ICSD 2017

III INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT

BOOK OF PROCEEDINGS

April 19 - 23, 2017 Sarajevo

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3rd INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT (ICSD)

ISBN 978-605-83575-9-4

BOOK OF PROCEEDING OF THE
3rd INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT (ICSD)
19-23 APRIL 2017, SARAJEVO

Edited by

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Published, 2017

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On behalf of the organizing committee, we are pleased to announce that the 3th International Conference on Sustainable Development (ICSD-2017) is held from April 19 to 23, 2016 in Sarajevo - BOSNIA-HERZEGOVINA. ICSD 2017 provides an ideal academic platform for researchers to present the latest research findings and describe emerging technologies, and directions in Sustainable Development issues. The conference seeks to contribute to presenting novel research results in all aspects of Sustainable Development. The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Sustainable Development. It also provides the premier interdisciplinary forum for scientists, engineers, and practitioners to present their latest research results, ideas, developments, and applications in all areas of Engineering and Natural Sciences. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. ICSD 2017 is the oncoming event of the successful conference series focusing on Sustainable Development. The scientific program focuses on current advances in the research, production and use of Engineering and Natural Sciences with particular focus on their role in maintaining academic level in Engineering and Applied Sciences and elevating the science level. The conference's goals are to provide a scientific forum for all international prestige scholars around the world and enable the interactive exchange of state-of-the-art knowledge. The conference will focus on evidence-based benefits proven in clinical trials and scientific experiments.

Best regards,

Prof. Dr.Özer ÇINAR

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19 - 23 April 2017, Sarajevo

Seismic Retrofitting Conventional Methods for Historical Constructions

Muslum Murat Maras[1]

Abstract

Old masonry constructions are an important percentage of the residential in many countries. The constructions are highly vulnerable external effects to formed losses even in moderate earthquakes. The losses are gave rise to by natural calamity have been increased dramatically in masonry historical structures. Therefore, the safety evaluation of seismic damages for the structures has gained significant attention in recent years. The paper aims to investigate into seismic retrofitting conventional methods of masonry structures, advantages and drawbacks. Fundamental concept and the general procedures of seismic strengthening and rehabilitation methods were evaluate in this study. Consequently, the main aim of the seismic retrofitting is to advance the resistance of a damaged construction while repairing thus it becomes reliable under coming earthquake occurrences.

Keywords: Structures, seismic, strengthening, rehabilitation.

1. INTRODUCTION

Old stone masonry dwellings belonging to historic centers overall the world have been frequently neglected for decades without any maintenance. Their typical structure is therefore exposed to the danger of collapse under the earthquakes which occur over the territory [1]. The masonry structures are very brittle elements with low resistance to the earthquake action [2]. A wide variety of intervention techniques can be considered for strengthening and repair of this structures that have undergone damages due to many external effects [3]. Nevertheless, it is not possible to conceive retrofitting of masonry structures without understanding the ways they are affected by the earthquake action [4]. In the last decades numerous studies have been conducted concerning ways investigation into strengthening and rehabilitation methods for masonry structures [5]. Numerous conventional techniques are available for retrofitting of historical masonry structures. This paper aims to investigate into repair and strengthening methods of masonry structures, advantages and disadvantages. In addition, the paper presented most suitable seismic retrofitting methods for unreinforced masonry structures considering efficiency and economic problems.

2. RETROFITTING METHODS FOR UNREINFORCED MASONRY STRUCTURES

2.1. Shotcrete

Shotcrete method called has been used repair for old construction for many years [2]. Application of the shotcrete to surface of a masonry wall is a common method for strengthening both in-plane and out-of-plane strength of the walls [6]. The strengthening using shotcrete significantly increases both shear and flexural capacities ultimate load of the retrofitted walls. The method improves in-plane inelastic deformation capacity and dissipates high-energy due to successive elongation. However, shotcrete is expensive because considerable materials and labour are involved with placement [4]–[9]. Figure 1 shows that the use of the shotcrete method seismic strengthening applications [33].

2.2. Fiber Reinforced Polymer (FRP)

Fiber Reinforced Polymer (FRP) composites are common in rehabilitation and strengthening of masonry structures [10]. The method has been a many advantages that used to enhance the strength and ductility for seismic strengthening of the historical structures [16], [18]. [21], [26]. In addition, using FRP in seismic retrofitting applications has advantages like rapid application, durability, low cost of installation, no loss of valuable space and additional weight and therefore can remain the same dynamic properties of the structures [2]. Nonetheless, research has identified that the inelastic deformation capacity of the wall may be limited as a result of de-bonding of FRP sheets, which occurs suddenly with little ductility. In general, due to high cost and no complete knowledge of their mechanical behaviour[6].

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Figure 1. FRP retrofitting method

2.3. Stitching and Grout/Epoxy Injection

Grout injection is a popular strengthening method for historical buildings [21]-[25]. The main purpose of the injections technique is to restore the original integrity of the retrofitted wall and to fill the voids and cracks [26]. The techniques have been used to repair cracked/damaged masonry in Figure 3 [13]. It should be noted that the selection of grout materials is important because corrosion protection and compatibility with the existing materials have to be ensured. The materials have excellent penetration and bond characteristics, and are commonly used for concrete retrofits [6]. The advantages of epoxy injection method have no changes in aesthetic and architectural features [2], [7], [12], [25]. However, the disadvantages of grout injection repair technique have high segregation and shrinkage.

Figure 2. Grouting injections

2.4. Re-Pointing

Re-pointing is a traditional retrofitting technique commonly used in the old masonry structures [13]. This technique offers some advantages as reduced surface preparation and preservation of aesthetics [3]. It might be provided as low cost and application of implementation. On the other hand, the method is not sustainable and the success of the lies with the compatibility of the new mortar [11]. It demonstrated to sharply improve the shear and bending moment capacities of masonry improving decrease of deformation [4], [6]. The technique can integrate other repair technique as grout injection; in this case it may be applied so as to better confine the injected material [13].

Figure 3. Re-pointing strengthening method

2.5. Post-Tensioning

Post-tensioning method has been improved by recent research and is increasingly being used for new construction besides the retrofitting of historical building [2]. The method is considered one of the potentially efficient strength options for masonry structures, providing strengthening to the overall structure with minimal intrusion [28]. The basic concept of the post tensioning method is to improve the strength and ductility [3], [4], [7], [26]. Also, it does not change the appearance of the historical masonry structures [14], [17], [29]-[31]. However, the method has been costly and shrinkage of masonry. In

addition, the biggest disadvantages of the method are external straps and the elements being external are exposed to corrosion [20].

Figure 4. Post tensioning method

2.6. Center Core

Center Core method is improved method for strengthening of masonry buildings [12]. The technique is successfully used to enhance the resistance of URM wall under cyclic actions, and lateral maximum lateral displacement. The method is also related to the possibility to preserve the architectural aspect of the structure [19]. However, the main disadvantage is given by the fact that highly qualified personel, high tech equipment and strict quality control are needed. Moreover, the method tends to create zones with widely varying stiffness and strength properties [7], [10], [12].

3. COMPARATIVE OF RETROFITTING METHODS FOR HISTORICAL MASONRY BUILDINGS

Seismic retrofitting is important for old masonry buildings. There are some techniques in practice and under investigate that are also suitable for implementation. Each the strengthening method has its own advantages and drawbacks, when a technique is appropriate for one building. The selected method must be consistent with aesthetics, strength, ductility and the cost requirements. According to literature survey, Table 1 summarizes advantages and disadvantages of each retrofitting method for historical masonry structures.

Table 1. Advantages and Drawbacks of Each Strengthening Method for Old Masonry Structures

Method	Advantages	Drawbacks
Shotcrete	- high deformation - improving stability -increases ultimate load	- expensive - labour placement - architectural effects
FRP	- improve shear resistance - easy application -increase ductility	- high cost -high electric conductivity
Stitching and grout injection	- easy application - not changing the architectural aspect - minimum cost	-high segredation - high shrinkage - irreversible action
Re-pointing	- minimal cost - low deformation - prevention penetration	- lead corrosion
Post tensioning	- increase ductility - easy to apply - reducing cracking	-somewhat costly -shrinkage and creep - corrosion - anchorage problem
Center core	- safe resistance - not alter the ppearance	- high cost - high technology requires

4. CONCLUSION

The seismic retrofitting and rehabilitation techniques for historical structures have been reviewed and discussed in the paper. In order to retrofit existing buildings, it is important to understand the seismic performance of the building. The main aim of the seismic strengthening is to advance the seismic resistance of a damaged construction while repairing so as to becomes safer under future earthquake occurrences. Each retrofitting technique has its own advantages and disadvantages, when a technique is convenient for one building. The selected method should be consistent with aesthetics, strength, ductility, stiffness and the cost requirements. In this study, epoxy injection method, increase in strength the confinement improved the deformations and energy dissipation. Re-pointing developed the shear and bending moment and minimal cost of masonry structures. In addition, the technique reduced surface preparation and preservation of aesthetics. However, Center Core method highly qualified personal and strict quality control are needed. As a result, the methods of strengthening among should be recommended grout injection methods and Re-pointing for old masonry structures due to its low cost besides a no requirement for high working capacity.

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Determination of Pre-Service Science Teachers' Perceptions of Planetariums via Metaphors

***Aykut Emre Bozdogan*[1]**

Abstract

The purpose of this study is to identify pre-service science teachers' perceptions of planetarium concept via metaphors. Phenomenology, one of qualitative research techniques, was used in the study. The population of the study consists of total 255 fourth-grade pre-service science teachers in four different education faculties. The data of the study was collected with a form prepared according to a fill-in the blanks method and consisting of a one question. The pre-service teachers were asked to develop a metaphor about the concept of planetarium and asked to write a sentence completing the statement "A planetarium is like /similar to ..... because .... ". Content analysis was used for the analysis of data. The results of the study revealed that pre-service teachers generated 68 different metaphors and used the following metaphors in the top-five list: space (f=36), sky (f=23), planet (f=22), universe (f=12) and observatory (f=10). 18 pre-service teachers could not generate any metaphors related to planetarium. These metaphors were classified under five different categories. When these categories were examined, it was found that 63 pre-service teachers generated metaphors about a research centre where the space is examined, 63 of them about learning environment where the space is told, and 62 of them created metaphors related to open public places where the space is viewed. In addition, it was determined that 28 pre-service teachers generated metaphors about the physical features of planetariums. The metaphors not included in this list were grouped under the others category.

Keywords: Metaphor, Perception, Planetarium, Pre-service Teacher.

1. INTRODUCTION

There has been a need of using out-of-school settings actively at the point of bringing scientific information to the individuals in society as a result of rapid developments in science and technology. Planetariums are one of these out-of-school settings which facilitate learners to establish direct relationship with the real objects and enable them to gain permanent knowledge by adopting positive attitudes, values and new perspectives [1,2,3,4,5]. A virtual reality is created with the simulations projected on to a dome in planetariums and thus giving the visitors the feeling that they are travelling in space [6,7]. Planetariums are places which improve visitors' knowledge about space and make contributions to them to explore and understand the secrets of the universe [8,9,10] and they present features for their visitors to observe the motions of celestial bodies in a few minutes which last days or years [11]. It is important that the number of planetariums which are very few in Turkey should be increased and a bridge should be established between planetariums and Science course while especially teaching astronomy subjects/concepts. Thus, they will make important contributions to raise new generations who are scientifically literate, like, understand and use/do science. Within this context, it is stated that because planetariums are a new concept in Turkey, the number of studies carried out about planetariums is very rare and that teachers and pre-service teachers particularly do not have much information about the planetariums' content and functions [1]. When considered from this aspect, any incorrect perceptions of pre-service teachers about planetariums will have negative effects on them about designing and organizing trips to these places. The research study aimed at revealing pre-service teachers' perceptions about new planetariums in Turkey. The study sought to answer the following research questions.

1. What are the pre-service science teachers' metaphorical perceptions about the planetarium concept?
2. What are the pre-service science teachers' metaphorical categories about the planetarium concept?

2. METHOD

Phenomenology was used in the research study. This research design focuses on in-depth meaning and investigation of a particular aspect of a phenomenon. In addition, this design presents examples, explanations, and experiences which will yield results and help to recognize and understand a phenomenon [12]. Within this context, this design was chosen so that pre-service teachers' perceptions related to planetariums could be understood much better.The population of the study consisted of total 255 final year pre-service science teachers studying in four different education faculties. Out of 255 pre-service teachers, 125 of them are males and 130 of them are females. The question "…… is like / is similar to because ……." [13,14] is used to revealmetaphors because this question is frequentlyused as a tool to gather data via metaphors in literature. Within this context, the participants in the study were asked to answer the question "A Planetarium …… is like / is similar to…….because ……..".Content analysis was used for the data analysis. Both metaphors and categories for metaphors were determined by examining the metaphors used for planetariums by the pre-service science teachers as well as the sources/

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reasons for theses metaphors. Themes were generated while classifying the metaphors and their frequencies were presented in tables.

3. RESULTS

Pre-service science teachers' metaphorical concepts and metaphor categories about planetariums were presented in Table 1 and Table 2.

Table 1. Metaphors generated by the pre-service science teachers about the concept of "planetarium"

Metaphor	f	Metaphor	f	Metaphor	f
Space	36	Model	2	Galaxy	1
Sky	23	10D film	2	Freedom	1
Planet	22	Space travel	2	Farabi	1
Universe	12	House	2	Moon	1
Observatory	10	Opening a window on the universe	2	Animation	1
Earth	10	Planet house	2	Sea	1
Star	9	Beyond space	1	Church	1
Telescope	8	Mustafa Topaloglu	1	Miniature	1
Space shuttle	7	Knowledge school	1	Extraterrestrial	1
Mosque	7	Tent	1	Roof of the house	1
Astronomy	5	Big Bang theory	1	Laboratory	1
Dream	5	Celestial bodies	1	Space centre	1
Curiosity	4	Artificial space	1	Jupiter	1
Dome	4	Space land	1	Orbit	1
Amazing feeling	4	Summit of Mt. Agri	1	Abstraction	1
Eternity	3	Dream	1	Sea star	1
Observation	3	Summit of Mt. Everest	1	Binoculars	1
Bath	3	Space house	1	Material	1
Cinema	3	Eye of the space	1	TUBITAK	1
Science	3	Scientist	1	Summit	1
Pluto	2	Simulation	1	Space camp	1
Sun	2	NASA	1	Don't know	18
Mars	2	Puzzle	1		

When Table 1 was examined, it was found that pre-service teachers generated 68 different metaphors and space (f=36), sky (f=23), planet (f=22), universe (f=12) and observatory (f=10) stand out as top 5 metaphors. 18 pre-service teachers could not generate any metaphors about the concept of planetarium.

Table 2. Metaphor categories generated by the pre-service science teachers about the concept of "planetarium"

Metaphor Categories	f	%
1. A research centre where the space is explored	63	24.70
2. Places where education is carried out	63	24.70
3. Public places where the space is watched	62	24.30
4. Physical features (mosque, bath, having a dome and etc)	28	11.00
5. Others (a celebrity, places where different emotions are experienced)	21	08.20
6. No answer	18	07.10
TOPLAM	255	100.00

When Table 2 was examined, the metaphors generated by the pre-service teachers about the concept of "planetariums" were grouped into five conceptual categories with regard to their common properties. Each metaphor was classified within the context of ideas which constitute the reasons for the metaphors in the direction of pre-teachers' explanations. When pre-service teachers' metaphor categories were examined, 63 (%24.7) of them developed metaphors related to research centres where the space is explored and the place where education is carried out, 62 (%24.3) of them generated metaphors about places open to public and 28 (%11.0) of them considered physical features of the planetariums. Different examples were given below about the metaphors and metaphor categories pre-service teachers generated.

A planetarium is like the space because it gives an opportunity to watch space (F_{28})
A planetarium is like the space because there are miniature planets there (M_{36})
A planetarium is like the space because visual and theoretical information is presented (F_{55})
A planetarium is similar to the space because it enables us to have information about the diversity in space and size of the universe (F_{82})
A planetarium is like the space because it provides opportunity for students to see the objects existing in the space concretely (M_{103})
A planetarium is like the space because it is a place where the planets in space are explored (M_{109})
A planetarium is like the sky because presentations about the sky are made here (F_{18})
A planetarium is like the sky because it enables us to explore and look at the sky (M_{24})
A planetarium is like the sky because the planets and stars are explored (F_{86})
A planetarium is like the sky because the sky is introduced (M_{116})
A planetarium is like the sky because the movements in the sky are explained with simulations (M_{120})
A planetarium is like a planet because the planets are examined (M_{47})
A planetarium is like a planet because it is a place where there are materials about the planets (F_{50})
A planetarium is like a planet because the existence of the planets is investigated (F_{122})
A planetarium is like a planet because it gives information about the planets (F_{46})

4. DISCUSSIONS AND CONCLUSIONS

Although education carried out in out-of-school settings is more difficult, more complicated, and more expensive than in-class teaching [15], it is stated that it has very important functions for learners to acquire cognitive, affective, and psychomotor skills [16,17]. However, teachers play an important role for the effective and efficient use of these setting which emerge as attractive learning environments. There are many reasons why teachers cannot benefit from these settings effectively. One of the reasons is the perceptions of teachers [18,19]. The results of the study revealed that pre-service teachers generated 68 different metaphors about the concept of planetariums. Space, sky, planet, universe, and observatory are the main metaphors. These results are similar to the results in literature [1]. In addition, considering the results of the study, it was determined that the metaphors generated by the pre-service science teachers about the planetariums were classified into five conceptual categories. Within this context, nearly one fourth of the teachers stated that a planetarium is a place where space is explored. This finding demonstrates that pre-service teachers have misconceptions about planetariums. It is stated in literature that pre-service teachers have the same incorrect perceptions [1]. It was found that nearly one-fourth of the pre-service teachers developed metaphors about planetariums such as a place where teaching and learning activities are performed and a public place where the space is watched. Moreover, it was revealed that 11% of the pre-service teachers generated metaphors about the physical features of planetariums. Within this context, pre-service teachers compared a planetarium mostly to a mosque and a bath due to its dome. These results are compatible with the results in literature [1]. Form this point; it turns out that these settings must be introduced so that pre-service teacher can change their perceptions towards planetariums to teaching environments where space is described. Thus, their desire to organize trips to such places in the future can be fostered positively because pre-service teachers' negative or incorrect perceptions/views about these settings can have a negative effect on them to organize trips in the future and also these negative or wrong perceptions can prevent them from benefiting these settings for the best. In addition to this, this study discussed planetariums, one of the out-of-school-settings. However, it is so important that studies must be carried out about many places which can be used in teaching of science like science centres, zoos, botanical gardens, aquariums, national parks, and natural monuments. In addition, studies can be conducted with different pre-service teachers and teacher groups to increase the reliability and validity of the results of this study and thus obtaining data in a much broader perspective.

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The Situation Of Synthetic Cannabinoids In Turkey

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Abstract

Synthetic cannabinoid; Tetrahydracannabinol obtained from Cannabis sativa is obtained by spraying onto plants (Salvia spp, Veronica spp, Turnera diffusa, etc.) with solvents such as ether, acetone and chloroform. Tetrahydracannabinol has chemical psychoactive properties (Perception disorders, hallucinations, pleasure, psychosis, etc.). Synthetic cannabinoids started to be seen in Turkey for the first time in 2010. In the beginning of 2011 were covered in illegal substances. Until 2014, approximately 130 different synthetic cannabinoid were recorded. Although named differently in Europe and the United States, it is known that Spice, K2, Genie while in Turkey, Bonzai, Jamaica Gold Jamaican and are the most widely known.Synthetic cannabinoids take an important place in the rapidly growing drug market. Current abuse of synthetic cannabinoids continues to grow rapidly in Turkey and in the world. In Turkey, sales of synthetic cannabinoids in 26 cities were detected in 2011, which is 43 cities in 2012 and 70 cities in 2013. Today, however, it is unfortunately seen in 81 provinces of Turkey. Drug use among our children and young people is becoming increasingly widespread. In Turkey and around the world, awareness needs to be raised to prevent drug use for community health.

Keywords: Synthetic Cannabinoid, Community Health, Turkey

1. INTRODUCTION

From the beginning of the 20th century, the Cannabis sativa-named plant was predominantly used on the industrial field, but later it started to trade as a remedy for the globalizing world. At the same time, Tetrahidracannabinol (THC) from *Cannabis sativa* was synthesized by Raphael MECHEULAM with the advance of chemistry. John William HOFFMAN synthesized the named compounds of JWH compounds (JWH-018, JWH-073, JWH-200 etc.) from THC, while this synthesized compound was edited for therapeutic use for a long time. It is too late that this substance has toxic effects according to THC as well as addictive effects. These compounds obtained from THC have attracted the attention of those who trade in illegal substances over time. These compounds were fed on various plants with some solvents to obtain very differently designed drug addictive agents. These substances have escaped punishment for such substances as laws (incense etc.) have been expelled to the market. This situation was noticed very late. The laws and regulations of each country have had to be updated and the dependency of these substances has increased in the countries that are late to this update.Synthetic cannabinoid; Tetrahydracannabinol (THC) obtained from *Cannabis sativa* is obtained by spraying the plants with *Salvia spp* (sage), *Veronica spp* (turmeric), Turner diffusa (damiana tea) etc. with solvents such as ether, acetone and chloroform. Because of the volatile nature of the active substance, it is necessary to keep it in a closed bag. Plant selection is a feature that can be taken as a way of acting as a crime organization. The use of Damiana tea while the use of island tea in the construction of synthetic cannabinoids demonstrates the amateurism of the manufacturer of the substance, shows the professionalism of criminal organizations.

1.1.History of Synthetic Cannabinoids

Cannabis sativa and *Cannabis indica*; It is a plant known in Central Asia and China since 4000 BC. The therapeutic effects of cannabis have been known for a long time. It was first reported in the history that the Chinese Emperor Shen-Nung (2737 BC) mentioned that cannabini was effective against malaria and rheumatism [1]. The plant has different nomenclature in different societies. The most commonly used names are; Marijuana, grass, tea, pot, weed, and Mary Jane. Other names describing the various stiffnesses of marijuana grown as a natural plant; Hemp, chasra, bhang, ganja, dagga and sinsemilla. In our country, cannabis or females are called junk hemp. Plant; Can be grown almost anywhere in the world. The ability of the plant to grow in all climatic conditions makes it the most consumed matter. Δ9-tetrahydrocannabinol (Δ9-THC) found in the content and predominantly leaves of *C. sativa* and *C. indica* plays the most important role in dependence.In 1941, under the leadership of the American organic chemist Roger Adams (1889-1971), a group of researchers developed molecules similar to phytocannabinoids.By the 1960s, Raphael Macheulam (1930-) from Hebrew University of Israel synthesized tetrahydrocannabinol (THC) from Cannabis sativa.At the beginning of the 1990s, John William Huffman (1932-) and colleagues synthesized naphthoindoles, naphthoylpyrrolidines and compounds with cannabinoid receptor activity known as "JWH compounds". Over time, these materials have become the main component of new substances containing synthetic cannabinoids [2].Synthetic cannabinoids; *Cannabis sativa* plant, free electrons Δ9-tetrahidrokannabinol (THC) called substance different substances (jwh-018, etc.) is obtained as a result chemically synthesized [3].Performed many different

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classifications, although the front office on Drugs and Crime United Nations Office on Drugs and Crime United Nations UNODC) and the British Advisory Council on the misuse of Drugs (ACMD) classification.

1.2.Chemical Effects Of Synthetic Cannabinoids

THC; Chemical psychoactive (disorders of perception, hallucination, pleasure, psychosis etc.). Synthetic cannabinoids started to be seen in our country for the first time in 2010. It was taken into the scope of illegal materials in early 2011. By 2014, about 130 different synthetic cannabinoids have been recorded [4]. Most of these materials are estimated to be of Chinese descent [5]. Spice, K2, Genie in Europe and USA, and Bonzai, Jamaica and Jamaican Gold in Turkey are known to be different according to the countries. Other brand Synthetic Cannabioids; Spice silver, Spice diamond, Spice Arctic Synergy, Spice Tropiccl Synergy, Spice Egypt, Yucatan Fire, Smoke, Sence, ChillX, Highdi's Almdrohner, Earth Impact, Gorillaz, Skunk, Genie, Galaxy Gold, Space Truckin, Solar Flare, Moon Rocks, Blue Lotus, Aroma, Scope, Albino Rhino Buds, Aroma, Aromatic Incense, Barely Legal, Bliss, Bombay Blue, Bonzai Black Diamond, Bonzai Aromatic Potpourri, Bonzai Cuba, Bonzai Plant Growth Regulator, Caneff 5 Star, Chilin XXX, Fake Weed, Fusion, Galaxy, Genie, Gorilla, Heaven, Herb Dream, Fake marijuanna, Fake mage, Experience: Ignite, Experience: Experience: Chill, Experience: Dream, Everlast, Magic, Mojo, Moon Rocks, Pep Spice, Red Magic, Sence, Skunk, Smoke, Smoke, Herbal incense, Ice Bud Extra Cold, Ivory Wave, Jamaican Gold, Jamaican Spirit, K2, K3, XXX, Solar Flare, Space, Truckin ', Spice, Spice Arctic Synergy, Spice Tropical Synergy, Spice Diamond, Spice Gold, Spice Gold Spirit, Spice Silver, Spicey XXX, SpiceWorld420, Spice99 Ultra, Spike99, Smoke, Splice Platinum, Star Fire, Syn, Tribal Warrior Ultimate, Yucatan Fire, Zohai, Zohai SX. Are sold under many different names and packaging names.In a study conducted in Germany in 2008, Spice was searched by a pilot research on synthetic named cannabinoids. In the study, it was found that 6% of the people aged 15-18 years used synthetic cannabinoid named Spice [6]. When blood samples taken from patients in psychiatric wards are analyzed by mass spectrophotometry, more than 50% of the blood is found in synthetic cannabinoids [7].A qualitative study in California shows that cannabis users are avoided from being controlled for synthetic cannabinoids [8]. In a study completed in Canada in 2013 (Ontario Student Drug Use and Health Survey (OSDUHS)), the prevalence of synthetic cannabinoid use was measured as 1.8% in the 7-12 age group [9]. In a study conducted in our country (n = 158) (10), 70.3% (n = 111) of the patients stated that they were using "Bonzai" and 8.2% (n = 13) were "Jamaica" 21.5% (n = 27) of them were using both. 91.8% of the patients used SK in the last 4 days and 8.2% in the last 4 days and 2 weeks. 69.6% (n = 111) of participants were using SK through cigarette with 56.3% (n = 89) using bucket-chisal method and 3,2% (n = 5) using foil. Eighty-seven (55.1%) reported using SK alone, 35 (22.2%) using a group, and 34 (21.5%) using both. The average daily use was 2.7 ± 2.2 (0.5-18.0) grams. The mean duration of use of SK was 22.0 ± 11.9 (2-60) while the mean duration of regular use was 17.2 ± 12.0 (2-48) months. The final dose was reported as 13.0 ± 10.9 (1-48) on average. One hundred thirty-five people (86.0%) stated that they used cannabis before the use of SK, 19 (12.1%) said that the first person to use was SK and 8 (5.1%) had used another substance before. In 92.3% (n = 143) of the patients, the reason for the use of SK was the relief felt by SK. Eighteen people (70.1%) had previously attempted to quit unsuccessfully.

2. RESULT

In the synthetic cannabinoid studies carried out in our country, the rapid increase in psychoactive substances of new herbal origin has been found. Synthetic cannabinoids have an important place in the rapidly growing drug market. Synthetic cannabinoids were initially of interest in Europe, but nowadays abuse of these substances is rapidly increasing in Turkey and in the world and continues to increase. Since 2010, synthetic cannabinoid seizures have increased in Turkey; In the case of catches, in 2012, 9-fold increase compared to the previous year, and the security forces, the number of provincial sales increased from 21 to 47 reports have passed. In 2012, 4,784 Forensic Medicine Bulletin 201 suspects were arrested in 3,401 synthetic cannabinoid cases in Turkey. In 2012, the number of incidents increased by about 19 times compared to the previous year, while the number of suspects increased by about 57 times [4]. The influence of the spread of drug and synthetic cannabinoid use can not be denied in the rapid increase of crime incidents in recent years. It is known that drugs are also pioneers in the processing of other crimes. At the same time, it should not be forgotten that the production and marketing of drugs is also an important financial resource in terms of illegal terrorist organizations.Considering all this information, primarily the future of our children and youth, children and society to the spread of drug use among our youth causes and what should be done for our health and to awaken the consciousness in the society regarding the determination of this determination and take the necessary measures in order to the Grand National Assembly of Turkey, including all safety and security teams conduct research in a very serious manner, taking every precaution and are required to take all necessary measures to avoid them.

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ICSD
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19 - 23 April 2017, Sarajevo

Oxidative Stress And Antioxidants

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Abstract

In recent years important studies have been carried out on the consumption of antioxidants in order to increase the quality and duration of life. It is now known that free radicals cause great damage to nucleic acids, lipids, carbohydrates, enzymes, proteins and other cellular elements. Cell injury, cell death, cancer, heart, etc. it has quite a complex structure which can cause chronic diseases of the metabolism and free radicals cause damaging oxidative stress to the organism properties. This body, which is formed by free radicals, constitutes some defense mechanisms with food supplements or with metabolic events. Thanks to this defensive mechanism, the harmful effects of radicals are minimized. Antioxidants is vital in combating oxidative stress. Antioxidants inhibit the formation of free radicals or neutralize free radicals formed. While free radicals put our lives at risk, antioxidants emerge as life sources. The disruption of the balance between the production of free radicals and the defense mechanism of antioxidants causes the deterioration of the structural integrity of cells and tissues and the functional dysfunction. Balanced nutrition and adequate intake of antioxidants are sufficient to get rid of the adverse effects of free radicals. Therefore, oxidant-induced diseases to minimize the risk as a defense mechanism important for long life and better quality antioxidants is recommended.,

Keywords: Oxidative stress, Antioxidant, Free radical, Diseases.

1. INTRODUCTION

1.1.Free Radicals

Elements or compounds with unpaired electrons in their external orbit are called free radicals [1]. If the free radicals are produced by environmental and physical effects, there is a serious and various free radical production in the cell [2]. Although the radicals vary functionally, they have less stable structure than non-radical species. The simplest free radical is a hydrogen atom that contains a proton and an electron. Almost every radical species can affect another radical or molecule by a different mechanism. Free radicals are encountered more frequently in cigarettes, biologics, toxicology and food industry [3]. Free radicals may occur during normal cellular metabolism or through various external factors [4]. Radicals; lipids, proteins, nucleic acids and carbohydrates, such as essential has the ability to cause damage to cellular components [5]. Free radicals; alcohol, radiation, aging, viruses, ultraviolet rays, cigarette smoke, infections, stress, toxic products of fat metabolism, some destructive chemical substances, remedies and pest control for reasons like these many more damage to our metabolisms. Free radicals formed by the immune system in order to neutralize the harmful substances in the body or in the body are in a state of equilibrium. If the production of free radicals is excessive and the protective effect of antioxidants is insufficient, oxidative damage occurs in the body.

1.2.Free Radical Types

Hydrogen Peroxide (H_2O_2);It has no radical properties and is not a reactive species because it does not contain unshared electrons in its structure.

$$2O_2^{\cdot-} + 2\,H^{+} \rightarrow O_2 + H_2O_2$$

Hydroxyl Radical (HO•); Although the hydroxyl radical is highly reactive, it is short-lived. The hydroxyl radical is the strongest reactive oxygen species [3].

$$HO^{-} - H \rightarrow H\bullet + OH$$

Superoxide Radical; The main advantage is the hydrogen peroxide source and reducing the transition metals. When the peroxide radical enters the reaction with the superoxide radical, one is oxidized and the other is reduced [6].

$$2O_2\bullet - + 2H^{+} + SOD \rightarrow H_2O_2 + O_2$$

Hypochloric Acid (HOCl); Hypochloric acid is not a free radical, but a potential oxidizing agent.Ozone (O_3); It is a strong oxidizing agent and a molecule containing three oxygen atoms [3].

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Singlet Oxygen ($^1O_2$);This form of oxygen is very effective. It is a non-radical reactive oxygen species because it contains unpaired electrons [6].
Transition Metals; When an electron is taken or given, free metal ions accelerate radical reactions, catalyze the decomposition of existing lipid hydroperoxides and the chain reaction of lipid peroxidation. This makes the less harmful radicals more harmful [7].

$$Fe^{+3} + e^- \longrightarrow Fe^{+2}$$

$$Cu^{+2} + e^- \longrightarrow Cu^{+}$$

1.3.Oxidative Stress

We have a very sensitive oxidant-antioxidant balance. Inadequate antioxidant defense mechanism, excessive antioxidant uptake, overproduction of reactive oxygen species, or, depending on them, oxidative stress resulting in the resistance of the antioxidant level to reactive oxygen. In situations where oxidants are elevated or antioxidants are inadequate, the oxidative stress that the organism is exposed to produces metabolism, destruction, and tissue damage that has lost its end-function [1]. For this reason, oxidative stress should be taken into account in the protection of tissues, the protection and recovery of vital health [8].Oxidative stress is thought to contribute to many chronic diseases with cell damage caused by free oxygen radicals [9]. Oxidative stress has been implicated in diseases such as atherogenesis, lung diseases, Parkinson's disease, pregnancy preeclampsia, cancer, alcoholic liver disease, diabetes mellitus, acute renal failure, Down syndrome, rheumatoid arthritis aging and cerebrovascular disorders [10].

1.4.Important Diseases Associated with Oxidative Stresses

- In your brain; Alzheimer's, stroke, autism, Parkinson's.
- In the heart; Cardiovascular diseases, Hypertension, ischemia.
- In the lungs; Asthma, cancer, ARDS.
- In Blood; Atherosclerosis, clotting disorder.
- Immune System; Inflammation, autoimmune disorders, lupus, multiple sclerosis.
- In the kidney; Ischemia-reperfusion, acute kidney disease, nephritis.
- In joints; Rheumatoid arthritis, bone diseases [11].

As the role of oxidative stress in the pathogenesis of diseases has been understood, studies on this area have begun to be emphasized and studies have been increased. Increased free radicals or deficiency of antioxidant defenses have been investigated in oxidative stress studies, and new methods have been developed for analyzing various materials such as plasma, serum, erythrocytes, tissue samples [10].

1.5.Antioxidants

The organism has a defensive mechanism against free radicals and harmful effects caused by it. The substances that make up this defensive mechanism are called antioxidants [12]. Antioxidants help stabilize the radicals by providing the appropriate electrons to free radicals and function as the most important advocates of the body to remove the oxidative damage that can be caused by free radicals [13]. Benefits of antioxidants vary according to gender, harvesting time, harvesting method, pox, even consumption patterns of communities [14]. The antioxidant defense system prevents radical formation before damage, repairs the oxidative damage, cleans the damaged molecules and prevents mutation. Immediate or severe heart, vein etc. that may occur in our body. It has been observed with multiple studies that it is protective and therapeutic against diseases [11]. Antioxidant substances, which are usually found in polyphenolic structure, are found in almost all plants, fruits, vegetables, microorganisms, fungi and animal tissues [3].

1.6. Mechanism of Effect Antioxidants

Sweeping Effect; Antioxidants act by holding free oxygen radicals or converting them into weak molecules. Extinguishing Effect; Reduces or prevents activation by adding hydrogen to free oxygen radicals. Vitamins and flavanoids are antioxidants with this property [12]. Chain Breaker Effect; It breaks chains of free oxygen radicals. Hemoglobin, ceruloplasmin and minerals act in this way. Restorative Effect; Repair of damage caused by free oxygen radicals. Enzymatic Effect; Antioxidant enzymes such as superoxide dismutase interact by increasing the synthesis of non-enzymatic antioxidants.Inhibition of Cellular Kinase Losses; They act by stopping the oxidation reactions [15].

1.7.Types of Antioxidants

It can be classified as endogenous and exogenous origin antioxidants.

1.8.Antioxidants of Endogenous Origin

Superoxide Dismutase (SOD); Defends the mechanism against radicals and acts directly. Superoxide chain is the initiator of radical reactions [10].

$$2O_2\bullet^- + 2H^+ + SOD \rightarrow H_2O_2 + O_2$$

Glutathione Peroxidase (GSH-Px); They are antioxidants found in the cytoplasm of cells and contain 4 selenium atoms. It is the most effective antioxidant enzyme against oxidative stress in erythrocytes, responsible for the reduction of hydroperoxides.

$$H_2O_2 + 2GSH + GPx \rightarrow GSSG + 2H_2O$$

Glutathione Reductase (GR); Reduction of hydroperoxides via NADPH allows the resulting oxidized glutathione (GSSH) to reduce re-reduced glutathione [16].

$$GSSG+NADPH+ H^+ \rightarrow 2GSH+NADP^+$$

Glutathion S Transferase (GST); Their functions are very high. External or intracellular reactions detoxify by converting the harmful substances resulting in water into water-soluble mercapturic acid species and have intracellular carrier and binding functions [17].

$$ROOH+2GSH \rightarrow GSSG+ROH+H_2O$$

Melatonin (N-acetyl-5-methoxy-tritylamine); It is known as the most effective antioxidant (10). Because of its lipophilic nature, it reaches almost the entire region of the cell, exhibiting a broad distribution and antioxidant effect by retaining different forms of radicals such as hydroxyl, hydrogen peroxide and superoxide [13] and stimulating some antioxidants including SOD, CAT, GPx and GR [16].Glutathione (GSH); It inhibits hemoglobin to oxidize to methemoglobin and neutralizes lipid peroxides and hydrogen peroxide by GPx effect. Erythrocytes, leucocytes, protect the eye lens against oxidative damage [13].A-Lipoic Acid (1,2-dithiolan-3-pentanoic acid); A-lipoic acid and its reduced form dihydrolipoic acid (DHLA) are potent antioxidants. Superoxide and peroxyl radical eliminator. It creates a strong bond between the other antioxidants and increases its use in the body [18].

1.9.Antioxidants of Exogenous Origin

B-carotene; the precursor of vitamin A and, if necessary, is converted to vitamin A.. B-carotene is a powerful antioxidant and it is the best one of the cleaners 02.Vitamin E (A-tocopherol); powerful fat-soluble antioxidant and a large capacity. Reduces superoxide and hydroxyl radicals. The chain peroxidation of membrane lipids by dissolving out is not very effective, although effective in breaks [16].Vitamin C (ascorbic acid); the hydroxyl, superoxide, hidroperoksit, resolves and reduces tocopherol radicals, such as ozone. Is plentiful in fresh fruits and vegetables [3].Folic Acid: A vitamin B soluble in water. DNA synthesis and production of red blood cells. C, E vitamin antioxidants play an inhibitory role against oxidative damage via homocysteine [16].

2. RESULT

In our body, free radical species produced during normal metabolic processing or through various external factors play an important role in the formation of many degenerative diseases, especially cancer and cardiovascular diseases, where oxidation events occur constantly in our metabolism.In order to prevent these diseases which are directly related to free radicals, oxidants should be stabilized with antioxidants. Balanced nutrition and adequate intake of antioxidants are sufficient to get rid of the adverse effects of free radicals. Therefore, antioxidants are recommended as an important defense mechanism for lowering the risk of oxidative diseases and for better quality and longer life. The variety of antioxidant foods is quite abundant and each one is protective and therapeutic.As a result, antioxidants with defensive system against free radicals prevent the damages caused by free radicals with antioxidants, which are taken from the outside during the metabolism process, and also treat the damages that occur.

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19 - 23 April 2017, Sarajevo

Effects Of The Use Of Synthetic Cannabinoids On Cardiovascular System

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Abstract

Cardiovascular diseases are one of the most common causes of death worldwide, with a mortality rate of up to 15% today. In Europe and the United States, studies and practices are underway to reduce deaths by cardiac causes. The incidence of cardiovascular diseases worldwide is due to changes due to geographical differences and due to an increase in known major causes such as age, obesity, high cholesterol and metabolic factors such as smoking. There are many factors in the etiology of cardiovascular diseases, in addition to substance addiction. Consumption of cannabis causes cocaine use, which has different negative effects on the cardiovascular system. The most important complications following the use of synthetic cannabinoids are tachycardia, tremor and palpitations. The effects of synthetic cannabinoids on the myocardium; It is known that cocaine and mariuhana increase myocardial oxygen demand while decreasing oxygen supply and increasing levels of carboxyhemoglobin. The consequence of the widespread use of synthetic cannabinoid is that we are thinking more awareness and prevention awareness to change the text used to reduce and promote cardiovascular problems that are increasing rapidly.

Keywords: Oxidative stress, Antioxidant, Free radical, Diseases.

1. INTRODUCTION

Cardiovascular diseases are one of the most common causes of death worldwide in 2011 with a mortality rate of 12.8%. Work is underway to reduce cardiac deaths in Europe and the United States. Cardiovascular system diseases vary depending on geographical differences; Metabolic factors such as age, obesity, high cholesterol, and an increasing number of known causes, such as cigarette smoking, increase the incidence of disease worldwide [1]. Controlling risk factors and other basic measures will also reduce the economic burden of hospitalization, reduction in diseases requiring expensive treatment and surgery, and reduction in workforce losses and deaths due to these diseases. The causes of cardiovascular diseases are nowadays added to substance dependence. Consumption of cannabis, cocaine intake and alcohol consumption, which cause myocardial infarction, can be considered as substance dependence which can cause mortality [2]. Cannabinoids are absorptive on the autonomic nervous system and exhibit a dazza-dependent biphasic effect. Increasing sympathetic activity at low and moderate doses reduces parasympathetic activity, leads to tachycardia and increases cardiac output. At higher doses, on the contrary, semapatical activity is inhibited while parasympathetic activity is increased, thus bradycardia and hypotension are seen. Synthetic cannabinoids (bonzai) exhibit similar properties to cannabis, and their binding capacities to receptors are 4-5 fold higher. The reported findings of cardiovascular system following synthetic cannabinoid use are tachycardia, tremor, palpitation, hypertension, arrhythmia and myocardial infarction, respectively [2,3]. In a study conducted, tachycardia (25%), bradycardia (16,6%), hypertension (16,6%), hypotension (8,3%) and tachycardia were observed in the evaluation of cardiovascular system of patients with synthetic cannabinoid (Bonzai) intoxication and intensive care unit Arrhythmia (16.6%) was seen. According to a study done in the literature, it has been reported that myocardial infarction develops 72 hours after using synthetic cannabinoid. When studies in the literature are examined, it is stated that myocardial infarction cases are frequently seen in young patients and these patients have previously had coronary artery disease. Although the effects of synthetic cannabinoids on myocardium are unclear, they are thought to increase cardiac oxygen demand, reduce oxygen delivery, and increase carboxyhemoglobin levels. What is noteworthy here is that although myocardial infarction is very young, myocardial infarction can be seen even 72 hours after ingestion. It is not clear which substance in the synthetic Cannabinoid content causes myocardial infarction. Vasospasm is thought to be due to plaque rupture, thrombus formation, or myocardial oxygen imbalance presentation. [4] Two possibilities have been proposed to explain this case; The first of these may contain synthetic Cannabinoids, which may contain other substances that cause coronary artery spasm, and the second may contain synthetic Cannabinoids that have not yet been identified in these substances and cause coronary vasospasm alone. [2] In a reported case report, a 33-year-old male patient admitted to the emergency department with a sudden onset in the retrosternal region, complained of chest pain accompanied by thalassemia spreading to the left arm, accompanied by thalassemia, 10 pts / day for 12 years, 12 hours prior to the onset of chest pain is said to use excessive amounts of bonzai. On the occasional T sharpness and ST segment elevation on electrocardiography

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(ECG) resultant precordial leads, the patient was taken to the catheter laboratory for primary percutaneous coronary intervention with an acute anterior myocardial infarction diagnosis. Coronary angiography revealed that the left anterior descending (LAD) artery was 100% obstructed in the septum 1 axis and the other coronary arteries were open (Fig. 1). Successful percutaneous balloon and stent implantation was performed in the same seansta patient's LAD artery. Postoperative transthoracic echocardiography and segmental wall motion defect were detected in the coronary intensive care unit, and the ejection fraction value was reported as 50%. It was stated that there was no known systemic disease, drug allergy, angina pectoris or dyspnea, fever before the chest pain, flu-like symptoms in the patient's question. He stated that the mother and father of the patient were alive and had no family history of diabetes, hypertension and sudden death. Patients with no additional complications in the patients were discharged with ASA, clopidogrel, metoprolol, ramipril, and atorvastatin treatment and necessary recommendations [6]

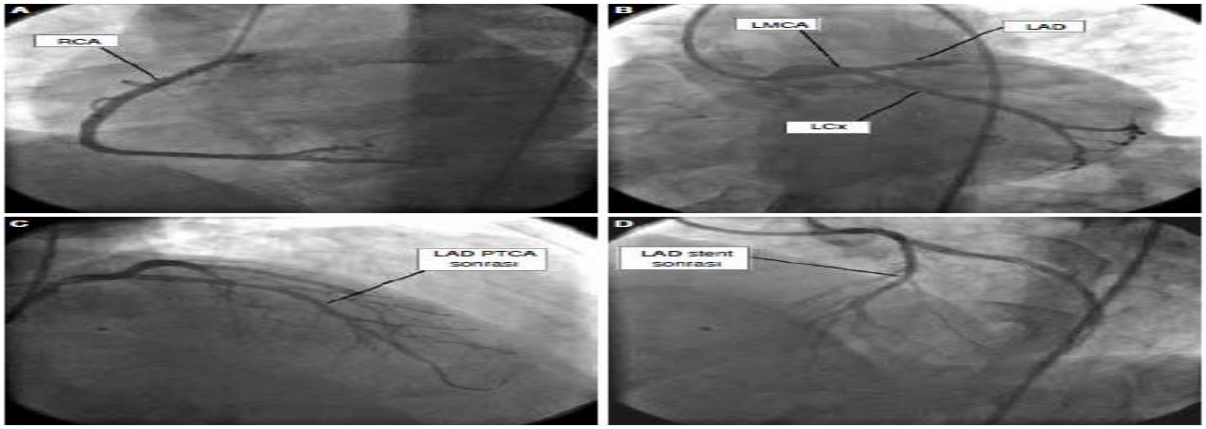

Figure 1. RCA in Coronary angiography (A), LMCA, LAD and LCx(B) images. PTCA in Coronary angiography (C) ve Stent(D) post LAD image (4)

2. RESULTS

The use of synthetic cannabinoids all over the world and our country is becoming increasingly widespread. Although the synthetic cannabinoids are considered as a new generation of addictive substances, the clinical effects they emerge are less known than the old known substances such as heroin and cocaine. The fact that it has not been encountered by clinicians yet can lead to various difficulties in the medical treatment that an addict who is influenced by this substance should be applied. For this reason, health professionals also add to the possibility of using the patient's synthetic cannabinoid into the medical approach to diseases such as myocardial infarction, especially seen at a young age. Before the patient makes a definite judgment about the clinical course, he or she should be sure to ask the patient or the relative about what triggered it. When the reported case reports are briefly reviewed, symptoms such as chest pain, dyspnea, agitation, bradycardia, unconsciousness, dizziness, dyspnea, heart attack, tachycardia and hallucination appear in the left arm in the emergency department after the use of synthetic cannabinoid [7-11]. Such indications may also be indicative of different diseases. The most effective way to prevent this situation is to take detailed anamnesis in such cases. As a result, health professionals should be cautious in this situation that is vital to clinics. This should be supported by in-service trainings. It should not be forgotten that such incomplete or incorrect diagnoses which may be put into the case may lead to some negativities which can not be reversed.

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May Students in Business administration and Economy Will Be Passionpreneurs in Labor Market?

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Abstract

The term of entrepreneurs Culture dominates scientific works of Scholars and the best practices of practitioners during the 20 past years. It has been exhaustively described (principles, methodology, models, culture, practices,) and of course its success was huge in companies and organizations.However,recently, to adapt the development of management sciences with the speed change in the environment (external and internal of the organizations), the specialists (Scholars/ Researchers) have invented the term of (Passion-preneur) which includes the characteristics of (courageous people, passion, spirit of success, challenge desires, business,*confidence and creativity to pursue multiple passions in life, despite being told the correct way is to focus on one area , ...)* to get to the success in the business and economy field. This (passionpreneur culture) is a new approach in the business or economy and it implements new components of culture and methodology to achieve effective results in modern enterprises.This paper presents the approach which exceeds (Entrepreneurial or organizational Culture) and it addresses students in business and economy in order to know if theywill be passion-preneurs in labor market?

Keywords:students in business and economy, passion-preneur culture, HR Management.

1- INTRODUCTION

The old model of building a business to benefit only you is dead. Those who have not adopted the new model will find themselves totally lost. This new model is someone who has plugged into his or her passion and turned it into a profitable business while positively contributing to other people's lives. They are Passionpreneurs come from all walks of life and represent a vast number of businesses and business models. To be a passionpreneur you must attach your passion to a cause or something that is close to your heart. With this concept, Passionpreneurship is not just doing what you love to do; it's also doing what you love to do while benefiting others. The Passionpreneur is a potent model. It's a powerful way of doing business.Passionpreneurs come from all over the world in different disciplines and they share strategies, marketing tools, and how they've generated a successful passionpreneurship. Passionpreneur can meet with any other individuals who have plugged into their passion and turned it into profits while communicating their message to the world and helping others.There are a few famous passionpreneurs, but there are a lot of passionpreneurs out there. Men and woman who have a huge movement that is growing exponentially.This paper presents the basic of passionpreneurship (definitions of concepts and terms of passionpreneurs, their characteristics, intellectual passions and passionpareneurs, passionpreneur models, techniques of creating passionpreneurs and managing the model, types of passionpreneurs personalities, Passionpreneur culture and some case studies and examples of famous passionpreneurs.Finally, this paper offers an interesting practical model for creating, implementing the passionpreneur culture, especially to students in business administration and economy.

2- LITERATURE REVIEW

There are not many scientific works that addresses the topic of passionpreneur except some books intended for the public and other articles combined between passion personality trait and the enterprise spirit among ambitious people. That is why; few scientists have contributed to enrich the subject methodologically and practically. Passion (from the Greek verb πασχω meaning to suffer) is a very strong feeling about a person or thing. It is an intense emotion, a compelling enthusiasm or desire for something. Passion may be a friendly or eager interest in or admiration for a proposal, cause, discovery, or activity or to a feeling of unusual excitement, a positive affinity or love, towards a subject. (Wikipedia, the free encyclopedia).In the English Dictionary passion means:
astrongaffectionorenthusiasmforanobject,concept,etc;apassionforpoetry.Astrongorextravagantfondness,enthusiasm,ordesireforanything. (English Dictionary). Shailaja Rao Thinks of the point you find the options to move forward when you desire something and you go to any length to achieve; it is called passion. same way an activity that you like to do, you do it without a sense of time or sense of your surroundings or the people around you and at the end of it you don't feel tired mentally, is your passion. (shailaja.rao (2015).
Passion in Psychology Dictionary is a noun. A severe, driving, or all-consuming sensation or conviction. It is frequently compared with feelings, wherein an individual is affected involuntarily with severe carnal desire, an intense liking or enthusiasm for or commitment to an activity, item, idea, or the like.(Psychology Dictionary.org).

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Denis Diderot describes passions as: penchants, inclinations, desires and aversions carried to a certain degree of intensity, combined with an indistinct sensation of pleasure or pain, occasioned or accompanied by some irregular movement of the blood and animal spirits, are what we call passions. He further breaks down pleasure and pain, which are the guiding principles of passion into four major categories: (Timothy L. Wilkerson; Arbor .Ann (2004/ 2009),Diderot, Denis).

1. Pleasures and pains of the senses
2. Pleasures of the mind or of the imagination
3. Our perfection or our imperfection of virtues or vices
4. Pleasures and pains in the happiness or misfortunes of others.

6. Passionate meaning in (collins dictionaries) is manifesting or exhibiting intense feeling or desire, capable of, revealing, or characterized by intense emotion, easily roused to anger, quick-tempered.(collins english dictionary, harper collins publishers).

A passionate person has very strong feelings about something or a strong belief in something, his passionate commitment to peace or believer in public art. He is very passionate about the project. (Advanced English Dictionary. Harper Collins Publishers)Generally,passionate person refers to someone who has intense feelings on some topic, whether it is devotion to an ideology or to some cultural passion, like impressionist painting or hip-hop. It is often one who tries to convince others that their preferred topic is worthy of everyone else's attention. (Gary Allen, (Jul 16, 2015) .Passionpreneurship is not just doing what you love to do; it's also doing what you love to do while benefiting others.pa-ssion-pre-neur is**:** A person who has the courage, confidence and creativity to pursue multiple passions in life, despite being told the correct way is to focus on one area.(Goodridge. Walt F.J.(2016).Passionpreneur **S**omeone who has plugged into his or her passion and turned it into a profitable business while positively contributing to other people's lives. He comes from all walks of life and represents a vast number of businesses and business models. Passionpreneur is a potent model; He's a powerful way of doing business. (Anderson.Eric (2014) .So, Passionpreneurs are men and women of every age, ethnic group, educational background, profession and religion. They are a diverse group of people from every corner of the globe who share a common trait and found something they enjoy doing and have decided to keep doing it. They include housewives, inventors and artists. In other words, they've created businesses to make money doing what they love. As a result, they set their own schedules and control their time, live according to a personal value system rather than someone else's.Everyone can turn his or her passion into profit because of a few special beliefs. Everyone is creative. Therefore, each one has the ability to create as well. People can learn to be successful. Every desire, motivation, talent, skill, reason and rhyme you need is already a part of you. (Goodridge. Walt F.J.(2016).

3- INTELLECTUAL PASSIONS AND PASSIONPRENEURS

Some Scholars insist that there are passions far more exciting than the physical ones. There are intellectual passion, passion for discovery and exploration: the mightiest of all passions. (Weintraub.Stanley.(1996).These are some of the intellectual passions :

3-1-The motivation in an occupation is one of the intellectual passion. When an individual is passionate about their occupation they tend to be less obsessive about their behavior while on their job, resulting in more work being done and more work satisfaction. Other reasons include the effects of intrinsic and external motivations. When an individual is doing the job to satisfy others, they tend to have lower levels of satisfaction and psychological health. (Burke, R. (J.; Fiksenbaum, Lisa (2009).

3-2- Work enjoyment is another intellectual passion that qualifies as reasons for considering an individual as a workaholic (a person who works compulsively).While the term generally implies that the person enjoys their work, it can also imply that they simply feel compelled to do it). There are two workaholism components that are used to measure workaholism. These include inner pressure and work enjoyment. Both of these affect an individual differently and each has different outcomes, Work enjoyment and inner pressure were tested with performance ratings. Inner pressure lowered the balance between work-life and life satisfaction and enhanced people's performance at their occupation, whereas work enjoyment led to a positive balance between the two. Again, when individuals are passionate about their occupation and put in many hours, they then become concerned that their occupation will satisfy personal relationships and the balance must then be found according to the importance levels of the individual. (Burke, R. J.; Fiksenbaum, Lisa (2009).

3-3- Desire is a passion in an occupationand it goes hand in hand, especially as a motivation. Linstead & Brewis say that passion is an intense, driving, or overmastering feeling or conviction, Passion is connected to the concept of desire.(Linstead, S.; Brewis, J. (2007).

3-4- Motivation / Work enjoyment and desire affect positively the outcomes. The researchers indicate different patterns of correlations between these components and performance. These patterns offer motivations or orientations to work which result in its effects on work and well-being. Inner pressures will hinder performance while work enjoyment will smooth performance. Inner pressures of workaholism have characteristics such as persistence, rigidity, perfectionism, and heightened levels of job stress. Individuals who enjoy their work will have higher levels of performance for several reasons. These include creativity; trust in their colleagues, and reducing levels of stress.(Burke, R. J.; Fiksenbaum, Lisa (2009).

3-**5**- - Innovation and passionpreneurship.Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service. It is capable of being presented as a discipline or learned, and practiced. Passionpreneurs need to search purposefully for the sources of innovation, and they need to know and to apply the principles of successful innovation.

3-**6**- Innovation and Entrepreneurial Orientation EO. The most widely used definition of EO is based on work), developed further, and augmented. This conceptualization has been used in over 200 studies focusing on entrepreneurship (George, B. A.,& Marino, L. (2011). The five components of EO in this stream of research are:

1. Risk-taking, it is a key characteristic associated with entrepreneurship. It referred to the risks individuals take by working for themselves rather than being employed.

2. Proactiveness, entrepreneur was thought of as someone who identifies opportunities in the marketplace and proactively pursues them (Lumpkin and Dess, 1996).
3. Innovativeness, it is defined more narrowly, emphasizing the importance of technological leadership to the company, as well as changes in its product lines.
4. Competitive aggressiveness, it refers to the company's way of engaging with its competitors, and to those that aggressively pursue their competitors' target markets.
5. Autonomy, it refers to the independent action of an individual or a team in bringing an idea or a vision and carrying it through to completion. The components have typically been measured by using questionnaire items, with (likert-type scales). (i.e. from 1-5 or 1-7), as shown in table.(brice .c.martin,jeffery.j.mcnally michaelj.kay., (2013) .

Table 1. Measuring the components of entrepreneurial orientation

EO Component	Typical Assessment Items
Risk-taking	Managers in my firm have a strong proclivity for high-risk projects. Managers believe owing to the nature of the environment.
Proactiveness	My firm typically initiates actions when it deals with its competitors, which competitors then respond to. My firm is very often the first business to introduce new products/services, administrative techniques, operating technologies, etc.
Innovativeness	The top managers in my firm favor a strong emphasis on R&D, technological leadership, and innovation. Very many new lines of products or services, Changes in product or service lines have usually been quite dramatic.
Competitive aggressiveness	When confronted with decision-making situations involving uncertainty, my firm typically adopts an aggressive posture in order to maximize the probability of exploiting potential opportunities.
Autonomy	My firm supports the efforts of individuals and/or teams that work autonomously.

3-7-passionpreneur Management Implication. Authors vary in how they combine the dimensions above into the overall EO construct. The most common variations are for researchers to use either the three components of (risk-taking, proactiveness, and innovativeness) (Miller WR. (1983).) or all five components. There are also studies that report on single components only. Some authors suggest that each of the dimensions is a reflection of a company's EO. This approach implies that the different components cover with each other. (Ferreira HC, et al. (2011);(Schillo . R. Sandra (2011).

4- PASSIONPRENEUR MODELS:

4-1- Passionpreneurs mentality and characteristics at work:

When Passionpreneur share special mindset ,they can do everything they put in their mind to, and they will find a way, and have fun pursuing each and every one their passions from this day forth (Connect, Promote, Grow, Inspire). Then, they can formulate (Mission, Philosophy, Formula& Promise) of their company / organization such as:
- Mission: offer the world a philosophy and formula for turning one's passion into profit. Encourage its use by parents, teachers, coaches, as well as within institutions of higher learning.
- Philosophy: Your passion is part of your life's purpose, happiness in life starts when you pursue it, everyone has a passion, all passions have value, any passion can be turned into profit, and you can make money doing what you love.
- Formula &Promise: formula is the Cycle of Success, Promiseis the Value, capitalizes on your history, incorporates your experiences, harnesses your talents, optimizes your strengths, complements your weaknesses, honors your life's purpose, and moves you towards the conquest of your own fears. (Goodridge. Walt F.J. (2016).
Then, Passionate People can do things differently regarding to their characteristics, Passionate people lead significantly different lives from their less-than-enthusiastic counterparts. Here are 10 things that passionate people do differently in order to their characteristics.(Hudson. Paul (2014).
1. Start their days early.It's just that once they're up, they get excited about the work ahead of them.
2. Always have their passions on their mind.Passionate people live in a world in which the few things that matter to them in life basically involve the passions they love.
3. Get excited more than the average person.Passionate individuals may feel excited. They get excited more fully, for a longer duration and, overall, more frequently.
4. Get pissed off and emotional more than the average person.Passionate also can come off as very moody. They go from happy and excited to piss off and miserable.
5. Willing to risk more and put more on the line.Passionate are willing to risk more for the thing(s) that you find most important that you are most passionate about.

6. Devote their lives to their dreams .Passionate knows what will make them happy and are willing to ignore the rest.
7. Surround themselves with their work. Passionate work is home because their work is in them and reflects in everything they have and do.
8. Can't help but talk about their projects.Passionatedon't see their passions as separate from themselves; they are their passions.
9. Tend to either be pushing ahead full throttle or are completely still.Passionate get overly excited and push themselves to their limits. They love working and love moving forward quickly.
10. Always think positively about the future.Passionate minds are always looking ahead, looking at what can be instead of what is.

4-2- Creating a passionpreneur model:

The whole concept of turning your passion into profit is one that developed the term "passionpreneur" to describe someone who has turned a motivation, innovation, hobby, talent or passion into a business. (passion-based entrepreneur). The Passion Profit model is a four-step process:

-Step 1. Discover your purpose (which you've already covered).Once you have a better idea of why you are here on the planet, your next step is discovering your passion (the thing you are good at and love to do) is perfectly designed to help you fulfill your purpose. The three types of people encounter in Passion Profit workshops are:

1) Individuals who don't know what their passion is, your passion may be hiding in your hobbies; it maybe in your desire to make a difference; it may be a childhood wish.
2) Those that have too many, whichever passion you decide to pursue are just the first step in a journey that may lead through different expressions of your passion.
3) Those that have a passion and don't know what to do with it.

-Step 2. Develop your passion.The fact that every passion has value means that everyone can be rewarded for the pursuit of something that has special meaning in his or her life. You must transform that talent into a product or service that represents value to the rest of the world.

-Step 3. Create a product. Create a tangible product, regardless of what your passion is, there are some passions that are better expressed as services. The trick here knows how to price your services so that you remain profitable.

-Step 4. Market it for profit. Sell your product or service. There are only two ways to make money in business: charge more, or spend less. (Goodridge. Walt F.J. (2016).

4-3- Nomadpreneur model:

Nomadpreneur is an individual whose income strategy allows him or her freedom to travel while generating income regardless of where he or she happens to be physically located. A nomadpreneur makes money and maintains mobility. Goodridge. Walt F.J**.** says:It's a lifestyle I've created for myself and which I coach others as part of my Achievable Freedom concept. Freedom has always been my own personal prime directive. Whatever decisions I make in life from what job to take, to what relationships to engage in are usually made by considering how much each option will affect my freedom. I truly believe many people would love to make decisions in the same way, but they simply aren't aware that other options exist, or that freedom is, in fact, achievable. Many people have bought into a paradigm of entrapment. Nomadpreneurs have that freedom. (Goodridge. Walt F.J. (2016).

5- PASSIONPRENEURIAL CULTURE:

For at least the last 30 years, entrepreneurial culture has been a frequently appearing Concept in both the entrepreneurship and broader management. It has been described as a form or type of culture which is "creative, innovative, takes risks, and challenges the status quo".(Ireland R.Duane. &All (2003). Entrepreneurial culture has been used as a new approach with respect to (values, attitudes, beliefs, assumptions, norms, and behaviors) related to passion- entrepreneurship.Passionpreneurship is meant here as "a process centrally concerned with the notion of(Opportunity, recognition, discovery and/or creation) where opportunity is defined asthe creation of new value to society in part or in whole" (Schendel & Hitt, (2007).

5-*1- Needs for Theoretical Understanding of Passionpreneurial Culture*

Passionpreneurial culture is a concept that has been used to characterize a broader. Organizational culture that supports or champions entrepreneurship. Organizational cultures influence new and existing members, motivates and cautions them, shapes and conforms their thinking and behaviors, creates structure within the organization, and builds routines and traditions that are held with emotion (Sackmann, 1992; Schein, 1990).As a result, passionpreneurial culture has been argued to be a powerful force within organizations to enhance the innovative abilities of employees, fuel a desire for firm survival (Sundara Murthy & Kreiner, 2008), provide permission to fail and try again, encourage a broad array of new ideas, experimentation, and creativity, and develop organizational learning abilities and a focus on markets. Contemporary, research continues to call for the study of culture in passionpreneurship, particularly in new venture creation and teams (Klotz, Hmieleski, Bradley, & Busenitz, 2014).Related to the lack of conceptual clarity around entrepreneurial culture, there has been a paucity of empirical examinations of passionpreneurial culture.

5-2- Componenets of passionpreneurial Culture

5-2-1- Learning & Development Support

This characteristic of passionpreneur culture is the values of optimism toward improvement, valuing efforts to learn, and improve one's self and others, and an interest in employee development. In entrepreneurial cultures people are thought to generally (or at least sometimes) have good ideas and are motivated to improve things and pursue new opportunities. (Monsen, E., & Boss, W. (2009).

5-2-2-Cohesiveness

In the passion-preneurial, culture, and literature and in the related subtype examples, the general notions of collaboration, communication, and social interaction were identified as important cultural characteristics (David J. Ketchen Jr , and all.(2007) .

5-2-3-Nomological Network

When developing a new construct, (MacKenzie .Scott B.(2011) suggest that while a fully mapped nomological network may be forthcoming. Reflecting on the nature of the passionpreneurial culture construct, a number of antecedent constructs seem likely.

5-2-4-Ontology

In the domain of construct development, ontology is theoretical link between the theoretical model and the measurement model.

5-2-5-Organizational Enthusiasm

Organizational enthusiasm is highly related to passionpreneurial culture conceptualizations that referred to the characteristics of possessing a vision and passion for the business. this concept is partially based on entrepreneurs' perspectives towards work, the purpose of entrepreneurial organizations, and their overarching vision for the organization. passion refers to the zeal and enthusiasm they have for their organizations. entrepreneurial passion has been defined as "an entrepreneur's intense affective state accompanied by cognitive and behavioral manifestations of high personal value".(xiao-ping.chen,xinyao and suresh kotha a pattern of values, assumptions, and practices demonstrating a willingness to change in order to identify/develop opportunities and execute on them. a passionpreneurial culture was defined as a pattern of values, assumptions, and practices shared within an organization that is centrally concerned with opportunities, where opportunity is the creation of new value to society in part or in whole. (wong .matthew a. (2014) .

6.FINDING

6-1 Passionpreneur Personality types

Once you know your purpose, it becomes easier to identify the passion that you should pursue. Take the Passionpreneur Personality/Purpose Test for clues to your purpose. Walt F.J. Goodridge presents in his book. ”Turm your passion into Profit” the types of passionpreneur personality by using a test of 40 questions. According to the Passion to Profit Personality Test, the dominant Passion-Type is: (Goodridge. Walt F.J. (2016).

Table .2. Passionpreneur Personality types

Exciter	**Competitor**
Informer	**Supporter**

Each type Guide includes: What It Means the Type? The type's Prime Directive? Recognizing the type? What Moves the type to Action? How the type Inspire Others? How to Be a Better in the type? Where the type Find Passion? Can the type Turn Passion into Profit? The type in Love?

6-2 Case studies

The hot new movement in business today is Passionpreneurship. Passionpreneurs are every day individuals whose love and passion for their hobby inspired a new business idea. They combine an entrepreneurial flair and a passion of theirs to make money, be their own boss and contribute something exciting and fresh in your community.

6-2-1 Passionpreneur Network.

It is founded by Adera Angelucci (founder and CEO) with Kristal Barrett-Stuart (partner). Its activities are to promote, connect, inspire) amazing passionate people in business. (http://www.passionpreneurnetwork.com/)

6-2-2- Passionpreneur Clinic Msme

It is a professional training & coaching clinic offers services for preparation to be passionpreneur such as:passionpreneur vision, effortless prosperity for all concerned mission, turning passion into prosperity values, integrity, unreasonableness, and wisdom beliefs. the passionpreneurship coaching program is to practically attract wealth and build net worth for whom. the fields of the clinic are transformation, entrepreneurship, wealth creation, prosperity. (http://passionpreneur.in/2010/11/09/why-msme-owners,http://www.raymondddcoaching.co.in)

6-2-3-Passionpreneur Univeristy

Passionpreneur university proposes a master of passion degree program as ongoing course and curriculum based on the philosophy and formula in the course text, turn your passion into profit, and includes step-by-step guidance, suggested reading lists, tests, special presentations, and will meet once-a-week in our "email classroom" all designed to help you master and graduate to a passion-centered life. interactive course author passionpreneur/ nomadpreneur is walt goodridge ("professor passion preneur"), who presents how to: discover, develop and profit from the pursuit of your passion; turn your hobby/talent into a passion-centered business; develop a viable income strategy; launch your passion-centered business on the internet; escape your nine-to-five job & create true freedom if you wish; make money doing what you love; help others do the same. passionpreneur university publishes a newsletter, and watch this on youtube.(http://www.passionpreneur.com/university**).**

6-2-4- Amway Usa Passionpreneurs

Amway begins in ada, michigan. founders (jay van andel and rich devos) coined amway as an abbreviation for "american way". amway launches its first product, l.o.c. (liquid organic cleaner) one of the first bio-degradable, concentrated multi-purpose cleaners. l.o.c. becomes a high seller and initiates the legacy of taking our stewardship for the earth seriously. the amway center, a 20,000 seat entertainment and events center opens in downtown orlando, florida, usa. the amway center is the home of the national basketball association (nba) orlando magic basketball team. amway opens a new business center near krakow, poland which provides it and marketing services for amway's european markets**.** (http://www.amway.com/).

6-2-5- Passionpreneur 101- (Teleclass)

It gives insight and tools that will help you to explore the passions that are in you. passionpreneurs will be able to: (understand what passion in the business world is; understand the levels of passions as an entrepreneur; recognize one's dominate trait(s) as a passionpreneur; develop a passionpreneur profit calendar for.(https://www.meetup.com/pinkroom/events/231625646/innovation is about failure!march3,2016).

6-2-6-Global Head Of Innovations For Microsoft Talks

Jc oliveris theglobal head of innovations for microsoftand is bbc award winning multimedia programs producer amongst many other awards & roles .so when it comes to innovation he is one of the best globally. he said: as usual i was being cheeky and asked him "if you had a choice between someone skilled yet low on passion vs. someone who ispassionate but low on skills which one would you choose" ;he immediately said **"**always go with passion**!** you cannot teach passion and that translates into your entire team". he talks about how putting people on tasks they already know will get them board easily, you need to challenge them with things to innovate, maybe a research about fruit bats! http://www.campaignlive.co.uk/article/microsofts-global-head-innovation-defines-innovation/1342125).

6-2-7- Moustafa Hamwi, TheSyrian Who Lost Everything, Then Became A Passionpreneur

He is a Syrian who came to Dubai in 2000, the day after he left university. Working first as a telesales operator, then at advertising firm Leo Burnett, he sets up events business after his own birthday party guest list hit 650 attendees. Over the course of eight years he hired 45 employees, created the Cavalli Club and made US$15 million. Then he had to shut down in the recession, losing most of his money to bad debt and investments. After that he was stressed and unhappy, he bought a one-way ticket to India in 2012, heading to Rishikesh in the northern state of Uttarakhand. Mustafa Hamwi headed back to Dubai to set up a series of talks and training courses to help students to chief executives to find their passion. His business card says he is an international speaker, passionpreneur coach and chief energy officer. He has run workshops for local companies from Emaar Hospitality and Mubadala to multinationals like General Electric, HP and HSBC. he adds. "My simple message is: Recruit for passion and train for skill. Any skill in the world is trainable, passion is not. At events like the recent Human Capital Forum, I use the Conversation Chair that's like a modern version of a love seat. He was featured with Dr. Marshall Goldsmith, World's 1 Leadership Thinker. Mustafa has interviewed over 50 global leaders, sports champions, award winning artists and celebrities diving deep into their interpretation of passion and its impact on all aspects of success in business and life including: leadership, innovation, employee engagement, performance and quality of life. (Passionnovate Mustafa Hamwi, Suzanne Locke , (2016).

6-3- Passionpreneur Culture Practical Model:

Passion culture practical model includes nine characteristics, six components, and four types, such as :

Passionpreneur Characteristics
Skillful

Components of passionpreneurial culture
Learning & Development Support
Cohesiveness
Nomological Network
Ontology
Organizational Enthusiasm
Opportunity Driven Change

Strong-willed
Expressive
Learner
Love their job/work
Focused
Perseverant
Productive
Risk-taker
Independent Thinker

Passionpreneur Personality types
Exciter
Competitor
Informer
Supporter

Figure.1. passionpreneur culture practical model

7. CONCLUSION:

For concluding, it is preferable to mention that passionpreneur is a new approach of practice in Business and economic development. So, the conclusion and recommendation are: Modern organizations and enterprises should benefit of the technique and tools used by the passionpreneurship, Students in business administration and economy are invited to study carefully and deeply this efficient approach (Passionpreneurship). Passionpreneurship culture is characterized by several traits totally different than the organizational or entrepreneurial culture.There is some practical models related to passionpreneur culture, and it is necessary to understanding it before integrating in the implementation stage. Students in business administration and economy have the potentiality to be passionpreneurs, and to carry out this approach successfully.Business schools and faculties or higher institutes in business administration and economy must develop their curricula's or teaching programs according to the needs of passionpreneurship approach.

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Biography

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–participating in (10) consulting projects with international consulting and training companies (including 4 eu- tempus project) .
- publishing(15) scientific papers in international and arabic journals.
- participating with (28) papers in the international /arabic conferences.
- designing /executing (30) training package (programs) in the arabs countries .

29 years of experiences in teaching / researching /consulting / training in the field of hrm / institutional organization/ capacity building / sociology of organizations.

ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

The Use of Cost-Benefit Analysis And Benchmarking Analysis In The Planning Period of Bioenergy Projects

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Abstract

Various experiences show how development and investment decisions must be made in a complex analytic framework, to avoid incorrectly planned bio-energetic investments. This means a safe and moderately riskless investment environment for either municipalities, or other investors. Various estimation and planning methods play a significant positive role in meeting these criteria, f.e. in our case, using the Cost-Benefit Analysis, and the benchmarking methods together. These two methodologies showed their positive effects through various other areas of research, and planning processes, through being applicable to processing external effects which come up during environmental investments into data which can be evaluated and translated to monetary values. Cost-Benefit Analysis doesn't apply to any given investment, where accepting, or rejecting the plan is the focus, but to the complex analysis of the development concept itself. It's exceptionally important if there are various ways to determine development concepts, or if it's not even determined in the first place. I concluded a benchmarking analysis of comparing multiple project variations based on sustainability indicators. I was able to do a satisfactory evaluation of these indicators for all three options. The evaluation of my analysis pointed out the optimal variation, which should be implemented to make sure that the investment remains economically, socially and environmentally sustainable even in the future.

Keywords: Cost- Benefit Analysis, Benchmarking Analysis, sustainable environmental investments, bio-energetics.

1. INTRODUCTION

Nowadays, due to the effects of climate change, it's becoming more and more important to make our decisions related to planned investments' realisation in a way that they're as all-encompassing and well thought out as possible. Therefore, the European Union demands the cost-benefit analysis to be made in case of bigger projects, before the actualisation begins [4,8,10]. The goal of the cost-benefit analysis is to determine if the investment is possible and sustainable economically, while it also helps to translate related external effects to numbers [1]. I analysed how we can use the cost-benefit analysis for bio-energetic projects that also employ subsidies of the European Union. This is important because in this complicated economic situation, making obtained subsidies used as efficiently as possible, and generate as many positive effects as possible for realised projects has become more and more important [11]. The process of my analysis consists of two parts. The first part is the detailed overview and adaptation of the methodology of cost-benefit analysis. The intention behind this was to make it obvious why this method has to be applied before starting the realisation process, during the decision preparation period. The methodology makes it possible to have a more detailed outlook on the project's payoff, also including the other effects hard to express in monetary gains and losses that can be expected [6,7]. In this phase of the analysis, I employed the help of the Cost-benefit analysis guidebook for investment projects (2014-2020) by the European Committee. The guidebook notes that external effects' inclusion has to cover as much as possible. However, the methods of translating effects to numbers can be different for the various projects[5]**.** During the analyses, I placed various charts to illustrate how the various effects were translated to numbers, in order to help in interpretation. However, there might be cases where external effects can't be expressed in monetary terms [9]. These cases have to be explained, and the effect has to at least be detailed in qualitative terms. The advantage of this is that according to prior experiences, non-monetary advantages and disadvantages are less expressed during the decision-making, when compared to monetary advantages and disadvantages [2]. In order to express external effects in monetary terms, I used the benchmarking analysis, which makes it possible to identify the project-generated external effects. Furthermore, we can also aggregate these effects for the entire project life cycle. The concept of our current study is to introduce the planning methodology of biogas plants, which make up a large chunk of the energy resource produced using renewable energy sources.

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2. MATERIALS AND METHODS

The basis of the analysis method was the study of cost-benefit analysis guidelines. The European Union's projects have been supported by issuing such guidelines for years. The newest and most complex guidelines are issued by the European Commission, with the following title: Guide to Cost-Benefit Analysis of Investment Projects- Economic appraisal tool for Cohesion Policy 2014-2020. In this source, the various chapters detail the analysis methods of different investment project types. This is a huge step forward compared to the methodology of generic guidelines. However, internalising and translating the externalities to monetary terms still causes problems, even now. Generally, the first problem is finding specific indicators which match the development investments' specific system attributes. Integrating the benchmarking method into a method analysis system helps with this.We analysed the amount of externalities aggregated in the system with the benchmarking method - this basically means that we determine the amount of externalities. It should be important to include the effects of all externalities, may they be positive or negative, as excluding these may result in incorrect decisions [3]. The analysis is concluded along three aspects, which are the technical, environmental and economic aspects. Within the various aspects, we determined basic indicators, taking the system specifics into consideration. These help us to identify the externalities generated by the project.

3. RESULTS AND DISCUSSION

According to the base hypothesis, the process of environmental authorisation experienced in international practice designed mainly for biogas plant development processes contains practical inconsistencies, due to which there are entirely different expenses, obligations and return indicators are required for creating biogas-production systems based on processing waste and biomass in the different EU member states. We can find many inconsistencies in our domestic planning processes as well, which is clearly signified by how multiple, currently authorised biogas plants have structures filled with doubts. As far as our domestic, currently realised planning processes go, the basis is usually business plans employing credit loans, and technical plan documentation and environmental effect analyses of entrepreneurships selling biogas technology. These planning materials mainly concentrate on the employed technology, and in many cases, they oversize the production capabilities in the authorisation process as well. In order to make it possible to show better return indicators, they contain optimist production parameters which can only be achieved by taking on high technological risks (f. e. plans without cessation and technical errors, eternally optimal base material supply, etc.).Choosing between alternative options is a process of planning which is very important, and requires a sophisticated analysis method. It's an element which can be determined for the future, as the sustainability of an investment is of utmost importance, both from an economic and an environmental and technical perspective. Making sure that this background is assured, is the responsibility of the analysis based on estimation and planning processes realised during decision making.In the planning phase of the bio-energetics, in our case, biogas projects, they generally determine multiple development scenarios (size of the investment, technological-technical variants), furthermore, they also analyse what would happen to the system elements without the investment. In order to compare the scenarios, a benchmarking analysis based on sustainability indicators has to be conducted, for which the indicators that are in all scenarios have to be correctly evaluated as well, as follows:

Table 1.Technical base indicators

TECHNICAL BASE INDICATORS	1. quantity of produced biogas
	2. quantity of produced electricity
	3. quantity of produced heat energy, and estimated waste heat
	4. electric performance
	5. area requirement and noise effect
	6. required oversize ratio

Choosing the technical indicators (Table 1) are determined during the professional meeting between the experts of the planning process and the local decision makers. During the discussion, multiple indicators were suggested, but as the result of the post-evaluation, we thought that characterising these attributes was the most important, and these can be compared to each other in a differentiated matter.

Table 2.Environmental base indicators

ENVIRONMENTAL BASE INDICATORS	1. existence / lack of authorisation obligation
	2. existence / lack of limit value exceeding
	3. tilling area required for placing output products
	4. tilling area required for assuring inputs / substrates (tilling requirement of silo production)
	5. processed wastewater
	6. area and land usage in ecological systems

In the case of choosing environmental and economic indicators (Table 2-3), we basically chose system attributes which show significant differences, as this makes it possible for us to see the level differences sufficiently.

Table 3.Economic base indicators

ECONOMIC BASE INDICATORS	1. investment expenses
	2. required personal expense, amount of bank financing
	3. liquidity demand
	4. return time
	5. possibility of establishing related entrepreneurships
	6. level of increasing employment capacities

Therefore, the indicators are grouped into three groups: economic, environmental and social aspects. All aspects contain three different indicator groups, which were evaluated on a scale ranging from -2 to +2 for each project, and the resulting values were summarised. The values show us how many externalities are amassed within a project (positive is +, negative is -). This evaluation has to be conducted for all aspects, and in the end, all three have to be summarised.

Table 4.Example of evaluating projects

Code/ Aspect	1. project	2. project	3. project
1.	+2	-1	+2
2.	+1	0	+2
3.	+1	-2	+2
All externality	(+)4	(-)3	(+)6

Arithmetic mean is at: 4,5. During the evaluation of the benchmarking analysis, the values resulting for the various aspects have to be summarised, which can be seen in the last row of the chart. In order to evaluate this, I took the arithmetic mean of the tow extreme values, and considered the values close to this optimal. In other words, during the summary of the results, I determined the theoretical optimum value (mean), using which the base indicator groups were organised into orientation sustainability categories. This made it possible to assign sustainability values to the scenarios described. Based on the evaluation, the scenario which reached the highest value became the most sustainable scenario from the technical, environmental and economic perspectives.Evaluating the investment's strategic goals and priorities compared to the sustainability value system combined with the benchmarking analysis can be realised, therefore, the scenarios of the realisation of the investment in relation to the possibility of completing the sustainability criteria are also easy to compare.The results of the conducted comparison analyses will clearly mirror which industrial size will be the most preferred variant from either technical, environmental or economic perspectives, since the sustainability criteria system can be assigned with properly working system attributes in all its dimensions. Therefore, the introduced analysis methods also work in practice, and showed relevant and obvious results, which also made the work of decision makers easier. However, it's important to have a team of professional experts conduct the cost-benefit analysis made within the bounds of the realisation studies, and the related benchmarking analysis, because the systems determined work in a close cooperation. These connections, effects and counter-effects have to be identified in case we want to determine relevant goals for investments.

4. CONCLUSIONS

The goal of the Cost-Benefit Analysis, or CBA for short, is to evaluate the advantages and costs of a measure aimed at improving the livelihood of society in money, and make it obvious for the decision makers, it makes the decisions related to investments and operations easier, since it reduces the costs and benefits coming from many areas into a single dimension - translates it to the language of money, or at least, would translate it, if it were successful. This means the most notable advantage, and the most threatening danger of this method: according to experiences, advantages which can't be expressed in financial terms have a much lower priority during decisions compared to those which can. Therefore, during their internalisation, the systems can't be judged in their true forms, which makes it important to try to completely identify these effects for each investment or project, and try to express them in numbers.Earlier projects generally had the problem of their professional analysts not having conducted any usable financial and economic calculations at all. In truth, they only calculated the investment costs and the social benefits, but even the methodology used to do this was often lacking, and had a weak theoretical basis. Sensitivity analysis and risk analysis often isn't conducted, and calculations weren't done for the sustainability of the investment. In essence, the analyses are incapable of assisting reliable decision making without these methodologically important chapters, even so, they could receive a sufficient basis for decisions related to realisation after the net current value calculation.Seeing the results of the analyses, we can state that in the case of economic effects, the projects show attributes greatly different to each other. Based on this, we can state that the economic indicators, when approached from an incorrect methodological perspective, can cause further extern effects in the evaluation, which place the various development programmes in the centre of preferred economic decisions in a way that they don't generate sufficient social, economic and environmental benefits. Based on the benchmark analysis, we can generally say that many externalities are hiding in the projects we evaluated, which aren't identified correctly in the cost-benefit ratio calculation. This causes a problem, as benefits expressed in numbers appearing in the project development documentation could make the projects and development concepts for decision makers, to decide if they have proper characteristics from an investment economic, environmental and social perspective as well.

ACKNOWLEDGMENT

Supported by the únkp -16- 3-4 new national excellence program of the ministry of human capacities.

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BIOGRAPHY

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

A Preliminary Investigation: Studentification is a Threat or a Potential for the Sustainable Community?

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Abstract

In this paper, the relationship between studentification and sustainable community was discussed at micro scale. Studentification refers to the concentration of higher education students in certain areas, both seasonally (during the academic term) and temporarily (throughout their education life), and to influence the area in various ways. The effects of studentification were explained under 6 headings: social cohesion, housing and built environment, community services, economy, participation and, transport and connectivity. The assessment of effects of studentification also uncover the connections with sustainability. So this headings were discussed in the light of the components of sustainable community. The main effects of studentification posing a threat to create a sustainable community are as follows: Homogenization, conflict of life styles, displacement of local residents, decrease of affordable housing, physical downgrading, ghost town. However, also some contributions are as follows: Volunteering activities, social upgrading, urban vitality. Obviously, studentification has more negative consequences to create sustainable communities. Therefore in the study, some proposals have been made to convert these threats into opportunities for sustainability.

Keywords: studentification, sustainable community, social sustainability, higher education students

1. INTRODUCTION

In the last decades, higher education students are one of the most important parts of society. "Studentification" [1] represents a number of effects of students on both community and place. These impacts are very diverse and was discussed in the literature. There are basically two groups that affect the process in various ways: higher education students and local residents. Studies in the literature, and especially in the UK, focus on communication and conflict between these two groups. In National HMO Lobby reports in UK, studentification is seen as an obstacle to establishment a balanced and sustainable community [2]. The biggest reason for this is segregation, displacement and lifestyle conflicts. Reference [3] has statistically proven that the residential segregation between students and non-student residents is very marked. Reference [4] has uncovered the negative transformation of studentification in deprived communities. However, Reference [5] has shown that some policies developed for the studentification process may be an example of reducing the negative effects of gentrification and realizing the vision of sustainable communities. In the literature, the effects of the studentification process on the contrary to the vision of the sustainable community have not been addressed holistically. In this paper, it is aimed to investigate the effects of the studentification process on the neighborhood and to examine these effects in the light of the components required for the sustainable community. In this perspective, attempts have been made to develop proposals for the studentification process, which is seen as a threat to sustainable communities.

2. METHODOLOGY

The research is based on the following: a comprehensive survey of the literature available on the studentification, social sustainability and sustainable community, a review of the case study examples, an examination of state and university reports. In all studies, effects of studentification are discussed under 4 headings: Physical, economic, social and cultural. However, this study will be addressed under 6 headings to make comparisons between these effects and the components of sustainable communities and make them more understandable: Social cohesion housing and built environment, community services, economy, participation, transport and connectivity.

3. EFFECTS OF STUDENTIFICATION

The concept of studentification was first introduced in 2002 by the English geographer Darren Smith [1]. Firstly, students move from their parents home due to university education. Then the process of studentification is triggered in university town by intense housing demands by these students [6]. But these housing demands are especially for certain areas and consequently result in high concentration of students. It has been observed in various case studies that the students firstly preferred to accommodate close to the campus or close to the transport links (see [6]-[7]). Therefore the studentification process is particularly visible in the

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immediate vicinity of the university. Local residents are affected in many ways from the process. The main effects of studentification are as follows:

3.1 Social Cohesion

The studentified area is an area where student density is high. Because of this density, these areas are referred to as "student ghetto"(see [8]-[9]). Students who hold the numerical superiority in the area become unsupervised. So there are problems such as noise, vandalism, alcohol caused by studentifiers in the studentified area [10]. However, the studentifiers do not complain about each other [11]. Thus, the families living in the area become unable to live in the area over time and are being displaced. This allows more students to come to the area and the area becomes increasingly homogenous. According to Reference [6], although this displacement is not physical, local residents are socially marginalized. The segregation in the studentified areas is quite visible. Communication between students and local residents is very poor. Therefore residents who lost their social network, they also lose their sense of belonging to the neighborhood. Students are "temporary residents" in the area [12]. They are located in the neighborhood at certain times of the year and usually leave at the end of their education life. The high circulation of students harms to social integrity [3].

3.2 Housing and Built Environment

Housing rents in studentified areas are increasing due to the intense demands of the students. Another factor is that more than one student can come together for pay the rent. The fact that students can pay rent with together means that they can meet higher rents than a family. The landlords usually prefer students as tenants to increase their profits. At the same time the residences that appeal to the students in the studentified areas gradually start to be produced. For example, PBSAs (Purpose Built Student Accommodation) opened in the UK (2005) are considered to be the starting point of the second wave studentification [6]. Studentifiers are often unconcern and do not to adopt the area because of they are temporary. Therefore they can also cause downgrading of housing and environment [8]. The studentified areas generally have problems about levels of rubbish and upkeep of external environment [13].

3.3 Community Services

Studentifiers do not need primary or high school and so these services are limited in the area [13]. Families who can not meet these needs suffer from this situation. Services in the area show an increase, however, these services are mostly addressed to students. Cafes, restaurants, bars, gyms etc. are beginning to concentrate in the studentified area [14]. The presence of the students adds vitality to the city and creates a cosmopolitan atmosphere.

3.4 Economy

Economy in the studentified area is generally dependent on students. The tenants usually consist of students, and mostly students use the commercial facilities. So the economy can suffer large losses in case of university move to another area.

3.5 Participation

There are associations established in universities for various topics (helping street animals, helping poor children, sharing books, etc.). Students are involved in various volunteer activities with these associations [15]. And also higher education students actively participate in various activities because of subjects that they are against on the agenda.

3.6 Transport and Connectivity

During certain periods of the year when students are in the area, they cause traffic problems and parking problems [15]. But students contribute to the development of the public transport system (number of voyages, etc.).

4 COMPONENTS OF SUSTAINABLE COMMUNITY

Sustainability is often discussed frequently on the three components: Environment, economic and social. Social sustainability as one of the three components of sustainability was emphasized in Our Common Future (WCED, 1987) and Agenda 21 (UN, 1992) [16]. Social sustainability is, however, the least discussed component among them. Social sustainability refers while fostering an environment to the compatible cohabitation of culturally and socially diverse groups and supporting social interaction of these groups, at the same time increasing the quality of life for future generations [17], [18]-[19]. As a result, "socially sustainable communities" should be equitable, diverse, connected, democratic to create healthy and livable communities for future generations [19]. The components of sustainable community are as follows [20] - [21]

Table 1. The components of sustainable community

Social Cohesion	**Housing and Built Environment**	**Community Services**
✓ Population diversity ✓ A strong sense of community and belonging ✓ Strong neighbor relationships and social integration ✓ Low levels of crime, drugs and anti-social behaviour	✓ Afordable housing ✓ Mix use and different housing typologies ✓ Sense of place ✓ High quality and durable building ✓ Public spaces for all	✓ Availability of high quality services for families, children and the old ✓ Life-long learning ✓ Adequacy of affordable public and private services which are accessible to the whole community
Economy	**Participation**	**Transport and Connectivity**
✓ A wide range of jobs and training opportunities ✓ Dynamic job creation for the benefits of local community	✓ A strong community and voluntary services ✓ Strong, informed and effective partnerships that lead by example (e.g. government, business, community) ✓ A sense of responsibility	✓ Accessibility ✓ Non-car dependent ✓ Facilities to encourage safe local walking and cycling ✓ Availability and adequacy of parking facilities ✓ Good access to national and international communications networks

5 CONCLUSION: HOW CAN A SUSTAINABLE COMMUNITY BE CREATED IN STUDENTIFIED AREAS?

The main obstacle to creating sustainable community in the studentified area is the concentration of students on a single area. This high concentration of students negatively affect almost all of the components of sustainable community. Therefore this concentration should be decreased to support especially population diversity, sense of community and belonging, social integration, and different housing typologies. Also the high concentration is more visible in near of university campus of away from the city center. The location of the universities is important from this point of view. Hence, the accommodation and social needs that the universities will bring with them during to establishment of universities should be taken into consideration. Even if the students want to live in a city center or a neighborhood outside the surrounding of university, transportation may not be enough. According to component of transport in sustainable community, accessibility of the neighborhood can be increased in various ways and encouraged to safe walk and ride a bike. Thus, students can be dispersed in other areas. The spread of students to other areas brings diversity to the populations in the neighborhoods. When students do not concentrate on a single area, their neighbors will often not be students. In this way, communication can develop between local residents and higher education students. This can also contribute to social cohesion in the area. Especially for children in almost poor neighborhoods, university students are good examples. Students can help them in their lessons and thus contribute to the lifelong learning component. The second obstacle to creating sustainable community in the studentified area is inadequacy of meeting places for students and local residents. The affordable public and private services which are accessible to the whole community should be increased.

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19 - 23 April 2017, Sarajevo

Utilization of Nanomaterials for Reduction of Microbiologically Induced Deterioration (MID) of Cement-based Composites

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Abstract

During its lifetime, cement-based materials undergo various kinds of deterioration associated with environment, usage, and specific features. This process may be also caused by microorganisms which lead to the microbiologically induced deterioration (MID), a problem that creates significant economic loses annually. This problem gained considerable attention of researchers who developed several methods for its mitigation. The most interesting solutions are based on ureolytic bacteria and implementation of nanostructures as admixtures. Together with the rapid development of nanotechnology in the 21st century, advances in this field provided nanomaterials that could be used in cement-based nanocomposites to deal with the MID. Introducing such composites to the mass production requires additional studies regarding the impact of nanostructures to natural environment and environmental bacteria.

Keywords: biodeterioration, concrete, corrosion, microorganisms

1. INTRODUCTION

In the analysis of the life-cycle of concrete structures, all factors causing unacceptable performance during the whole lifetime of structure should be taken into consideration and eliminated. The properties of concrete during its lifetime can be affected by various factors including: variable loads, operational characteristic and a full scope of environmental conditions. One of the serious threats significantly affecting the performance of concrete structures is microbiologically induced deterioration (MID). During the lifetime of building, most of the structures undergo biodeterioration due to interactions between soil, water, sewage, as well as agricultural, municipal and other waste materials. Microorganisms that are present in the environment are able to form specific communities which can lead to many physical and chemical destructive processes [1]. The damage is not limited to one particular type of microorganism but is rather based on syntrophic relations between various genera. MID is a complex process containing vast diversity of microorganisms which can grow depending on the available conditions in processes that lasts for years. Therefore, the presence of particular type of microorganism is varied due to its activity depending on the growing conditions. Depending on the environment and biodiversity various conditions may act as a selective agent for species with different growth optima that are specific to their own environment. Through trophic cooperation and by formation of microbial consortia microorganisms may maintain their optimal growth rates [2]. Along with the operation of the structure, deterioration process occurs leading to decrease in performance, as well as, increase in the potential maintenance costs of the building. According to the US estimation, the microorganisms are responsible for up to 30% of total deterioration of materials [1]. Moreover, it has been estimated that yearly loss caused by biodeterioration in Poland equals 5% gross domestic product (GDP) [3]. Despite the economic aspects, exposure to pathogenic microorganisms (e.g. molds and pseudomonads) can lead serious health issues in humans especially in indoor conditions [4]. Based on the economic and health related issues there is growing awareness of these interactions, and developing methods to efficiently prevent or mitigate MID is the subject of interest for many researchers.Although the microorganisms responsible for MID are relatively well defined and examined, most of the recent research is focused on the relation between the material properties and bacterial growth, as well as methods to protect the structures from MID [5]. Recent developments of nanotechnology enabled to produce nanosized additives and admixtures which can be used in the production of concrete structures. Global cement production is responsible for around 5% of total carbon dioxide (CO_2) emissions. Due to positive effect of nanomaterials on the mechanical and microstructural properties of cement-based composites it is possible to produce sustainable concrete structures (with reduced amount of cement) exhibiting similar or even improved structural properties. Moreover, incorporation of certain type of nanomaterials (such as: TiO_2, ZnO, CuO) enables to improve the bactericidal properties of concrete structures. These substances can react with cytoplasmic membrane of microbial cell often causing its disintegration and as a result cell's death [7]-[8]. Therefore, utilization of nanomaterials in cementitious

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composites leads to the extended life-cycle of concrete structures and development of novel sustainable cementitious composites that thanks to modern additives may be produced with reduced CO_2 emission. This study presents recent developments and issues in the utilization of nanomaterials for producing sustainable cement-based composites allowing to prevent or decrease the microbiologically induced deterioration process.

2. THE EFFECT OF MID ON THE PROPERTIES OF CEMENT-BASED COMPOSITES

Depending on the operation characteristics, concrete structures are continuously exposed to ambient or harsh environments. Exposure to environmental conditions may lead to different types of concrete deterioration. Generally, MID contributes to irreversible aesthetic, physical, and chemical changes. Moreover, development of MID is a relatively simple process due to the fact that infrastructures and buildings are exposed to microorganisms from many sources. Every interaction of the structure with water and moisture creates a propitious environment for the development of bacteria and fungi. These favorable conditions include low pH, porosity and access to moisture and water, and in some cases specific gaseous atmosphere. In such conditions, microorganisms can freely grow on the concrete surfaces. Moreover, in certain parts of the world high humidity or various freezing and defrosting cycles, as well as high, CO_2 and chloride ions can be beneficial for increasing the structure deterioration [9] MID requires previous contamination of the material with certain bacteria and fungi. The most common sources of environmental microorganisms residing in building materials are water, air, and even aggregate that is used during the preparation of material. Sand as well as soil is a reservoir of many microorganisms including e.g. actinomycetes that are able to survive in concrete [10]-[11]. During the deterioration of building materials, microorganisms may act from inside and outside of the structures. One of the most important factor causing biodeterioration is the acidic attack accompanying growth of the microorganisms on/in cementitious materials [11]-[12]. Microorganisms may organise growth of their population in structures that are called 'biofilms'. These are comparable to living 'microbial societies' of bacteria and fungi. Biofilm develops in five steps that were well described for environmental bacterium *Pseudomonas aeruginosa*. First step is the contamination of surface with organic material (lipids, hydrocarbons, proteins) and adhesion of cells. Three next steps following adhesion include the formation of microcolony and maturation of the structure, when cells produce exopolymeric substances that provide them matrix for the development of biofilm as well as considerable protection from the outside environment. Five stage is a release of cells from mature biofilm. Mature biofilms are difficult to eradicate and may pose a health risk especially in hospitals [13]-[14]. The first aspect which has a significant impact on the maintenance costs of structures is related to the visual performance of buildings. This part of the MID process can be observed at ordinary housing estates as well as cultural heritage buildings. Microorganisms can grow not only on cement-based supports, but also on various stones and roofing tiles. Their growth results in a development of green, black, or red stains. Occurrence of such microobiota leads to significant cleaning and reparation costs [5]. In spite of aesthetic deterioration, some of microorganism (i.e. fungi) can exhibit more disruptive action associate with microstructural and mineaorological changes in building materials [15]. In-depth analysis shows [9] that the action of microorganisms can noticeably enhance the surface erosion of concrete, increase porosity, and induce cracking and spalling that leads to the increased transport of degrading materials into the concrete. Such action results in further corrosion of reinforcing steel and eventually deterioration of mechanical properties. Such disruptive action caused by the MID can be observed especially in harsh operating conditions like sewer and wastewater pipes. MID caused by sulfur-oxidizing bacteria, along with chemical corrosion, has been found to be responsible for the dramatic deterioration of concrete materials.The mechanism responsible for deterioration of microorganism is caused by the interaction of microorganism with concrete ingredients. This reaction is attributed to the microbial metabolism. During decomposition of organic matter that present in cement or concrete materials (provided e.g. with sand), bacteria and fungi may produce acids which lower pH. Sulfur-oxidizing bacteria creating acidic environment around cells can indirectly react with calcium hydroxide (that occupies around 15% volume of ordinary cement paste) leading to form gypsum and ettringite. Those newly-formed products significantly increase their volume leading to the formation of cracks and defects in the microstructure.

3. METHODS FOR MITIGATING MID

Many efforts has been made to develop sustainable building materials that can withstand various deteriorating agents such as temperature, erosion, and even irradiation. Microbiologically induced deterioration is only one of such problems, nevertheless it has great importance because is associated with growth and development of environmental microorganisms which may not only cause damage in cementitious materials but also be hazardous to humans and animals. Various methods are incorporated in order to protect the concrete from the MID. Generally, the concrete structures can be protected from MID by using proper concrete mix design or apply coatings (i.e. biocides and water repellants) and liners [9]. Resistance to the MID can be achieved by incorporation of admixtures to the bulk mass like silica fume or polymers which presence can cause alterations (increase) in concrete alkalinity. Moreover, silica fume and polymers can refine the microstructure of composites and improve the durability of cement-based materials. This leads to decrement of the corrosion rate. In addition, utilization of certain admixtures can lead to decrease in the content of calcium hydroxide in the cement matrix, therefore, decreasing the potential for MID [9]. As mentioned above, the protection of the concrete can be improved by the use of spray coatings containing water repellents and biocides, although selection of proper coating requires a thorough knowledge on the physiology of microorganisms to which material is exposed to [1]. Microorganisms can be incorporated to the structure within aggregate where the disruptive action can be induced from inner part of the structure. Nevertheless, to some extent this process can be turned to a favorable way with a help of other bacteria. Researchers developed an idea to metaphorically 'fight fire with fire' by using certain bacteria to mitigate effects caused by the sulfur-oxidizing microorganisms. Studies indicate that incorporation of certain types of bacteria to the concrete ingredients can surprisingly improve the properties of cement-based composites. Such reaction was described in case of *Bacillus*

*sphaericus*which is an ureolytic bacterium that can converse urea into ammonium and carbonate. This process increases pH which may not only reverse negative effects done by acidic attack of other microorganisms but also causes the microbial deposition of calcium carbonate. Precipitated crystals of this substance can fill the cracks [16]. While activity of *B. sphaericus* is restricted to surface treatment, there are other bacteria such as *Deleya halophila*, *Halomonas eurihalina*, *Myxococcus xanthus*, *B. megaterium* that may be used as potential crack healers, also inside the structure [17]. Furthermore, Abo-El-Enein et al. [18] used another bacterium – *Sporosarcina pasteuri* in cement mortars and reported heightened compressive strength of material in comparison to the control samples.

4. THE EFFECT OF NANOMATERIALS

Great efforts are made to find a solution for a development of effective, safe, environmental friendly, less costly, and what is very important safe to human structure materials that will effectively mitigate the MID ratio. Recent developments in the field of nanotechnology and its significant impact in other fields, including medicine, agriculture and environment has showed promising effects on bactericidal properties of nanomaterials [15]. In the recent years researchers have also found its interest in modification of cementitious composites with nanomaterials that show bactericidal or bacteriostatic properties. Nanomaterials can be used to eradicate bacteria and fungi from structures due to their proven toxicity against various microorganisms. This is possible due to the characteristic interactions between nanostructures and bacteria that depend on the type and size of used nanostructures. It is acclaimed that the smaller nanoparticle is the more toxic it is against microorganisms [19]. Metallic nanomaterials interact with cell wall and membranes in physio-chemical reactions. Various types of nanoparticles may act e.g. by causing oxidative stress, protein dysfunction, or membrane damage. Moreover, nanoparticles are able to impede transport of ions between cell and the environment and even disrupt cell membranes causing cell's death [20]-[21]. On the other hand the operation of oxides such as titanium dioxide is often based on a light-dependent activation which causes gathering of reactive oxygen species (ROS) in the environment. Many bacteria do not produce peroxidases such as catalase which protect cell from the attack of hydrogen peroxide. Nevertheless other microorganisms developed certain mechanisms of protection including production of peroxidases or exopolymers or pigments. The last reaction may be observed for bacteria from genus *Streptomyces* which are also associated with MID [11], [22]. Similarly, another environmental bacterium *Pseudomonas aeruginosa* may also show resistance to the nanoparticles which was showed in the case of highly toxic quantum dots [23]. There are also other oxides that are known from antimicrobial properties including ZnO, CuO, and iron oxide. Activity of these substances is based mostly on causing oxidative stress against microorganisms [24]-[26]. Nevertheless, antimicrobial activity is only one side of the problem. Recently, interaction between nanomaterials and bacteria has been extensively studied in terms of antimicrobial effects, although most often on model microorganisms. On the other hand the reaction of environmental bacteria to nanomaterials has not been sufficiently explained [27]. This creates a necessity to conduct studies on changes in physiological state of environmental bacteria, which may have indirect impact on surfaces inhabited by bacteria and fungi. There are questions that need to be addressed by future studies especially whether microorganisms may become resistant to these substances, and whether this effect will not induce a cross-resistance to antibiotics [28]-[29]? Another aspect is potential impact on microbial communities in soil. Ge et al. reported that TiO_2 and ZnO may disrupt biodiversity in soils [30]. In other paper, Dhas et al. [31] showed that environmental bacteria may gain resistance to zinc oxide during a prolonged exposure. This problem also should be expanded in further studies. Certainly, nanomaterials have potential to be used in building material. Nevertheless, we assume that their usage should be preceded by thorough analysis of potential impact of these substances in the environment.

5. CONCLUSION REMARKS

Nanotechnology provides novel possibilities for development in numerous fields of life. Nanotechnological approach to the problem of microbiologically induced deterioration may result in novel technologies for production of sustainable building materials of improved characteristics. Nevertheless, there are some questions that need to be answered before application of certain nanomaterials in the cement-based composites. The ideal material would eradicate bacteria from surface, although its components would not be easily detached from the structure, so it could not actively interact with surrounding environment, hence it would be sustainable, self-cleaning, and environmentally friendly.

ACKNOWLEDGMENT

This research was supported by the National Science Centre within the project No. 2016/21/N/ST8/00095 (PRELUDIUM 11).

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19 - 23 April 2017, Sarajevo

Life Cycle Cost Assessment of Precast Concrete with Waste Glass Aggregate

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Abstract

The recycling of municipal solid waste is a major problem for municipalities worldwide. Due to the demand for green construction materials as well as shortage of natural aggregates alternative methods for production of building materials have been sought. In the last few decades, the utilization of waste materials as recycled additives in building materials has gathered spectacular attention. Currently glass is one of the least recycled materials in the majority of countries and requires the consumption of relatively large amounts of energy for the processing of the raw constituents. Due to the fact that chemical composition of waste glass (WG) is similar to that of natural sand (i.e. all commercial glass products containing more than 70% SiO_2), this waste material seems to be very interesting component to be incorporated as an aggregate replacement in cement-based composites. Available studies show that partial replacement of natural sand with WG aggregate can be beneficial for improving some of the building materials properties, however, from the perspective of sustainability and technological processing, substitution of 100% of natural aggregate with WG aggregate, would be much more desirable. Beside technological aspects utilization of such materials has significant impact on the economic aspects of manufacturing green building materials with recycled materials. In the presented study, the initial calculation of costs of concrete life cycle has been conducted. Based on the available literature and own calculation the results of costs have been referred to costs of ordinary building materials. The analysis showed that in certain conditions utilization of recycled materials exhibit both positive effects on economic and technological aspects.

Keywords: Aggregate, Concrete, Life cycle cost, Waste glass

1. INTRODUCTION

The idea of circular economy refers to the concept of a product life cycle designed to automatically renew and regenerate itself, from its design, production, distribution and consumption to recycling and reuse of waste which is considered as a potential secondary raw material. Such an approach to material and energy flows in production processes, transferred from the industrial ecology doctrine, is one of the key assumptions of the circular economy. Waste at the end of their life should be released to the industrial food web, both as material and energy flows. Their inclusion in the product life cycle allows to close the material and energy cycle, maximizing waste use, minimizing the use of virgin materials and reducing release of noxious materials to the environment [1]. In the last decades, the environmental awareness has significantly arisen as an effect of problem with utilization of annually increasing amount of solid waste materials produced. Finding both technically and economically satisfactory utilization methods of municipal wastes are major environmental challenges for modern societies [2]. The concept of energy efficiency along with sustainable design and 4R (reclaim, recycle, reuse and reduce) policies aroused the interest of researchers and different industrial sectors. Construction and use of buildings in the EU generates approximately a third of all waste and contributes to the environmental impacts occurring at various stages of a building life cycle, including the manufacture of construction products, construction of buildings, their use, repair and management of construction waste. A significant part of the waste from construction, refurbishment and dismantling or demolition of structures can be allocated to recycling, yet the average for waste recovery in the construction industry in the 27 EU member states is below 50 % [3]. Building materials industry is fast-growing market with already established successful utilization of various by-products and waste materials [4]. Concrete as the most manmade produced material in the world, has a great potential to employ high amount of waste materials and this approach is widely promoted [5]. Waste materials can be both utilized as powdered material or as an aggregate. Due to the shortage of natural aggregates (which consist 60-80% of concrete volume) methods for utilization of waste materials and construction and demolition (C&D) as an aggregate has gathered spectacular attention [2]. Environmental performance and cost-effectiveness are today two main selection criteria for construction product specifications. Therefore, among the decision criteria related to the use of recycled materials, technical considerations, environmental impacts and costs are equally important. The last two issues have been considered in the context of the product life cycle for a long time. Analytical tools such as Life Cycle Analysis (LCA), Life Cycle Costing (LCC) and Life Cycle Cost Analysis (LCCA) are used. Research on integrating environmental impact analysis with cost analysis is also conducted, for example under the Life Cycle Sustainability Analysis (LCSA) approach [6].The aim of this paper is to present the results of a preliminary comparative analysis of costs for a concrete prefabricate manufactured using a

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conventional method and using recycled glass, as an initial phase of LCC. The LCC method was used according to the PN-IEC 60300-3-3 standard: "Dependability management - Part 3-3: Application guide - Life cycle costing."

2. PRODUCT LIFE CYCLE COSTS

A product life cycle can be analyzed from a marketing point of view, and then it refers to the presence of a product on the market: from its introduction to the market (marketing), through the sales growth phase, to the product maturity and retirement or withdrawal. An indicator placing the product at a specific stage of the marketing life cycle is sales volume reflecting the demand and market situation of the products being analyzed. The ISO 14040:2009 standard defines the product life cycle as successive and interrelated phases, from the acquisition or production of a raw material from natural resources through the process of production, operational use, to final disposal [7]. This cycle may include in particular: research, development, industrial design, testing, production, transport, use, repair, modernization, change, maintenance over life time, logistics, training, wear, demolition, withdrawal and disposal. The issue of cost analysis at each stage of product life is generally presented in the PN IEC 60300-3-3 standard, according to which the Life Cycle Costing (LCC) is an instrument recommended by economic disciplines to evaluate the profitability of investment projects and to perform a comparative analysis and assessment of alternative solutions [8]. The use of this tool requires application of a specific algorithm, which includes defining the purpose of the analysis, initial identification of the parameters and requirements of the analysis, confirmation of system requirements, collection of cost data, calculations, analysis and interpretation of results. With reference to the construction industry, the ISO 15686-5:2008 standard: Buildings and constructed assets - Service-life planning - Part 5: Life-cycle costing:

- defines the life cycle cost methodology by introducing the concept of Whole Life Costing (WLC), defines the basis for setting goals, main principles, guidance for dealing with uncertainty and risk,
- contains examples of LCC use for the purpose of selecting the most economical project, and LCC use in planning and control of the costs of building use.

The LCC index value can be determined based on relationship (1). The value consists of investment outlays incurred to create the possibility to implement the production and the operating costs assumed over the product life cycle. Cash flows in the subsequent years are discounted so that it is possible to analyze the values occurring at different times. The LCC value is calculated for a specific system operation time.

$$LCC = C_{IC} + \sum_{t=1}^{n} \frac{C_{Ot}}{(1+r)^n} \quad (1)$$

where:

LCC – LCC index value [€],

C_{IC} – initial costs [€],

C_{Ot} – operating costs occurring in year t [€],

r – discount rate

n – lifetime of the system [years].

The value of the LCC may also be determined on the basis of a simplified relationship (2), according to which the total life cycle costs of a given investment project consist of the costs of acquisition, operation and disposal of the system.

$$LCC = C_{IC} + C_O + C_D \quad (2)$$

where:

C_{IC} – initial costs [€],

C_O – operation costs [€],

C_D – disposal costs [€].

As far as modelling of costs and the purpose of analysis are concerned, different types of life cycle costing can be distinguished. Taking into account the successive stages of a life cycle, the following costs can be distinguished:

- for the pre-production phase - costs related to product research and development, production planning, prototyping, testing;
- for the production phase - costs related to product manufacturing, logistics and production support processes - for example, advertising and distribution costs, costs of warranty repairs and other after-sales services, administrative and general costs;
- for the post-production phase - costs of recycling or sale of raw materials and semi-finished products remaining after production, land reclamation costs, disassembly and transport costs of machinery and equipment.

B.S. Blanchard and W. Fabrycky (1991) [9] argue that the total life cycle cost of a product should include research and development costs, construction and production costs, operating costs, costs of maintenance and repairs, as well as the costs of product withdrawal and storage.
Costs can also be classified as:

- internal costs - borne by a contracting authority or other users (e.g. acquisition costs, costs of use or operation, maintenance costs, decommissioning costs);
- external costs - costs attributed to external environmental effects related to a product, service or construction work, provided that their monetary value can be determined and verified (e.g. costs of emission of greenhouse gases and other pollutants, climate change mitigation costs).

3. CONCRETE LIFE CYCLE

Conventional concrete recipes used in the concrete production technology used to comprise four components: sand, gravel, cement and water. Nowadays, they can be composed of even a dozen or so ingredients. In case of regular concretes they are:

- Portland cements, Portland cement mixes and metallurgical cements, compressive strength classes 32.5 and 42.5,
- natural aggregates: sand, gravel, grits,
- mineral additives: fly ash,
- chemical admixtures modifying the properties of both a concrete mix and hardened concrete,
- water.

3.1 Use Of Waste Glass In The Concrete Production

One of the most promising waste materials to be incorporated in concretes is waste glass (WG). Glass is one of the least recycled materials in the majority of countries. Moreover, relatively large amounts of energy are consumed for the processing of the raw constituents. In theory, waste glass can be recycled completely and infinitely without losing any of its chemical and physical properties. However, broken, mixed colored and diverse origin of waste glass, make the recycling process impractical and highly expensive [10]. This is applicable especially to fine waste glass fraction which cannot be proceed to further recycling process and is dumped to landfills. Therefore, there is a need to develop markets for waste glass. Another reason for using WG as an ingredient in cement-based composites is the fact that chemical composition of waste glass (WG) is similar to that of natural sand (i.e. all commercial glass products containing more than 70% SiO_2) [11]. In the recent years, various attempts of utilization of WG aggregate and WG powder e.g. in paving blocks [5], screeds [12], architectural mortars [13], high performance concretes [14], self-cleaning concretes and bactericidal [15]- [16] mortars have been presented. Available studies show that partial replacement of natural sand with WG aggregate [15], [17]-[19] can be beneficial for improving some of the building materials properties, however, from the perspective of sustainability and technological processing, substitution of 100% of natural aggregate with WG aggregate, would be much more desirable. Beside technological aspects utilization of such materials has significant impact on the economic aspects of manufacturing green building materials with recycled materials.

3.2 Standard AndWG Concrete Life Cycle Comparison

The analysis of product life cycle cost is based on the definition of goals of the analysis, of system limits and further stages of the cycle. Defining the goal of the analysis also constitutes the first step of LCC analysis. This article focuses on the possibility to estimate the LCC for WG concrete. Such an analysis would serve for comparison of its results with the information on standard concrete costs contained in the literature. It should be noted, that the "standard concrete" according to EN 206–1 standard is understood as a concrete with dry density not lower than 2000 kg/m^3, but not exceeding 2600 kg/m^3. Definition of system boundaries for WG concrete life cycle has been performed with simplified chart for standard concrete life cycle (Figure 1).

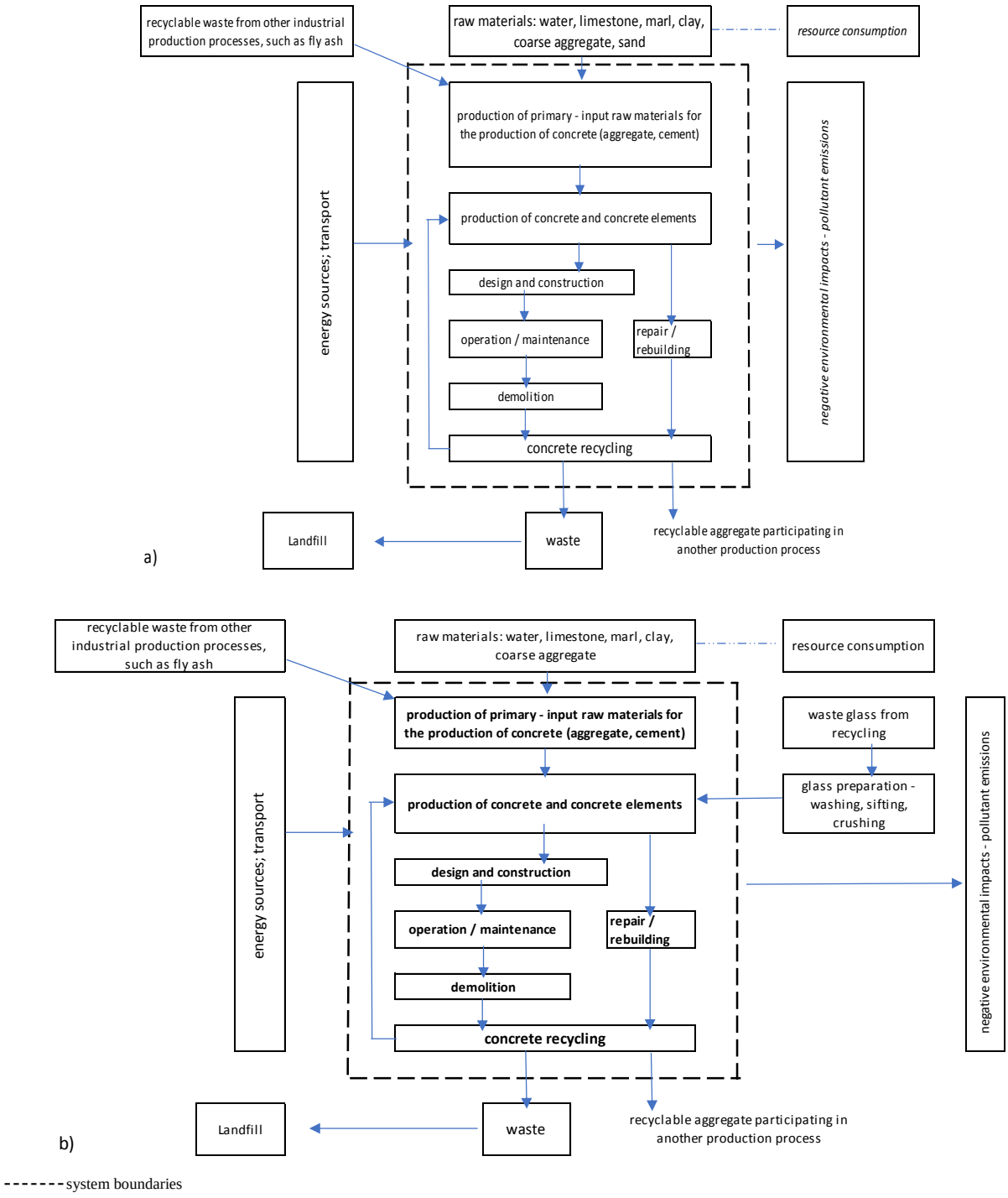

Figure 1.Life cycle of a) conventional b) with WG aggregate concrete.Based on [20]-[21]

In the model of the life cycle of WG concrete, it was assumed that the source of waste glass (waste recycling company or glassworks) and the sources of natural resources were located outside the system boundaries. At this introductory stage, it was also assumed that the process of preparation of WG for use in concrete manufacture (cleaning, sieving and grinding of glass cullet) was also occurring outside the system. This was an assumption that resulted in a significant simplification of the model.

For further analysis, in the next phase of research, the boundaries of the system will be extended so that the cost accounting takes account of the measurable external effects associated with aggregate extraction, water and energy consumption in the WG preparation process, and savings resulting from, for example, the reduction of the amount of glass waste sent directly to landfill.

3.3 Concrete Life Cycle Costs

Basic components of a concrete production cost calculation include material consumption, purchase costs, batching plant operation costs, labor and departmental costs. Each of these cost calculation items has its component cost items, is appropriately calculated and accounted for by the production volume. At a concrete batching plant, each production order for a customer can be calculated separately. From a manufacturing perspective, concrete plant costs shall include the following cost groups:

- production preparation,
- batching plant operation and maintenance,
- human resources,
- transport and equipment units,
- material storage,
- sales of concrete to customers,
- laboratory,
- marketing activities,
- management and operation of the plant,
- general infrastructure.

The costs of production preparation are related to the current preparation of materials for production at the batching plants. This includes i.e. sorting of materials, transporting necessary materials from warehouses and operation of equipment related to the delivery of materials to the mixing plant. These are usually the costs of transport and equipment services. The costs of operation and maintenance of a batching plant relate to its current operation and include primarily the costs of power consumption, spare parts replacement, the costs of maintenance and repairs, IT maintenance inspections as well as depreciation costs. Human resources costs refer mainly to the employment of operators, including salaries, salary overheads, training, work clothes, beverages, other employee benefits (identifiable for this group), business trips. In the process of production preparation and sales, transport units and vehicles are necessary e.g. trucks and equipment such as backhoe loaders for material transport, concrete mixer trucks to deliver concrete to a customer and concrete pumps which make it possible to complete a comprehensive customer service. Therefore, the costs of maintenance and operation of the transport and equipment units which the concrete plant owns or has at its disposal must be taken into account. These costs should also include: depreciation, fuel consumption, oils and greases, spare parts, tyres, repair services, maintenance services, telecommunications services (GPS), insurance, motor vehicle tax, vignettes (road tax), environmental charges and other which should be controlled, for example, leasing costs. Organization of concrete production requires storage of materials necessary for production. The materials must be placed in accordance with environmental protection regulations and must be properly protected e.g. from moisture. Hence, the costs of storage of material for production are incurred. Management and administration costs primarily concern organization and control of the production process, customer service, production settlement and management of plant resources such as transport, equipment, fuel pump and workshops. Depending on the size of the plant, separate sales departments may be identified in the organizational structure which are responsible for customer service and acquisition. The number, functions, duties and responsibilities of the employees in charge of these functions are derived from the adopted business model, work organization at the company and the organizational structure adopted. These costs include salaries, salary overheads, depreciation of fixed assets e.g. computers constituting workplace equipment, depreciation of intangible assets (relevant software), use of office supplies, telecommunications services, business trips, employee benefits, lump sums, professional literature. The maintenance costs of general infrastructure of a concrete plant are the costs of buildings such as administrative and auxiliary facilities situated on the plant premises, safety, security, protection and cleanliness on the premises of the plant, lighting etc. These costs include power consumption costs, heating costs, water costs, property tax, insurance and other operating costs, such as maintenance and repairs costs. Apart from costs related to the pre-production process and concrete production, including the "from cradle to grave" span of analysis, the costs shall include the stage of using the concrete in a structure construction (alternatively, with pre-fabrication of concrete elements), then operating costs of an object are taken into consideration, including repairs and restoration. Further on, demolition, concrete recycling and finally waste management of non-recyclable material are calculated.

4 PRELIMINARY RESULTS OF COST ANALYSIS

Comparative calculations of standard and WG concrete have been performed in the scope of "from cradle to gate" system. The classic C25/30 concrete formula was used for calculations and the costs associated with the production of this concrete were estimated, including material, payroll, general enterprise costs and laboratory test costs. The costs of prefabricated components

(energy, payroll, depreciation of equipment, general enterprise) were then added, using the example of a 50 cm x 50 cm x 7 cm pavement slab. These costs were then converted into costs for 1 m^3 of concrete used in the prefabrication process, in order to unify the calculation procedure. Then similar calculations were performed for WG concrete. They are preliminary calculations, constituting and introduction to further research covering concrete life cycle costs including an attempt at monetization of external effects.

Table 2.Comparative production costs calculation of traditional concrete and concrete with WG

Materials	Cost	Unit	Concrete C25/30		Concrete with WG	
			amount	cost	amount	cost
Cement CEM II 42.5 R	92.50	€/t	0.325	30.07	0.325	30.07
Sand (0-2 mm)	6.46	€/t	0.630	4.07	-	-
Waste glass	25.00	€/t	-	-	0.630	15.75
Aggregate (gravel 2-16 mm)	12.75	€/t	1.226	15.64	1.226	15.64
Water	1.25	€/m^3	0.167	0.21	0.167	0.21
Production costs		€/m^3		14.00		14.00
Laboratory		€/m^3		5.00		5.00
Total production costs of 1m^3 of concrete		€/m^3		68.99		80.67
Prefabrication costs		€/m^3		25.00		25.00
Total production costs of 1m^3 of precast pavement concrete		€/m^3		93.99		105.67

On the basis of production cost comparison, it could be concluded that the total production costs of one precast paving slab (50cm x 50cm x 7cm) with WG would be higher by 14.38%. Using the WG requires glass transport costs, as well as preliminary material processing (washing, sieving and grinding), which in a simplified calculation method may show higher costs of this solution. The results however do not reflect complete life cycle costs of the product, not only because they do not cover costs of further operation of a structure, its demolition and concrete recycling. Illustrating the actual cost difference resulting from substituting the sand with WG requires inclusion of external costs and benefits. The external benefits of lowering the amount of glass directed to a landfill, and thereby lowering the waste storage costs, are of high value. Waste glass is not bio-degradable and therefore, rational consideration for alternative utilization dictates a diversion of the material away from landfill disposal sites. To illustrate the life cycle costs of both types of concrete and compare them, it is therefore necessary to extend the boundary of the system and carry out calculations on the life span of the structure in which the mentioned materials are used, for example 100 m of pavement constructed from prefabricated standard concrete and WG concrete. The next step will be the inclusion of costs associated with the demolition of this pavement and the recycling of slabs from the demolition, including the costs associated with the storage of demolition waste that cannot be recycled. This set of calculations should then include estimates of external effects, mainly regarding environmental impacts resulting from aggregate extraction, aggregate transport, as well as recycling costs of glass waste used in WG concrete production, and the benefits of reducing the use of natural resources (sand) and reducing the amount of glass waste sent to landfill without commercial use. This will be covered in further studies whose results will be presented in subsequent publications

5 SUMMARY

Reduced consumption of construction materials aimed at reduced consumption of non-renewable energy sources and raw materials with increasing use of recycled materials is one of the key design principles of sustainable construction. The use of waste materials for cement and recycled aggregate production results in a significant reduction in the consumption of natural resources and hence the negative impact of concrete structures on the environment [22]. Mixed glass cullet can compete in price with natural aggregate. The material is readily available, it does not need to be mined or excessively transported, reducing its carbon footprint. The recycling of waste materials by using them in the manufacture of building materials and products, due to the very large scale of this production, is systematically increasing and gaining importance, both in economic and environmental terms. An important reason for interest in production technologies using recycled materials such as glass cullet is the rapid depletion of natural resources used in production processes. The global dimension of concrete production results in extraction of very large amounts of aggregate , including sand, while the availability of these resources worldwide is very uneven. Also, even with a small unit consumption of waste materials, the scale of production of building materials such as concrete involves the possibility of utilizing significant quantities of waste. The benefits of using waste material include the protection of mineral resources, a reduction of energy use in processing (lower life cycle costs of products) and the reduction of emissions of harmful substances to the atmosphere. It is therefore necessary to continue exploring in parallel both research avenues: the development of new material technologies, such as WG concrete, and the study of the economic context of implementing such innovative solutions in industrial processes.

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19 - 23 April 2017, Sarajevo

Optimization of Fertilizer Production By Using Taguchi Method From Chromium Leather Shaving Wastes

Kaan Cakti[1], Aykut Sancakli[2], Bahri Basaran[3]

Abstract

Chromium came up to the most common tanning agents owing to its universal applicability, cost effectivity, easily procurance and tanning characteristics. Approximately 25% of chrome tanned leathers are generated as a waste basis of total mass in the processes such as trimmings, shavings and buffings. The fact that around 600.000 tones of chrome tanned solid waste is produced are being generated per year due to the world annual capacity is the main sustainability problem on the agenda; that lead to both environmental and economic problems caused by their high recycling and exhausting cost. Considering the severe impacts on industrial regularity this paper aimed at the valorization of solid waste by hydrolysate, ion process and the optimization possibilities in obtaining the amino acid content byanalysis. Calculation charts was prepared as per S/N ratio and results were analyzed by using Taguchi Method .

Keywords: Amino Acid, Collagen Hydrolysates, Shavings, Colloidal Solution, Liquid Fertilizer, Taguchi Method.

1. INTRODUCTION

Chromium, having a distinction due to its ability to produce lighter, softer, stronger and brighter leathers have gained importance in leather processing since the second half of last century and became the most important tanning agents still widely available in the world. The fact that the quicker and relatively cheaper processing has made the tanners to resort to the practice of chrome tanning has increased the adoption of the method up to 90% in the world [1]. Today; leather Industry is facing with a increasingly stringent and complex environmental challenges about the tanning routines and the stricter environmental legislations which mitigate discharge of untreated chrome tanning effluents. One of the major waste categories concerning about the environmental incompatibility is chromium solid wastes such as trimmings, splittings, shavings and dusts generated from mechanical processes[2]. In the case of conventional chrome tanning processes, 45-73% (average 64%) of the raw hides and skins is shifted to by-products and solid waste [3]. The fact that around 600.000 tons of chrome tanned solid waste are being produced annually is the main sustainability problem. Hence; it should be handed down unwinded to next generations [4]. On the other hand; these wastes require to be taken some special measures since the conversion of chromium (III) to chromium (VI) poses a potential risk to human health and the environment [5]. Disposals of these wastes have many drawback carrying potentials for the landfills. In some cases, the amount of wastes generated exceed the carrying capacity of the region. This in turn leads to adverse effects on eco-systems. Of solid wastes chromium shavings are of main importance being composed of chemically treated protein, if not utilized properly, they would pose hazardous pollution problem to the environment. For this reason there necessary to manage this chrome containing shavings which is not easy. Some authors have reported several alternatives for their recovery. Due to environmental problems, many scientific studies are widely carried out all over the world for valorization of chrome containing solid wastes [6]. [7], [8], [9], [10], [11]. According to these methods, the use of protein and chromium after destruction with an appropriate method would possibly become preference [12], [13], [14]. This study was carried out on the chromium shavings to hydrolyse them into amino acid colloidal solution. In details the maximization of free amino acid content, productivity of amino acids obtained from chrome shavings by chemical hydrolysis and the guideline yielded in the maximum efficiency were statistically evaluated by Taguchi method.

2. MATERIAL AND METHOD

The outstanding process parameters have been determined through some preliminary attempts carried out to acquire high amino acid content solutions for biostimulant applications. As per the experimental design the relevant process parameters and check points were identified, and the trial patterns of experimental design were scaled down and disburdened using the Taguchi Method.

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After hydrolisation, triplicated analysis were carried out and the results were evaluated by the Minitab program and observations were used for the amendments of the process. The chromium shavings used in the study were obtained from Iskefe Leather Co., sodium hydroxide (NaOH) and potassium hydroxide (KOH) were technical grade from Sigma Aldrich. The sediment filtrations were carried out by Whatman No: 1 filter paper. Ultra pure water having 0.5 μΩ/cm conductivity.was obtained using PURIS Expe-UP Ele-M model device (Experimentals). Prior to hydrolysation chromium shavings supplied were physically removed from the trashes and the moisture content was measured before the trials to specify the substance, therefore; the concentrations and chemical additives to be used in the hydrolysation. For the process parameters such as chemical additives and time; a relative proportional increments were executed according to the Taguchi method. The experimental results obtained in the Taguchi test design method are converted to signal / noise (S / N) ratio and evaluated. The signal / noise ratio values are calculated and analyzed differently depending on the quality parameters values targeted by large, small and nominal quantities. In the experiments, chrome shavings, chemical type, chemical ratio, duration and temperature were chosen as variable. The raw material concentration was determined as the main variable and the chemical ratio and duration in the experiments; it was selected at certain coefficient ratios according to the Taguchi method. Variables and ratios can be seen in Table 1.

Table 1. Hydrolyzation Experiment Parameters

	Trial 1	**Trial** 2	**Trial** 3
% Raw Material	10	15	22,5
% Chemical (KOH-NaOH)	4 / 6 / 9	4 / 6 / 9	4 / 6 / 9
Duration (h)	6 / 9 / 13,5	6 / 9 / 13,5	6 / 9 / 13,5
Temperature (°C)	75 ± 5 / 85 ± 5 / 95 ± 5	75 ± 5 / 85 ± 5 / 95 ± 5	75 ± 5 / 85 ± 5 / 95 ± 5
Agitation (rpm)	50	50	50

Depending on the variables given in Table 1; 64 hydrolysis reaction should be performed in order to analyze and perform full factorial regression experiments. With using Minitab software relevant variables and datas were generated to experiment design within the rules of Taguchi Method and 18 trials determined to represent total experiment. Experimental design using Taguchi method was carried out in 3 groups and sequential experiments were carried out according to the amount of chemical substances in each group and total amino acid, viscosity, free amino acid, organic carbon amount, total nitrogen, hydrolysis grade, brix, viscosity analysis were performed to evaluate the results on the obtained amino acid solutions.

Table 2. Taguchi Method Experimental Design

Group 1	Chemical Type	KOH	KOH	KOH	NaOH	NaOH	NaOH
	Raw Material (%)	10	10	10	10	10	10
	Chemical (%)	4,0	6,0	9,0	4,0	6,0	9,0
	Temp. (°C)	75 ± 5	85 ± 5	95 ± 5	95 ± 5	75 ± 5	85 ± 5
	Time (h)	6	9	13,5	13,5	6	9
Group 2	Chemical Type	KOH	KOH	KOH	NaOH	NaOH	NaOH
	Raw Material (%)	15	15	15	15	15	15
	Chemical (%)	4,0	6,0	9,0	4,0	6,0	9,0
	Temp. (°C)	75 ± 5	85 ± 5	95 ± 5	85 ± 5	95 ± 5	75 ± 5
	Time (h)	9	13,5	6	13,5	6	9
Group 3	Chemical Type	KOH	KOH	KOH	NaOH	NaOH	NaOH
	Raw Material (%)	22,5	22,5	22,5	22,5	22,5	22,5
	Chemical (%)	4,0	6,0	9,0	4,0	6,0	9,0
	Temp. (°C)	85 ± 5	95 ± 5	75 ± 5	95 ± 5	75 ± 5	85 ± 5
	Time (h)	6	9	13,5	9	13,5	6

2.1 Hydrolysation of Chrome-Tanned Leather Wastes

In the hydrolysis process of chrome-tanned leather wastes, the following test methods were applied for different chemical ratios (4.0%, 6.0% and 9.0%) at different temperature, time and raw material ratios.

3. RESULTS & DISCUSSIONS

Chromium content of chromium leather wastes and amino acids obtained from these wastes were determined by Agilent brand 240 FS-AA model atomic absorption device (16). Other chemical analyzes were determined according to the international standards of DIN, ISO, which are equivalent to each other.

3.1 Analysis Results

As a result of the hydrolysis studies, the physical properties of the samples obtained after filtration were determined by measuring the viscosity and brix values. The average results obtained can be seen in table-3.

Table 3. Physical Properties of Hydrolysate

Analysis	Results
Viscosity	1,36 cp
Brix	18,44°

The chemical properties of the samples obtained after hydrolysis were measured by performing total amino acid, free amino acid, total nitrogen, carbon amount, hydrolysis grade tests. The obtained results can be seen in Table-4.

3.1.1 Amino Acid Analysis

Total and free amino acid analyzes were performed using the pre-column derivation method on the Agilent 1260 Infinity model high-pressure liquid chromatograph. [15] It is necessary to break down the peptide bonds in the solution and to analyze the total amount of amino acids in the solution free form of all amino acids. Before the amino acid analysis in the study, the solution was hydrolyzed with 6 N HCl 37% in the reflux for 24 hours and then the amount of free amino acid was determined by the method described above.

3.1.2 Total Nitrogen and Carbon Amount

In the Carbon Quantity analysis the Walkley Black Method was used; the total amount of nitrogen analysis chemical fertilizer control regulation was carried out.

Table 4. Chemical Analysis Results

Exp. No	Chemical Type	Raw Material (%)	Chemical Ratio (%)	Temperature (°C)	Duration (Hour)	Total Amino Acid (%)	Free Amino Acid (%)	Total Nitrogen Amount (%)	Carbon Amount (%)	Hydrolysation Degree
1	KOH	10,0	4,0	75 ± 5	6	4,09	1,95	1,47	4,82	37,14
2	KOH	10,0	6,0	85 ± 5	9	2,51	2,75	1,49	3,73	62,60
3	KOH	10,0	9,0	95 ± 5	13,5	3,42	5,16	1,40	2,83	56,07
4	KOH	15,0	4,0	95 ± 5	9	10,37	0,59	2,30	5,41	18,64
5	KOH	15,0	6,0	75 ± 5	13,5	10,72	2,10	2,03	13,39	36,77
6	KOH	15,0	9,0	85 ± 5	6	10,88	3,88	2,05	3,59	49,84
7	KOH	22,5	4,0	75 ± 5	6	29,84	0,48	3,15	7,16	12,85
8	KOH	22,5	6,0	85 ± 5	9	8,56	1,08	2,71	6,42	22,18
9	KOH	22,5	9,0	95 ± 5	13,5	17,15	5,27	3,50	7,96	35,10
10	NaOH	10,0	4,0	85 ± 5	13,5	10,32	3,83	1,67	4,31	12,72
11	NaOH	10,0	6,0	95 ± 5	6	10,39	5,18	1,86	4,00	56,17
12	NaOH	10,0	9,0	75 ± 5	9	5,66	7,21	1,63	4,13	68,52
13	NaOH	15,0	4,0	85 ± 5	13,5	8,90	4,98	2,06	4,21	58,48
14	NaOH	15,0	6,0	95 ± 5	6	22,33	6,11	2,11	7,10	53,13
15	NaOH	15,0	9,0	75 ± 5	9	9,74	1,84	2,27	5,11	34,53
16	NaOH	22,5	4,0	95 ± 5	9	20,19	3,14	3,73	8,39	29,92
17	NaOH	22,5	6,0	75 ± 5	13,5	16,23	4,22	3,30	8,29	31,66
18	NaOH	22,5	9,0	85 ± 5	6	7,26	5,96	2,87	6,77	50,22

3.2 Statistical Analysis

Another important aspect of the Taguchi Experimental design method is that the design of the experiment is balanced, ie, that factors can be assessed independently of each other, and that there are an equal number of samples under each tested condition for different levels of design factors. Taguchi's standard designs are based on this system [16].

3.2.1 Taguchi Experiment Design Steps

1. Selection of factors and interactions to be evaluated,
2. Selection of factor levels
3. Choosing the right orthogonal order
4. Assigning factors or interactions to columns,
5. Making tests,

6. Analyzing the results,

7. Performing verification experiments [17]

3.2.2 Measurements

3.2.2.1 Signal / Noise Ratio Results

Table 5. Results of Signal Noise Ratio

Exp. No	Total Amino Acid (S/N)	Total Nitrogen (S/N)	Hydrolysation (S/N)	Organic Carbon (S/N)
1	12,2345	3,34635	31,3968	13,6609
2	7,9935	3,46373	34,6027	10,5009
3	10,6805	2,92256	34,9746	9,0050
4	20,3156	7,23456	25,4089	14,6639
5	20,6039	6,14992	31,3089	13,6248
6	20,7326	6,23508	33,9516	11,1019
7	29,4960	9,96621	22,1781	17,0983
8	18,6495	8,65939	26,9192	16,1507
9	24,6853	10,8814	32,4235	18,0183
10	22,3785	4,45433	34,5590	12,6895
11	18,5679	5,39026	35,3624	12,0412
12	18,4441	4,24375	36,7163	12,3190
13	18,9878	6,27734	35,3401	12,4856
14	20,5061	6,48565	35,0839	12,8096
15	21,2441	7,12052	30,5937	14,1684
16	25,3058	11,4342	29,8272	18,4752
17	24,2064	10,3703	30,7941	18,3711
18	23,2573	9,15764	33,7684	16,6118

3.3 Minitab Analysis

3.3.1 Total Amino Acid Main Graphic Impact

Table 6. Control Factor Variance Analysis

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Contribution (%)
Chemical Type	1	8,94	8,946	8,94	0,33	0,58	1,29
Raw Material	2	359,02	359,02	179,51	6,63	0,02	52,10
Chemical Ratio	2	66,61	66,61	33,31	1,23	0,34	9,66
Temperature	2	8,57	8,57	4,28	0,16	0,85	1,24
Duration	2	29,1	29,1	14,55	0,54	0,60	4,22
Residual error	8	216,74	216,74	27,09			31,45
Total	17	689,00					

S= 5,205, R-Sq = % 68,5, R – Sq (adj) = % 33, 28, These results were obtained from by using computer programme.

Table 7. Optimal Levels of Control Factors and Effect Sequence

Level	Chemical Type	Raw Material (%)	Chemical Ratio (%)	Temperature (°C)	Duration (Hour)
1	10,838	6,668	14,128	11,310	13,073
2	12,249	10,502	9,517	12,480	
3	-	17,458	10,983	10,838	
Delta	1,410	10,790	4,612	1,642	
Level	5	1	2	4	

The predictive equation for the total amino acid as a result of the analysis of variance;

Total Amino Acid (%) = 1,03 + 1,41*Chemical Type + 8,8*Raw Material Ratio – 54,1*Chemical Ratio – 0,24*Temperature – 0,153*Duration,

S= 4,95873 , R-Sq = 57,2

3.3.2 Free Amino Acid Main Graphic Impact

Table 8. Control Factor Variance Analysis

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Contribution (%)
Chemical Type	1	20,65	20,65	20,65	9,55	0,01	29,87
Raw Material	2	4,32	4,32	2,16	1,00	0,41	6,28
Chemical Ratio	2	17,38	17,38	8,69	4,02	0,06	25,24
Temperature	2	1,98	1,98	0,99	0,46	0,64	1,24
Duration	2	7,23	7,23	3,61	1,67	0,24	2,88
Residual error	8	17,30	17,30	2,16			10,49
Total	17	68,89					25,22

S= 1,471, R-Sq = % 74,9, R – Sq (adj) = % 46,6, These results were obtained from by using computer programme.

Table 9. Optimal Levels of Control Factors and Effect Sequence

Level	Chemical Type	Raw Material (%)	Chemical Ratio (%)	Temperature (^{o}C)	Duration (Hour)
1	2,584	4,347	2,495	3,187	3,927
2	4,727	3,262	3,573	3,913	2,780
3	-	3,358	4,898	3,867	4,260
Delta	2,142	1,085	2,403	0,727	1,480
Level	2	4	1	5	3

The predictive equation for the total amino acid as a result of the analysis of variance;

Free Amino Acid (%) = 2,76 + 2,14*Chemical Type + 7,18*Raw Material Ratio – 47,8*Chemical Ratio – 0,34*Temperature – 0,067*Duration,

S= 1,48057 , R-Sq = %61,8, R-Sq (adj) =% 45,9

3.3.3 Total Nitrogen Main Graphic Impact

Table 10. Control Factor Variance Analysis

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Contribution (%)
Chemical Type	1	0,108	0,10	0,10	1,61	0,24	1,19
Raw Material	2	8,179	8,17	4,07	60,55	0,00	89,66
Chemical Ratio	2	0,069	0,06	0,03	0,52	0,61	0,76
Temperature	2	0,189	0,18	0,9	1,40	0,30	2,07
Duration	2	0,034	0,03	0,01	0,25	0,78	0,37
Residual error	8	0,540	0,54	0,06			5,92
Total	17	9,122					25,22

S= 0,2599, R-Sq = % 94,1, R – Sq (adj) = % 87,4, These results were obtained from by using computer programme.

Table 11. Optimal Levels of Control Factors and Effect Sequence

Level	Chemical Type	Raw Material (%)	Chemical Ratio (%)	Temperature (°C)	Duration (Hour)
1	2,233	1,587	2,397	2,450	2,252
2	2,389	2,137	2,250	2,205	2,355
3	-	3,210	2,287	2,278	2,327
Delta	0,156	1,623	0,147	0,245	0,103
Level	3	1	4	2	5

The predictive equation for the total amino acid as a result of the analysis of variance;

Total Nitrogen (%) = 0,216 + 0,156*Chemical Type + 13,1*Raw Material Ratio – 1,93*Chemical Ratio – 0,0858*Temperature – 0,0087*Duration,

S= 0,248903 , R-Sq = % 91,9, R-Sq (adj) =% 88,5

3.3.4 Carbon Amount Main Graphic Impact

Table 12. Control Factor Variance Analysis

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Contribution (%)
Chemical Type	1	0,58	0,58	0,58	1,91	0,20	1,3
Raw Material	2	43,75	43,75	21,87	71,33	0,00	84,26
Chemical Ratio	2	1,41	1,41	0,70	2,31	0,16	2,72
Temperature	2	3,29	3,29	1,64	5,38	0,03	6,35
Duration	2	0,41	0,41	0,20	0,67	0,53	0,37
Residual error	8	2,45	2,45	0,30			0,79
Total	17	51,92					4,72

S= 0,5538, R-Sq = % 95,3, R – Sq (adj) = % 90,0, These results were obtained from by using computer programme.

.

Table 13. Optimal Levels of Control Factors and Effect Sequence

Level	Chemical Type	Raw Material (%)	Chemical Ratio (%)	Temperature (°C)	Duration (Hour)
1	5,148	3,905	5,717	5,932	5,118
2	5,509	4,582	5,205	5,070	5,468
3	-	7,498	5,063	4,983	5,398
Delta	0,369	3,593	0,653	0,948	0,350
Level	4	1	3	2	5

The predictive equation for the total amino acid as a result of the analysis of variance;

Total Carbon (%) = 1,53 + 0,361*Chemical Type + 29,5*Raw Material Ratio – 12,4*Chemical Ratio – 0,474*Temperature – 0,032*Duration,

S= 0,695775 , R-Sq = % 88,8, R-Sq (adj) =% 84,1

3.3.5 Hydrolysation Degree Main Graphic Impact

Table 14. Control Factor Variance Analysis

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Contribution (%)
Chemical Type	1	736,8	736,8	736,8	9,03	0,017	14,934
Raw Material	2	1549,8	1549,8	774,91	9,50	0,008	37,724
Chemical Ratio	2	641,8	641,8	320,90	3,93	0,065	15,622
Temperature	2	280,4	280,4	140,20	1,72	0,239	6,82
Duration	2	246,7	246,7	123,35	1,51	0,277	6,00
Residual error	8	652,7	652,7	81,59	-	-	15,887
Total	17	4108,2					4,72

S= 9,032, R-Sq = % 84,1, R – Sq (adj) = % 66,2, These results were obtained from by using computer programme.

Table 15. Optimal Levels of Control Factors and Effect Sequence

Level	Chemical Type	Raw Material (%)	Chemical Ratio (%)	Temperature (°C)	Duration (Hour)
1	36,56	54,59	35,26	37,45	44,01
2	49,35	42,40	43,79	46,52	37,99
3	-	31,88	49,81	44,89	46,87
Delta	12,80	22,71	14,56	9,07	8,88

The predictive equation for the total amino acid as a result of the analysis of variance;

Hydrolysis Degree = 21,8 + 12,8*Chemical Type - 178*Raw Material Ratio + 284*Chemical Ratio + 3,72*Temperature + 0,507*Duration,

S= 9,29639 , R-Sq = % 74,8, R-Sq (adj) =% 64,2

4. CONCLUSION

The most effective control factor on all selected quality parameters have been determined as raw material amount (51.82%). The statistical significance of the raw material ratio on all quality parameters was found to be significant as the percent contribution was greater than 5%. Raw material ratio has affect of total nitrogen (89.662%), organic carbon (84.268%), Brix (71.916%) and total amino acid (52.107%). Also the effects on other quality parameters are statistically significant. The total nitrogen, organic carbon, brix and total amino acid values are increased when the raw material ratio selected maximum value (22.5%) is increased, when the raw material ratio selected minimum value (10%) while the hydrolysis grade, viscosity and free amino acid values are increased. In the fertilizer market, fertilizers with high nitrogen, carbon and organic matter content are highly demanded. On international fertilizer market high amino acid content fertilizers belong special fertilizer class and find buyers at high price level. Based on the results obtained from the study, the raw material ratio should be 22.5% at the optimal level to obtain products with higher total nitrogen, organic carbon, brix and total amino acid amount. In addition , it has been possible to determine the process parameters for the targeted product feature by using the predictive equations obtained by the study. For this experimental study, when the correlation coefficient of the variance analysis was obtained as 79.5% as a result of the Taguchi Method analyzes of this study for the determination and evaluation of the effects of 5 control factors on 7 quality parameters of fertilizer product, the relationship between control factors and quality characteristics understood. Optimal control factor to ensure all 3 quality characteristics at the same time by optimizing with the methods such as Gray Relational Analysis, TOPSIS for the most important 2 or 3 quality parameters (eg "total amino acid, free amino acid, organic carbon amount" Levels can be determined. The results of this statistical analysis were made for the selected levels of selected control factors. When the experiment is repeated by changing the coefficient between the levels and levels of the control factor, different results will be obtained.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Valorization of Fibrous Leather Wastes: Leatherboard Production Technology

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Abstract

Tanning industry serves for value addition of a by-product having a considerably pollution potential and blighting the life quality due to the wastes generated. The wastes from leather industry are involving both the inorganic and organic pollutants spoils the aquatic life, soil quality and atmospheric conditions. Of them fibrous wastes are of main importance in terms of their disposal and especially wastes produced in shaving process have a great value for utilizing in composite material production. Namely bounded leather is one of the main variety of value added materials by regenerating the fibrous matrix into an upper sheets.In this research, considering the environmental sustainability, chromium shavings as fibrous leather wastes were used as reinforcement fragments in polymeric matrices for composite applications. To reveal the production parameters of composites used leather wastes, tanning agents, binders and fiber types were investigated. In the evaluation of performance and structural properties of bounded leather, some physicomechanical tests and scanning electron microscopy (SEM) analyses were carried out. Regarding the effect of tanning agents, it was comprehended that ligno sulphonates give better strength properties to the product. Natural latices among the binder types examined gave the best outcomes as polymer matrix. On the other hand, the combination of leather fibers with other fibers in the matrix, especially with paper fibers, seemed to be increased the product properties.According to the results, it was found that such products having similar properties to the leather are suitable for various applications such as shoe parts and some customer goods, and the properties can be developed in liaison with the demands as a composite basis for some fields.

Keywords: Composite materials, leather fibers, leather-like materials, tanned leather wastes.

1. INTRODUCTION

With the twenty first century, great changes and developments are taking place in our world affecting our life. It is seen as a current problem that the decline of natural products with the increase of industrial production causes to related environmental problems and turns our existence to technological life. Depending on these developments, production of regenerated products, which are environmentally friendly and recyclable, has come to the forefront in all sectoral areas for the elimination of environmental harms through recycling and reuse approaches. For these reasons, the development of new and environmental friendly technologies and the studies of new production models and product forms has become extremely important for the leather industry. In this context, conversion of tanned leather wastes into functional products for different uses is considered as a solution for a serious environmental problem in the sector. Leather industry will have to catch up with contemporary models of productions for being obliged to adapt ecologically compatible, enviromental friendly, energy efficient and cost effective processes. The fact that 1 ton raw hide results in only 200-250 kg of finished products implies that there are huge amount of wastes available which are mostly solid wastes. The leather industry wastes have to be securely disposed off in order to eliminate bad reputation and stop facing challanges.Of these wastes the shavings are of high volume and concerns about their disposals in landfills and considering the fibrous texture they are able to have a potential to reuse. The disposal problem is due to the fact that 0,6 million tons of fibrous solid waste generated by the industry annualy. The best practise in avoidance of disposal of those wastes to landfill is to transform them to a composite matrix namely bounded leather. Hence; this production is a solution oriented alternative for the deposition of huge quantity wastes containing chromium in landfills, thereby; preventing potential danger to public health due to the possibilityof oxidation of trivalent chromium into toxic hexavalent chromium ([1], [2],[3]). In this research, we have studied on the production of composite materials by regenerating natural leather fibrous particules into a new texture in three-dimensional way. In order to meet the demands and requirements some mechanical characteristics of rebuilt material were tried to improve as per the parameters of tanning agent, binder and fiber types. Additionally; new regeneration of texture having been simulated to leather were executed to comply with the integrity in mechanical behaviour Since the best solution is the use up this huge volume of wastes after converting them into any serviceable material, the improvement the properties was the main aim of the study for spending its usage in many fields. Results indicates that regenerated materials having leather-like properties is both going for the demands in many fields and that imperative for sustainability and competitiveness.

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2. MATERIALS AND METHODS

2.1. Materials (Fibrous wastes)

Leatherboard processing is the formation of a compound with leather fibers, non-leather fibers and binders appropriately. It deals with the preparation of a stabilized dispersion, spreading out on a band to be a continuous sheet and getting stuck on a material with an integrity. Even though fibrous wastes including shavings and others as well as binders and surface active agents are main components in leatherboard production, several processing auxiliaries such as; crosslinkers, softeners, retention and drainage aids, water repellents, antifoaming agents, dispersants, chelating agents, coagulants all are quality-dependent factors. This processing auxiliaries have certain functions for preparation of a dispersion with tiny particles ground to 1-2 mm, subsequently wet-laid period and dry sheeting. In the Fig. 1 the process outline is indicated schematically.

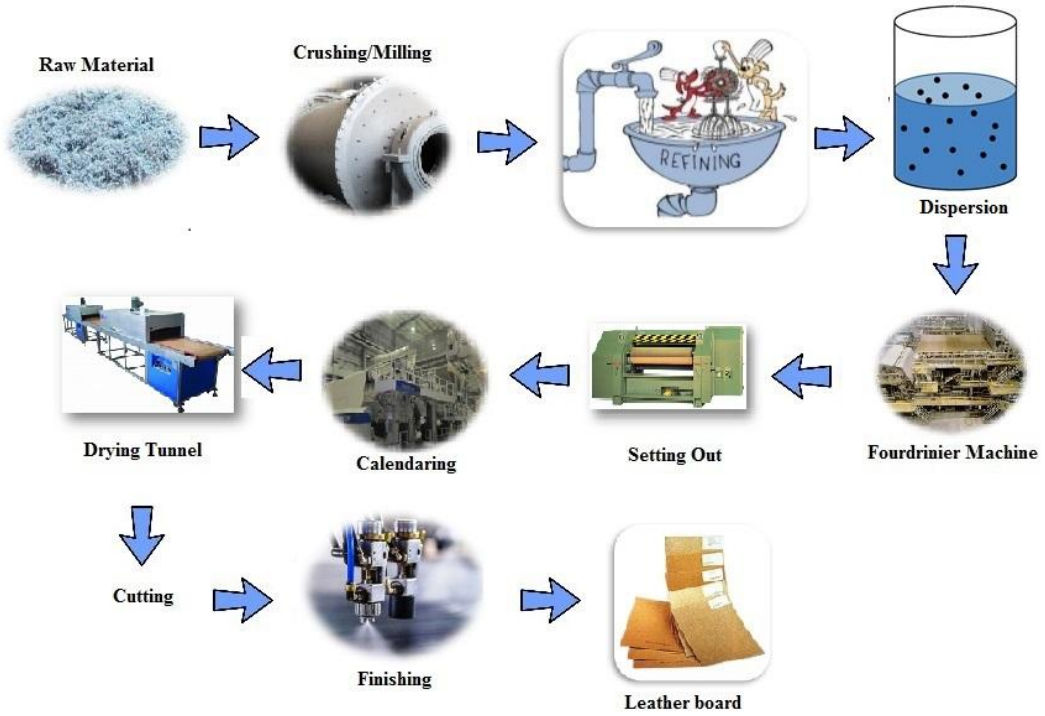

Figure 1. Leatherboard manufacturing process outline

2.2. Fabrication of Composite Materials

In the composite process various additives and extenders were compounded into dispersion and converted together into sheet. Herewith; Table 1. categorized them as specified.

Table 1. Preparation of Composite Materials

Additive Types	Product Code	Remarks
Tanning Agent	K1	Valex
	K2	Mimosa
	K3	Chestnut
	K4	Tara
	K5	Ligno sulfonates
Binder	K1	Acrylic acid ester copolymers
	K6	Natural latex
	K7	PVA
	K8	Styrene-acrylic ester copolymer
Fiber	K1	Leather fibers (Shavings)
	K9	Leather and paper fibers
	K10	Leather and cellulose fibers

2.3. Quality assessments

2.3.1 Structural Properties (Texture)

The functionality of composite material is influenced by the structural features and thereby; for the end usage in line with this objective; Hitachi TM-1000 Table-top SEM device was used to image the cross sections of leatherboard samples. Images were taken at 120 magnification for all samples.

2.3.2 Determination of Physicomechanical Properties

Usually referred to as "humidity ", this water vapor affects the physical properties of materials with which it is in contact. This is particularly noticeable in the case of materials of an organic and fibrous nature, such as wool, cotton, silk, wood, paper, and leather. Prior to the tensile, flexometer and stitch tear tests, the composite samples were conditioned according to the official standard of EN ISO 2419 and the sampling was performed according to EN ISO 2418. The tensile strengths and percentage extensions of the samples were carried out according to the procedures described in the standard of EN ISO 3376. The flex resistance of the samples were measured according to ISO 5402-1. The stitch tear strengths of the samples were measured according to ISO 23910:2017. To perform the tensile and stitch tear tests Shimadzu A-ISG tensile testing device and for flexometer tests, SATRA STM 129 testing device were used.

3)RESULTS AND DISCUSSIONS

Leather industry is known to be one of the largest waste generating industry. During the processing of raw hides; about 20 – 25 % of raw (salted) bovine hide weight is transformed into leather; for sheep or goat skins, this range is 12 – 15 %, In shaving certain thickness would be removed by cutting out the fine, thin fragments from the flesh side. Shaving can be carried out on tanned or crusted leather and the small pieces of leather which are shaved off are called shavings.Their characteristics being at the forefront is their fibrous texture and of course their recovery in comparison with other wastes is feasible. Developing low cost composite materials for use in footwear, leather goods, household interiors, etc. from leather wastes is an efficient way of waste utilisation and environmental pollution prevention.Mechanical properties of leather boards play a major role in determining their end use applications ([5]).

3.1 Structural Properties of Leatherboards

Some SEM analyses were examined to reveal the performance relevancewith structural properties of the leather board samples. Scanning electron photomicrographs imaging the cross section at a magnification of 120 are shown in Fig. 2 and Fig. 3.

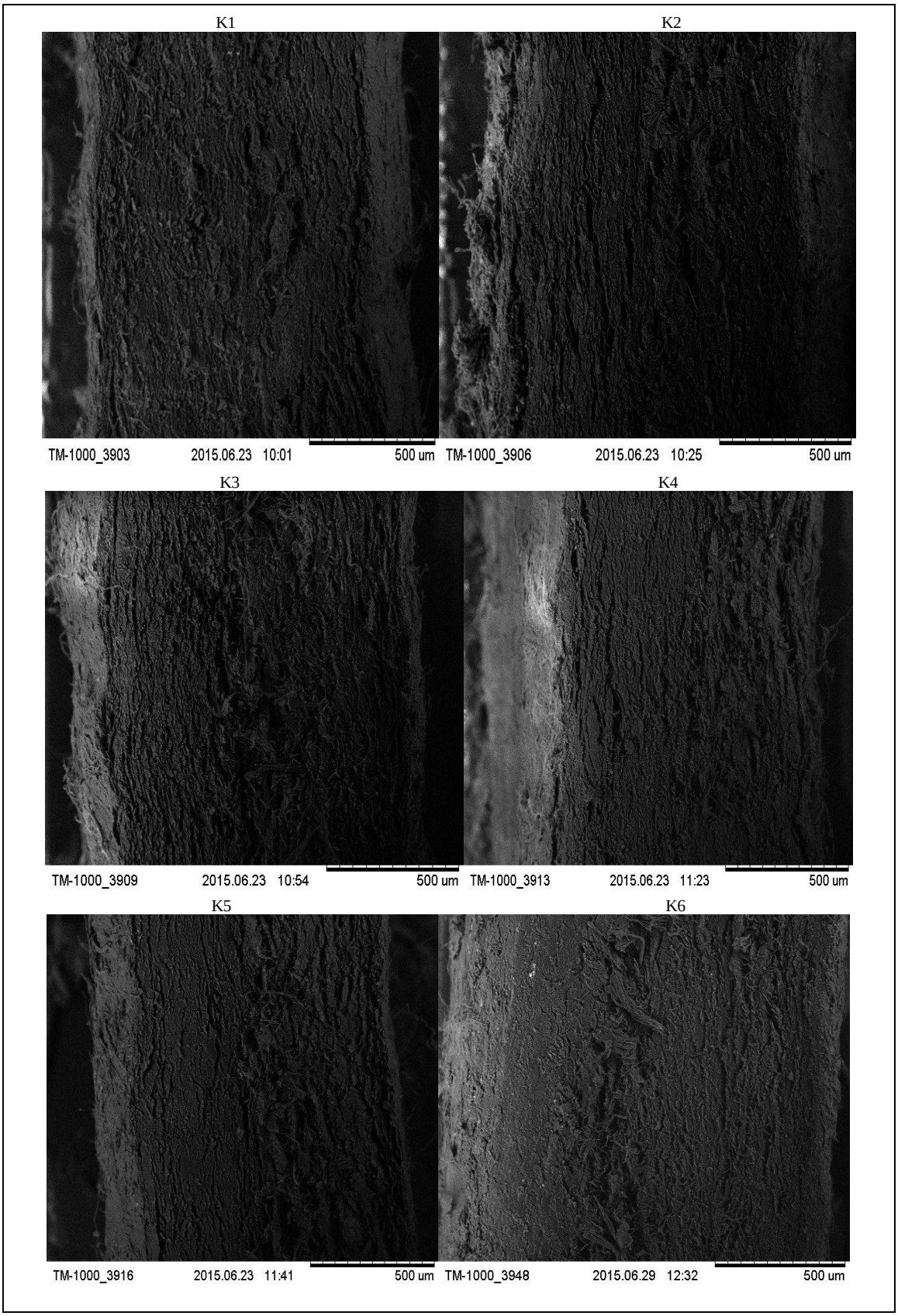

Figure 2. SEM's of the samples by magnification at 120X

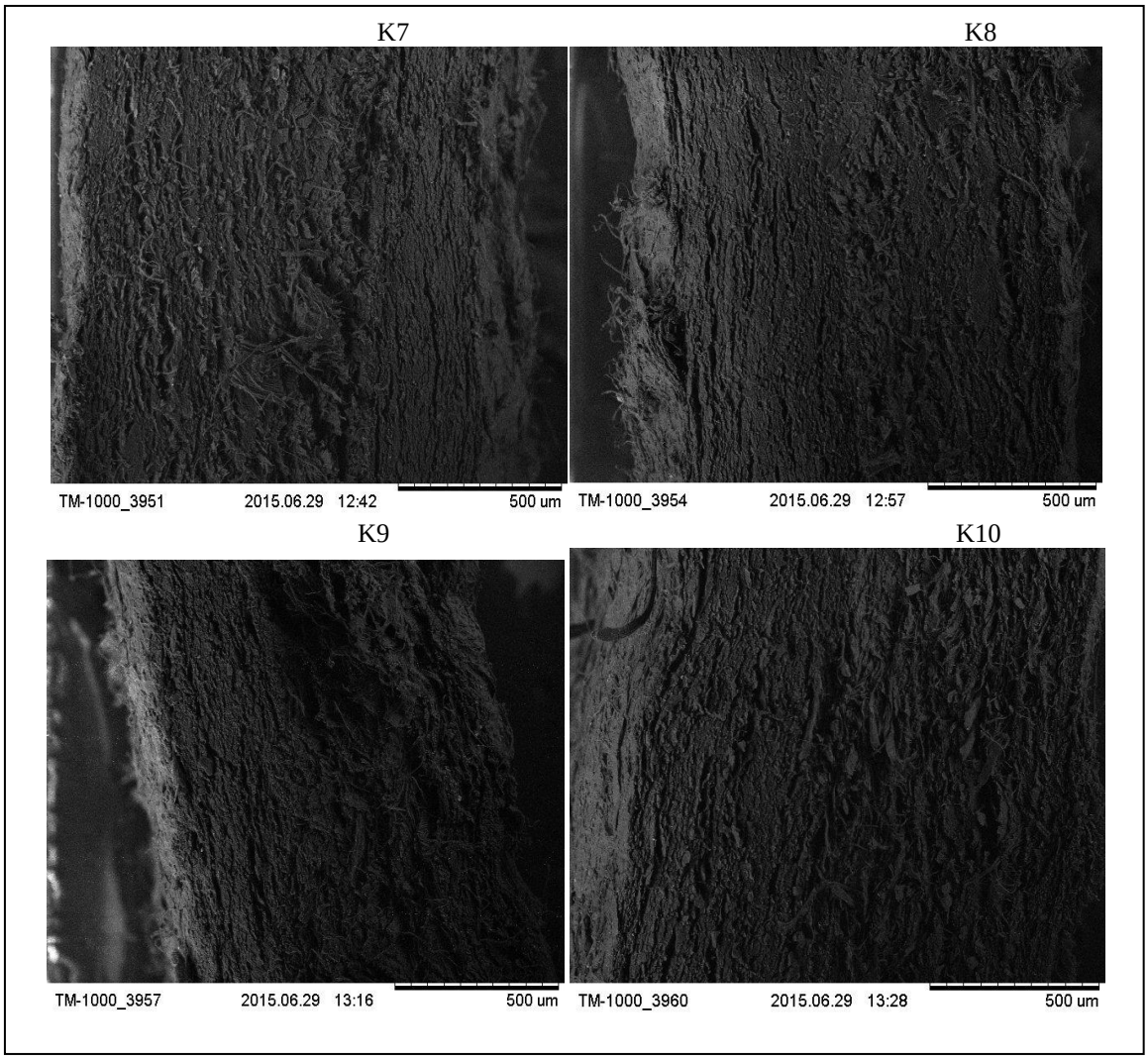

Figure 3. SEM's of the samples by magnification at 120X

The images indicated that all the product produced in the study have an appropriate integrity with required mechanical behaviour. New built texture and regenerated structure seem compatible for a sheet material for improvement in multi-purpose usages. Frayed fragments from the tips of the fibres help the knit together to get strength better. The sample K6 with natural latex seemed to have a soft and tight structure, while the other products had a rougher and looser structure. This explains that composites made using natural latex have better physico-mechanical properties than others. At the same time the product including valex tannin, in which fibers were homogeneously distributed throughout the structure is being characterized by its own rougher structure than the others.

3.2 Physicomechanical Properties of Leatherboards

Leatherboards was also tested for their mechanical properties to see usability of leather like product in accordance with customer demands. Table 2 demonstrates the experimental results obtain from physicomechanical tests.

Table 2. Tensile strength, stitch tear strength and flexometer test results of composite materials

Product Code	Tensile Strength			Stitch Tear Strength		Flex Resistance
	Maximum Force(N)	Tensile strength(N/mm^2)	Extension(%)	Maximum Force(N)	Thickness (mm)	Step number
K1	74,5 ± 34,7	6 ± 2,7	12,1 ± 4,3	43,16 ± 3,84	1,56	177
K2	71,8 ± 38,3	5,3 ± 2,8	18,3 ± 7,9	10,95 ± 1,54	1,61	82
K3	95,6 ± 31,8	6,5 ± 2,1	12,9 ± 2,3	45,52 ± 3,42	1,47	28
K4	75,6 ± 7,3	5,2 ± 0,5	10,9 ± 1	32,95 ± 5,91	1,48	9
K5	136,9 ± 40,5	9,7 ± 3	15,5 ± 3,1	33,93 ± 1,76	1,43	85
K6	171,1 ± 18	11,7 ± 1,6	23,1 ± 1,5	63,21 ± 7,77	1,60	23656
K7	133,9 ± 23,8	9,40 ± 1,5	11 ± 1,2	51,30 ± 11,41	1,66	89
K8	87,1 ± 21,9	6,2 ± 1,6	15 ± 1,8	35,88 ± 10,74	1,55	86
K9	142,3 ± 6,7	9,9 ± 0,5	16 ± 1,3	51,18 ± 3,83	1,49	543
K10	98,2 ± 10,1	7,5 ± 0,8	12,6 ± 0,8	40,19 ± 5,03	1,36	134

Of the leatherboards produced by valex, mimosa, chestnut, tara and ligno sulphonate tannins, maximum tensile force of 136,9 N and tensile strength of 9,7 N/mm^2 were obviously recorded by the product with ligno sulphonate. Considering the effect of the binder types on the tensile strength properties of the material product made of natural latex has the best strength properties almost close to that of leather and also having a highest extensibility according to the elongation at break results. With respect to the effect of the fiber types on the material tensile properties the leatherboard sample (K9) in which the leather and paper fibers are used in combination distinguished with the highest tensile strength and extension properties.As per the stitch tear strength tests; the chestnut treated leatherboards come up with high results and the lowest results obtained in the mimosa experiments. Among the binder types on the experimental study natural latex was found to have the highest stitch tear strength and styrene-acrylic acid ester copolymer observed to have the lowest stitch tear strength. In comparison with the different fiber types according to the stitch tear strength the highest results were recorded in the combination of leather fiber and paper fiber. In the study of tannin types effect on flexibility, valex doped composite have the highest and composite materials with tara have the lowest flexibility. As per the results of binder types on the flexibility the natural latex works distinctly superior flexural properties in which flexural cycles was over 23,656. For the effect of fiber types on flexing endurance; the best flexibility value was obtained in the sample containing leather fiber and paper fiber combination. Harvey (1986), according to the standards developed by SATRA-LASTRA, reported that the leatherboards used in the production of shoes have to ensure a minimum tensile strength of 7,7 N/mm^2 for high qualities and a minimum of 4 N/mm^2 for low qualities, and have a minimum stitch tear strength of 68 N for high qualities and a minimum 52 N for low qualities. He suggested flexing endurance for leatherboards with minimum 10.000-100.000 cycles for high qualities and minimum 1000 flexing step for low qualities [4]. Regarding the physicomechanical properties of composite materials produced in our study, these materials seems to be reasonably practicable in high quality shoes. Solid wastes from various industries have become an important environmental problem because of their toxic contents and inadequate waste management. The solid wastes generated from leather industry is a recent agenda because of their volumes and very limited recovery practices. The fibrous cut-out solid wastes, namely shavings, are toxic for environment and in case of oxidation to hexavalent form their disposal requires extreme cautions. Considering the amount of such wastes, methods such as recycling and re-use of trivalent chromium are not practicable. The existing methods such as incineration and pyrolys are not good choices because they cause harmful gase emissions. Therefore; the reuse of wastes in the production of composite materials is regarded as an issue to be highlighted in terms of environmental and health care.

In order to convert the fibrous wastes into harmless form and, exclude them from waste by valorization in possible usages the production of composite materials so-called leatherboard is a basic sustainability approach for the leather industry. Shifting to the practice of this approach yield in various material types with appropriate mechanical strength and efficient performance characteristics for different applications.

4. CONCLUSION

Leatherboards is an engineering products serving as a model of the approach from the waste to high value added material in which leather waste are being used The convertibility to a practicable composite material of shavings with some polymers and auxiliaries and the derivatization of new materials, for different usages was aimed, some experimental studies on process parameters were carried out to improve the product properties and some factors such as tannins,, binder types, fiber types and dispersion applications were examined and their effects were evaluated.It has been found that the effect of dispersion auxiliaries used on the physicomechanical properties were important and at the same time the approximation of these properties to that of leather by optimization of the factors can possibly be an attainable target for enlargement of these composite practices. Eventually; with the economical and ecological significance some noval products can be produced with different properties depending on their usage areas and requirements.

ACKNOWLEDGEMENTS

This work was financially supported by The Scientific and Technological Research Council of Turkey(TUBITAK) with the project number of TEYDEB 7130851 and Ege University Scientific Research Project Department Directorate (13 MUH 008). Also, we are gratefully acknowledge Aytas Ayakkabi Yan San. Tic. A.S. Denizli-Turkey for providing with their infrastructure.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Developing an Organizational Culture of Equality and Fostering a Discrimination Free Environment in Work Places

Shaher Alshamari[1]

Abstract

In the post-world war period, focus in contemporary organization has shifted from hiring just workers to hiring competent employees and retaining the talented ones (Iles, 2007. pp.97-98). The role of the human resource management (HRM) in organizations has also evolved. HRM departments devise new methods to screen the applicants. In most contemporary organizations specialized consultants are hired to develop customized systems and filter the applicants to find the most suitable candidates (Townley, 1989. pp.92-94). But it's not just the employers who have options. Recent decades have witnessed growing trends of employees leaving their organization to join another that offers better job prospects, more money and/or better working conditions. Therefore surmounting pressure has been on employers to retain the talent. For all these reasons, contemporary HRM policies are not only about hiring the best fits but also creating employee friendly environment at the work place that fosters equality and progresses towards discrimination free workplace (Townley,1989. pp.92-94; Iles, Paul. 2007. pp.97-99). Research into HRM has yielded that a greater gender and cultural mix at work place is directly proportional to the productivity. Therefore focus has also been on hiring employees from different cultural backgrounds. But not all employers have been able to adopt and execute it fairly for all cultural backgrounds. In early 1980s, Britain witnessed protests by blue collared employees, primarily black people and women who felt disadvantaged in terms of benefits and working conditions. This led to formulation of Equal Opportunity Policies (EOPs) to enforce industry wide common policies for employees irrespective their gender, race or cultural background (Gibbon, 1992. pp.235). This research paper gives an insight into recruitment and selection system, HRM policies and work place conditions for employees. Equality and discrimination issues as well as government policies and approaches of modern organizations will be analyzed.

Key words: organizational culture, equality, discrimination, employees, employers

1. INTRODUCTION

An organization is as good as its employees i.e. the people who deliver the services or products offered by the organization (Townley,1989. pp.92). Therefore in the post-world war period, focus in contemporary organization has shifted from hiring just workers to hiring competent employees and retaining the talented ones (Iles, 2007. pp.97-98). Increasingly rigorous recruitment and selection procedures are backed by large numbers of applicants which gives employers an opportunity to screen and a choice to select the best fits. Role of the human resource management (HRM) in organizations has also evolved and has become an integral part of the strategic management. HRM departments devise new methods to screen the applicants. In most contemporary organizations specialized consultants are hired to develop customized systems and filter the applicants to find the most suitable candidates (Townley, 1989. pp.92-94). But it's not just the employers who have options. Recent decades have witnessed growing trends of employees leaving their organization to join another that offers better job prospects, more money and/or better working conditions. Therefore surmounting pressure has been on employers to retain the talent. For all these reasons, contemporary HRM policies are not only about hiring the best fits but also creating employee friendly environment at the work place that fosters equality and progresses towards discrimination free workplace (Townley,1989. pp.92-94; Iles, Paul. 2007. pp.97-99). Research into HRM has yielded that a greater gender and cultural mix at work place is directly proportional to the productivity. Therefore focus has also been on hiring employees from different cultural backgrounds. But not all employers have been able to adopt and execute it fairly for all cultural backgrounds. In early 1980s, Britain witnessed protests by blue collared employees, primarily black people and women who felt disadvantaged in terms of benefits and working conditions. This led to formulation of Equal Opportunity Policies (EOPs) to enforce industry wide common policies for employees irrespective their gender, race or cultural background (Gibbon, 1992. pp.235). This essay gives an insight into recruitment and selection system, HRM policies and work place conditions for employees. Equality and discrimination issues as well as government policies and approaches of modern organizations will be explained to give a broader picture of the subject.

2. RECRUITMENT AND SELECTION

Townley, (1989. pp.92-93) and Iles, (2007.pp.97-99) explain the processes of recruitment and selection and illustrate the underlying differences and connections between the two activities. The scholars elaborate on recruitment as a process of establishing contact between the workers and employers. Watson, (1994) explains the recruitment as the process by which

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organizations implore, contact and interest potential candidates. It is more of a general process where employers need workers for activities at their organization and through various channels new workers are invited to apply. Newell, (2005. pp114-119) explains that recruitment process starts with the organizational review and analysis of the job roles that need to be filled. The recruitment requirement may arise because an employee left or work expansion. On the other hand, the selection process follows recruitment and is a complicated process. Newell, (2005. pp.116) defines selection as a process that involves predicting future behavior of prospective candidates so that decisions can be made about the most suitable or the best fit. The author further explains that Selection process is primarily about filtering the best suitable candidates for the employment among the available candidates received through recruitment process. For the approaches on recruitment Torrington, (2005. pp.123-128) suggests internal recruitment as a cheapest and suitable method where vacancy is filled from within the organization. The authors recommend other popular and suitable methods as advertisements in newspapers and online portals, recruitment agencies, word of mouth, job centers, job fairs, and direct recruitment at educational institutions. Townley (1989. pp.93-97) recommends that measuring psychological dimensions of the candidates gives a scientific touch to the collective process of recruitment and selection. Different job roles require different attitudinal and psychological traits; some require leadership, others require following orders to the word. Townley(1989. pp.93) quotes Owens and Schoenfeldt (1979) that a carefully designed selection process can identify personality profiles of the aspiring candidates for 'bright achieving leaders' or approval seeking humanitarians'; the next step shall be to match the results with desired job role and organization ethos. Newell (2001. pp.74) mentions that structured interviews can be the most promising and result oriented approach towards selection of best fits as well as team and organization oriented employees. A systematic interview process can be designed to find candidates suitable for a particular industry or organization. Collectively these approaches allow organizations to recruit and select the best fit for the job role and organization (Guest. 1987). Newell, (2005, pp.172-173) explain the other side of the recruitment and selection process as no single recruitment and selection protocol or system can be deemed as 'best practice' for all which could be followed in all circumstances. The authors explain that in different organizations, similar principals should be applied in different ways. Once employees have been selected, it is vital to place them in appropriate job roles and create an environment that shall foster efficiency and encourage commitment; the process is doing so is termed as 'people resourcing' or 'employee resourcing' (ER) (Iles, 2007.pp.97). Iles, (2007. pp.97-99) further explains that ER process includes elements of performance assessment, grading, appraising according to their grades, tracking, sorting and then placing or reshuffling the employees. Atkinson, (1984. pp28-29) explains flexibility as another important factor of ER. Organizations need to be flexible in terms of functionality which means redeployment of employees between activities and tasks. The other two important factors are Numerical flexibility where worker numbers can easily be changed and financial flexibility in order to pay and bear the contingencies. Guest (1984. pp49-50) adds that effective ER is outcome of serving the commitment towards the employees, flexibility and quality of services and environment offered to the workers. According to Proctor et. al. (2009) flexibility of work allocation, flexibility of technology and training, and flexibility of the system as a whole make the ER truly effective in any organization. Iles, (2007. pp.97-98) illustrates that ER operationalizes the defining process of skills, talent, values and relevant qualities in employees in order to allow the organization to move steadily towards the strategic goals. Employee resourcing ensures that employees are assessed according to predefined criteria and then are placed into suitable roles. ER also ensures that workers at different levels in the organization are properly appraised, developed and are rewarded appropriately.In order to maximize organizational efficiency Iles, (2007. pp.99-100) suggested 'best practice' model or 'psychometric-objective' model; this model recommends matching the right people with right roles; which means taking decisions to select most suitable candidates for the job and laying-off the less suitable ones. In the psychometric-objective model emphasis on 'performance' – specific and individual attributes e.g. behavior, ability, skill and knowledge. The laying off process removes the burden of inefficient people and best fit employees contribute to the higher productivity. The process of the 'psychometric-objective' model includes the job role analysis which leads to clear identification of job activities; against this job description the roles and responsibilities of the employee are defined and recruitment and selection process is carried out based on the checklist. Iles (2007. pp.100) quotes Anderson and Ostroff (1997) and Newell, (2005) to present another aspect that organizations that choose to tread considering strategic objectives deny adopting the 'best fit for job role' principle and prefer to go with the 'best fit for the team/organization' model. This thought process paved way for the 'social process' or 'exchange' model. The exchange model deems the employer as well the employee as a decision maker and allows information exchange in order to establish common grounds of suitability- for employee a desired role and for employer a skilled and suitable worker that fits the team, the organization and long term goals. Iles (2007.pp.100-101) quotes his previous work and Townley, (1989. pp.93-96) for another model of 'knowledge and power' which says that the employers possesses better knowledge and has the higher authority in taking decisions for the employee recruitment and selection, and entire employee resourcing (ER) process.

3. EQUALITY AND DISCRIMINATION

As illustrated above in the processes for ER, irrespective of the model, the organizational efficiency lies with the better selection and matching of employees. Iles (2007. pp.97-101) explains that in addition to selecting the best fit and grading, and having efficient appraisal systems, it is of critical importance to create employee friendly environment at the workplace. Therefore developing an organizational culture of equality and fostering a discrimination free environment is imperative in order to achieve strategic organizational goals. Gibbon (1992. pp.235-236) mentions that irrespective of the ER model an organization adopts, there are bound to be some situations where some employees may feel not happy about certain elements of the workplace environment; equality issues and discrimination are one of those of high importance. Equality is an insightful and wide-spread concept in terms of its immediate impact and long term consequences. Inside an organization, it is not here implied that persons must at all times relish the very similar equalities that they enjoy in the society in general. The author explains that at the

workplace employees may assume that they are privileged with certain basic modes of treatment as individuals. Gibbon (1992. pp.235-237) gives examples of incidences from the British industrial history in 1980s when certain groups of people that felt left out from benefits that other group leveraged. The most prominent protests were against racial and gender discrimination, but dissents were also registered from disabled people, homosexuals, etc.In the decades before 1980s, employers would openly discuss their reluctance to hire people from non-white races; it was one third of a chance for a black person to get an appointment as compared to a white person. Discrimination mostly is subtle in nature and for that reason it obscures the process by which employees perceive workplace discrimination and attempt to solve it. In order to getlegal redress for racial discrimination at workplace, the worker must ‘‘name’’ the act as discrimination, fix the ‘‘blame’’ on the person responsible or their employer, and then ‘‘claim’’ the conduct by seeking redress within the applicable regulatory framework. Perceptions about discrimination give the first step of eradicating workplace discrimination. Naming and establishing the accountability of the discrimination act has been deemed the most critical stage in the legal framework of dispute resolution because the degree and nature of succeeding legal proceedings depend on what behaviors the employees perceive as injurious and subject that to legal intervention. Given the formalization of the legal procedures against racial and other forms of discrimination, Equal Opportunity Policies (EOPs) came into practice and became a buzz word with enterprises and the labor unions (Gibbon, 1992. pp.238-246).The long-term aim of an equal opportunity policy (EOP) program is to remove any blockades that prevent the groups of women, non-white races, ethnic minorities and disabled people fully participating in an organization, and hence attain a random distribution among the workforce that reflects the general population at all organization levels. EOP is a set of principles for the distribution of earnings and job roles; and that individuals can make their choices just the same for all, irrespective of their gender or race. The author suggests that equality of opportunities occurs only if the likelihood of any specific outcome is the same for each employee. Equal chance and equal choice are together essential for equality of opportunities; EOPs ensure that this occurs. An equal opportunity enterprise is the one where ethnic minorities, women and disabled participate, grow and flourish. Gibbon, (1992, pp.237-238) quotes Jenkins (1986) and Andre (1985) for interpretation of equality and describes the two types as equality of outcome and equality of opportunity. Fore mentioned two types draw on diverse assumptions of the nature of inequality and the actions to tackle it. Most jobs, as interpreted by these scholars can be done equally well by anyone. The liberal approach of equality has been primarily about ensuring that the rules of engagement in the employment are set fairly. Basic assumption is that rigorous controls and formal protocols will guarantee the fair play and facilitate the circumstances in which previously disadvantaged groups are engaged in a healthy competition equally with other groups of workers. The more fundamental notion of equality is about general access through administrative action designed to address and nullify discrimination practices in the past. It has been an essentially dominant strategy aimed at reallocating means and opportunities to previously disadvantaged groups. Success or failure of EOP sis measured in terms of outcomes and the degree to which disadvantaged groups of employees have attained access to resources and power as compared to majority groups (Gibbon, 1992, pp.238-242).

4. RECRUITMENTAND SELECTION PROCESS AND EQUALITY

Gibbon (1992) illustrated the importance of equality and discrimination issues in an organization and then proposed EOPs as a remedy for the same. But it is not just the management of the current workers where the issue of equality needs attention or remedy; equality considerations start right at the beginning of engagement of employment- recruitment and selection. Newell (2005) defines recruitment as the process of attracting people who might be potential candidate for a particular job. Torrington et al. (2002) add to the definition as a process by which an employer sells a vacant job position to potential candidates so as to generate a pool of applicants. Now the point is- to generate a pool of what kind of applicants? The decision making process of a manager is always biased with their personal opinions and cognition. Therefore its more likely that the applicant pool will be what the manager wanted it to be, not what it could have been if it was a fair and unbiased recruitment process. Subjecting recruitment, selection and the ER process to discrimination against merit will result in the recruitment of incompetent employees in the workforce which will eventually lead to poor performance of the organization (Townley, 1989. pp.93-98). EOP in the recruitment and selection provides equal employment opportunity and facilitates points of entry for potential candidates based on merit rather than race, gender or societal majority, based on intricate communication channels both inside and outside an organization. An effective communication can only be outcome of a real and sincere effort that ensures that people who read the employment communication believe it. It is only the generated trust that can ensure the success of the EOPs in recruitment and selection; otherwise it will be a wasted effort all together. EOPs and collective Human Resource Management (HRM) is targeted at developing and applying policies that deliver a balance whilst considering the needs of different stakeholders in managing workforce diversity. The workplaces in recent times are constrained with various forms of diversities added with differing work ethics, opposing perspectives and diverse motivations. Workforce diversity is an outcome of fair EOPs which characterizes the motivations, preferences, personalities, visions and group identity (Townley, 1989. pp.93-99).The recruitment process should have an accurate and updated job description that does not discriminate against race, sex or any other criteria and avoids over inflated job criteria in terms of job role and desired person specification (Boxall et al., 2011). The flip side of the equality coin is diversity; the term diversity means quality or condition of someone or something that is different than majority. Diversity is based on the concept of acknowledgment and value of differences. Diversity refers to not just skin color but age, race, religious affiliation, economic class, and sexual orientation (Boxall et al., 2011). Motivation among organizations for implementing EOPs and eradicating discrimination is also competitiveness. Enterprises which tend to remain competitive in a global scenario are actively engaged in recruiting ethnic minorities and women. Managing diversity can be a key competitive gain, which encourages and fosters leadership, creativity and performance in the markets in which the firms are operating. The rationale behind endorsing diversity is primarily economic. Organizations that adopt diversity both in their customer base as well as workforce are generally more gainful than those that do not. A diverse workforce will be better adapted to deliver better services to a broader range of

service users. The diversity of employees within any organization ought to be reflected by corresponding diversity in the way services are delivered and their job descriptions are defined. Research into organizations indicates that discrimination in the workplace exists. Perceived discrimination against minorities should be negatively related to the perceived procedural justice of those minorities. Discrimination can be defined as denying some person equal and unbiased treatment compared to others because of their ethnicity, gender, sexual orientation or other characteristics. Perceived discrimination against employees in minorities will most likely create a perception that the organization's treatment of minority groups is procedurally unjust. Consequences of real or perceived discrimination can be at many levels e.g. discrimination can cause mental stress and in extreme situations can even turn a person suicidal. Discrimination also affects moral of the person and can potentially reduce their efficiency (Townley, 1989. pp.92-93; Iles, 2007. pp.96-99).

5. CONCLUSIONS

Description of recruitment and selection gives an idea about the general process, but then it seems unrealistic to frame one set of rules or protocol for all kinds of organizations. Different organizations require employees with different work related and psychological skills. Therefore generalizing the principals and standard procedures is unadvisable. Recruitment is more of a general process where employers need workers for activities at their organization and through various channels new workers are invited to apply. Selection follows recruitment and is a complicated process. Selection process is primarily about filtering the best suitable candidates for the employment among the available candidates received through recruitment process. The three models of psychometric-objective model, social process model and the resourcing, knowledge and power model illustrate the three different ways of recruitments of selection. Irrespective of the model, the organizational efficiency lies with the better selection and matching of employees. In addition to selecting the best fit and grading, and having efficient appraisal systems, it is of critical importance to create employee friendly environment at the workplace (Iles, 2007. pp.97-101).Developing an organizational culture of equality and fostering a discrimination free environment is imperative in order to achieve strategic organizational goals. Irrespective of the ER model an organization adopts, there are bound to be some situations where some employees may feel not happy about certain elements of the workplace environment; equality issues and discrimination are one of those of high importance (Gibbon, 192. pp.235-236). But equality and maintaining diversity is not only for the current employees but entire ER process. Subjecting recruitment, selection and the ER process to discrimination against merit will result in the recruitment of incompetent employees in the workforce which will eventually lead to poor performance of the organization (Townley, 1989. pp.93-98).

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Comparative Life Cycle Costing Analysis of Green Roofs: The Regional Aspect

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Abstract

The increasing environmental concerns and poor practices force construction industry to take some remedial measures for green and sustainable built environment. Especially in urban areas, one of these measures is to build green roofs for minimizing the environmental pollution. In fact, green roofs present a number of economic, environmental, and social benefits. However, compared with traditional roofs, green roof investments have high capital and maintenance costs and this makes potential investors hesitant about their applications. Therefore, in the present study, benefits and life cycle costing parameters of green roofs were evaluated through a literature review. In this context, numerical inputs and findings of past studies were utilized. In doing this, a special emphasis was placed on the regional characteristic of such investments as it is a natural feature of any life cycle costing analysis. In conclusion, the majority of benefits and life cycle costing parameters was found to be highly variable, and thus, any life cycle costing assessment that will be performed in the future should be case-sensitive instead of using some generalized or raw data. Therefore, based on findings and results of this study, industrial practitioners and potential customers may have a useful source of economic, environmental, and social information about green roofs while researchers may be encouraged for more region-specific studies.

Keywords: benefits of green roofs, extensive roofs, intensive roofs, life cycle assessment, life cycle costing, sustainability.

1. INTRODUCTION

The sustainable built environment phenomena can be defined as providing both healthy environment for people through improving the quality of life and a livable future for current and next generations in terms of social, economic, and environmental conditions [1]. The construction industry, one of the leading industries in developed and developing countries, has an important role to improve social, economic, and environmental conditions of the sustainable built environment. However, it is responsible for high values of energy and resource consumption, solid waste production, and greenhouse gas emission [2, 3]. These adverse effects force the construction industry to take some preventive measures to reduce its environmental damage to a minimum level. Today, green roofs are chosen both as a technological device that has potential to decrease energy and pollution based environmental problems and as a construction application that can minimize the lack of green fields in urban areas in many countries around the world [4]. This is because they present numerous benefits for societies and individuals, such as savings from energy and storm water [5], fall in the temperature of roof membrane [6], improving air quality [7], rise in habitat and biodiversity [8], mitigation of urban heat island effect [9], noise reduction and aesthetic view [10], and formation of recreation areas [11]. However, due to high initial and maintenance costs, they have not attracted the required attention of clients so far in many countries. For example, in some regions in Germany and Japan, green roof applications are mandatory [12]. As another instance, the Korean government subsidizes 50% of the initial investment cost of green roofs implemented in major cities [13]. Thus, in order to encourage investors for green roofs in practice, it seems to be necessary to present their economic advantages in the long term through the analysis of their lifecycle costs besides environmental benefits.Therefore, the aim of this study was to provide a useful source of financial information about green roofs for industrial practitioners and to encourage researchers for more region-specific studies as life cycle costing naturally needs and demands a regional resolution [14]. For this purpose, past studies concerning life cycle costing of green roofs in the literature were comparatively analyzed. In this context, a number of indicators such as unit construction cost, lifespan, life cycle costing method, interest rate, and economic, environmental, and social benefits were presented given their regional aspects.

2. MATERIALS AND METHODS

In the literature, there are a few dozens of studies that compare green roofs applied in different geographical regions. However, it was seen that, in these studies, only two or three different cities were compared with each other [15-17]. It means that the literature seems to lack a comparative life cycle costing study emphasizing the regional aspect of green roofs as a whole. Therefore, in the present study, this type of past researches was divided into two sub-categories as extensive and intensive green roofs by reviewing the related literature and was compared in terms of unit construction cost, life span, life cycle costing method,

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and interest rate in a regional manner. Moreover, in order to compare and reveal the potential regional variability of benefits, they were individually investigated from the economic, environmental, and social point of view.Table 1 includes extensive green roof researches that were analyzed in this study. Among them, Porsche and Kohler [15] compared green roofs in Germany, USA, and Brazil while Zhang et al. [16] examined green roofs in Germany and Singapore. The remaining ones can be categorized into three geographical locations as the American region (USA and Canada), the European region (Italy, Greece, and Belgium), and the Asian region (Hong Kong, South Korea, China, and Singapore).

Table 3. Life cycle costing studies on extensive green roofs

Authors	**Country**	**Unit Cost ($/m^2)**	**Method(s)**	**Lifespan (year)**	**Discount rate (%)**
Porsche and Kohler [15]	Germany-USA-Brazil	85-90	NPV	90	n.a.
Zhang et al. [16]	Germany-Singapore	31.72	NPV	40	5
Clark et al. [4]	USA	232	NPV	40	5
Carter and Keeler [5]	USA	158.82	NPV	40	4
Blackhurst et al. [9]	USA	97.04	BCR	30	5
Niu et al. [18]	USA	306	NPV	40	6-7
Wu and Smith [19]	USA	107.64	PBP-NPV-BEP	40	2.8
Bianchini and Hewage [20]	USA	130-165	NPV-PBP	40-55	2-8
Mullen et al. [21]	USA	158-306	NPV	40	n.a.
Sproul et al. [22]	USA	172	NPV	50	3
Joksimovic and Alam [23]	Canada	236.45	NPV	50	5
Peri et al. [24]	Italy	75.05	NPV	40	6
Angelakoglou et al. [25]	Greece	90-180	PBP	25	n.a.
Claus and Rousseau [12]	Belgium	141.9	NPV	50	4
Tsang and Jim [26]	Hong Kong	150	NPV	40	5
Chan and Chow [27]	Hong Kong	68	NPV-PBP	25	4.25
Peng and Jim [28]	Hong Kong	64	BCR-PBP	40	4.25
Lee et al. [29]	South Korea	134.5	n.a.	2-100	n.a.
Shin and Kim [30]	South Korea	23.32	BCR	20	5.5
Liu and Hong [31]	China	241.2	BCR	40	5
Wong et al. [32]	Singapore	89.86	NPV-SIR-AIRR-PBP-DPBP	40	6.15

Compared with extensive green roofs, there are much less previous studies regarding intensive ones (Table 2). This may be because intensive green roofs have higher initial investment and maintenance costs and it would likely be a vain attempt to investigate their viabilities unless the feasibility of extensive green roofs is revealed. Although Porsche and Kohler [15] performed the single study about intensive green roofs in the European region, their research takes into account three different regions together. In other words, it neither focuses on nor presents a comparative perspective of the European region. Similarly, Chui et al. [17] compared intensive green roofs in Hong Kong and USA. Therefore, intensive green roof studies analyzed were categorized into two geographical locations as the American region (USA) and the Asian region (Hong Kong, Singapore, and Australia).

Table 2. Life cycle costing studies on intensive green roofs

Authors	Country	Unit Cost ($/m2)	Method(s) used	Lifetime (year)	Discount rate (%)
Porsche and Kohler [15]	Germany-USA-Brazil	340-380	NPV	90	n.a.
Chui et al. [17]	Hong Kong-USA	153-273	NPV	30	n.a.
Bianchini and Hewage [20]	USA	165-540	NPV-PBP	40-55	2-8
Liu et al. [33]	USA	168.34	NPV	20	4.5
Langston [34]	Australia	n.a.	BEP	25-100	3
Peng and Jim [28]	Hong Kong	256	BCR-PBP	40	4.25
Wong et al. [32]	Singapore	178.93-197.16	NPV-SIR-AIRR-PBP-DPBP	40	5.15

3. RESULTS AND DISCUSSION

In this section, life cycle costs of green roofs was comparatively evaluated from a regional perspective to present the difference of the effect of costs and benefits. In the literature, the data used in life cycle costing studies can be grouped as primary and secondary data. Primary data represents the data provided directly from the manufacturer or market while secondary data is derived from the existing literature [35]. For the sake of reliability, primary data is preferred more to compile. In past studies about green roofs, unit construction costs and interest rates were usually used as primary data while lifespan and benefits were taken as secondary data. Here, monetary values of data were included using local values needed for the relevant region.

3.1 Life Cycle Costing Parameters

Considering previous studies, it seems that there are three causes behind the green roof choice of clients. First, roof gardens in the USA are fashionable due to the positive effect of a better aesthetic view on the renting or selling price of a flat or an office since there is no legal regulation on rental rates as in Germany [15]. Similarly, in Brazil, people prefer roof flats with green terraces for a beautiful garden view and for an open green space required in tropical climates. Second, from the viewpoint of storm water management, energy and cost savings increase through the green infrastructure used in Germany instead of traditional rain water harvesting system in Singapore [16]. Third, cost-efficiency of green roof investments are more in the USA than Hong Kong because of higher land prices in Hong Kong [17].Given unit construction costs of extensive roofs, they vary in a very large interval between $97-306 for the American region, $75-180 for the European region, and $23-241 for the Asian region. Interestingly, the difference between the lowest and highest values in the same region can be more than ten times. Such an enormous difference is valid even in the same country such as USA, Hong Kong, and South Korea. However, taking the lowest values as a baseline, the most inexpensive extensive roofs are in Asia while the most expensive ones are in America, which shows a difference of more than four times. As an expected finding, unit construction costs of intensive roofs are at least two times higher than those of extensive roofs and similarly vary in a very large interval between $165-540 for the American region and $178-256 for the Asian region. Although the difference between the lowest and highest values in the same region or country is not very high, it can be more than three times, denoting a serious difference. However, the lowest values of American and Asian regions are very similar. Main factors affecting the unit construction cost can be listed as the quality of materials and the cost of labor. As a result, it seems impossible to standardize unit construction costs of green roofs in any region or country, and thus, it is a necessity for investors to assess current market prices of construction materials to be used and regional labor costs. As can be seen in Tables 1 and 2, life cycle costing methods used in past studies are net present value (NPV), benefit-cost ratio (BCR), payback period (PBP), breakeven point (BEP), savings to investment ratio (SIR), adjusted internal rate of return (AIRR), and discounted payback period (DPBP). Among them, NPV is the most frequently used method. However, three methods (i.e., SIR, AIRR, and DPBP) were used in one research only. In conclusion, life cycle costing methods used in different regions of the world seem not to change.In terms of lifespan of green roofs, there is no common attitude in past studies. This is also valid for comparisons between extensive and intensive roofs and between geographical regions. However, as lifespan was taken 40 years in most of these studies, it seems to be reasonable to accept the average lifespan of any kind of green roofs as 40-50 years which is equal to the lifespan of an ordinary reinforced concrete building [36].Among all life cycle costing parameters, interest rate is likely the most uncertain input and its variation can lead to an overestimation or underestimation of the total cost [37]. Considering previous studies, it is evident that neither extensive and intensive roofs nor geographical regions have specific interest rates. These values change in a relatively small interval between 2-8%. In fact, almost all of past researches were carried out in developed economies. Accordingly, this low and stagnant level of the presented interest rates may turn to high and unstable rates in undeveloped economies, indicating a warning signal for potential green roof investors while making their decisions on the roof type.

3.2 Benefits of Green Roofs

Benefits of green roofs may be divided into three main categories such as economic, environmental, and social, as given in Table 3. Economic benefits are energy saving, longer roof life, increased property value, and other cost savings. Environmental benefits

include storm water management, improved air quality, mitigation of urban heat island effect, and increased biodiversity. Social benefits contain fire protection, green space, thermal insulation, noise insulation, and aesthetic view [30]. In fact, these three categories cannot be assessed individually because economic benefits may also provide environmental and/or social benefits and vice versa. For example, energy saving contributes to less energy production and thereby to reduction in greenhouse gas and CO_2 emissions, leading to richer biodiversity and healthier living conditions. In other words, types of benefits should not be perceived as totally independent factors, but as integrated and engaged advantages.

Table 3. Benefits of green roofs

Author(s)	Economic Benefits				Environmental Benefits				Social Benefits				
	Energy saving	Longer roof life	Increased property value	Other cost savings	Storm water management	Air quality	Urban heat island	Biodiversity	Fire protection	Green space	Thermal insulation	Noise reduction	Aesthetic view
Porsche and Kohler [15]			X		X						X	X	
Wong et al. [31]	X	X											
Clark et al. [4]	X				X	X							
Carter and Keeler [5]	X	X			X	X	X			X			
Blackhurst et al. [9]	X				X		X			X			
Niu et al. [18]	X				X	X							
Lee et al. [29]					X								
Tsang and Jim [26]	X				X					X			
Wu and Smith [19]	X	X			X	X							
Bianchini and Hewage [20]	X	X	X	X	X	X	X	X		X			X
Claus and Rousseau [12]	X	X	X	X	X	X	X	X	X			X	X
Liu and Hong [31]	X	X		X									
Angelakoglou et al. [25]	X												
Chan and Chow [27]	X												
Mullen et al. [21]	X				X	X							
Joksimovic and Alam [23]					X								
Sproul et al. [22]	X	X			X	X	X						
Langston [34]	X	X			X	X				X	X	X	X
Liu et al. [33]					X	X							
Peng and Jim [28]						X	X				X		
Shin and Kim [30]	X			X	X	X	X						
Zhang et al. [16]	X				X								
Chui et al. [17]	X				X								X

3.2.1 Economic Benefits

A building's energy use for heating and cooling is an important component of its sustainable design [5]. Green roofs have potential to decrease the energy consumption of a building. Energy savings associated with the increased insulation depend on the size of a building, the climate zone, and the type of roof [12]. The amount of energy savings is expected to be between 40-110% in Hong Kong, compared to other roofs [27], 1.5% in Belgium [12], and 3.3% in the USA [5]. In this regard, electricity prices per kWh are $0.185 in Hong Kong [27], $0.140 in Belgium [12], and $0.069 in the USA [19]. As a result, both saving amount and its monetary value seem not to change regionally. However, the monetary value is clearly prone to much higher values in many countries, presenting a larger room and motivation for such a saving.Protection of green roof membranes through the reduction in surface temperature by multiple layers results in a two or three times longer roof life [5, 10, 12, 18, 20, 22, 31, 32, 34]. In this context, as the effect of sunlight on the roof life will show totally different characteristics from a region to another, it needs to be investigated by future studies.Green roofs may contribute to increase the market value of properties via aesthetics. The increase rate varies between 2-5% [20] in property values and reaches up to 25% in hiring prices [15]. From the regional point of view, both land cost and property value will likely rise in highly urbanized regions subject to dense population and suffering from the lack of green areas.Lastly, there are some policies applied by governments to encourage investors for the use of green roofs. In New York, one-time tax reduction of $48/m^2 is allowed [20]. Similarly, the Flemish government in Belgium stimulates municipalities to grant subsidies of at least $36.16/m^2 [12]. Hence, these kinds of direct cost savings seem to be a mission of regional administrations in increasing green areas.

3.2.2 Environmental Benefits

The most cited type of environmental benefits is storm water management. Green roofs reduce storm sewer pipe size, water utility fee [5], costs of upgrading storm water infrastructure [22], and storm water tax rate [12]. While storm water fees in some cities of Germany have been reduced for buildings with green roof, investors in Switzerland take 20% of the cost of their investment back through storm water management [38]. In the USA, building owners could annually save between \$0.08/m^2 [4] and \$0.38/m^2 [20] by reducing storm water runoff amount. In South Korea, annual storm water runoff decreases 14.7-25.6% [30]. All these findings reveal the significance of storm water management practices and policies that can be applied and adjusted according to regional precipitation amounts.Green roofs are also expected to have positive effects on air quality improvement [4, 19]. The corresponding monetary value is calculated considering mitigation or prevention of air pollutants and thereby reduction of taxes and other legal payments. The monetary value of mitigation of NO_X in the USA was calculated \$1.07/m^2 by Clark et al. [4] and Mullen et al. [21], \$0.03/m^2 by Bianchini and Hewage [20], and \$0.011/m^2 by Sproul et al. [22]. It is \$0.43/m^2 in Belgium [12] and \$0.085/m^2 in Hong Kong. In terms of SO_2 and CO_2, the monetary value of their prevention was taken \$0.013/m^2 and 5.7 kg/m^2, respectively. From a general perspective, the mitigation of all air pollutants will provide a \$60 benefit per year [19]. Since the amount of these polluting compounds can take totally different values in different regions and environmental policies (i.e., sanctions and incentives) can change with region, more regional researches seem to be necessary for a better life cycle analysis.Urban heat island (UHI) increases energy consumption, concentration of harmful pollutants, emissions of CO_2 to the atmosphere, and affects health conditions [39]. Green roofs reduce the UHI effect by providing a medium for evapotranspiration and altering the surface albedo [9]. However, some authors [5, 31, 32] define this benefit as speculative while others tend to include it in life cycle costing analysis [9, 12, 20, 22]. In conclusion, as the amount of the UHI mitigation will vary between regions owing to their urbanization levels and climate conditions, green roof investments should be supported by governments given their environmental advantages regardless of financial revenues.Biodiversity is described as the variety of living organisms, ecological complexes in which they occur, and ways in which they interact with each other and the physical environment [40]. There is no doubt that green roofs have potential to enhance biodiversity although this benefit is not represented in the life cycle costing analysis due to unavailability or unreliability of data [12, 20]. In addition, it is very difficult to evaluate regional effects of the increased biodiversity. Consequently, similar to the UHI effect, the increased biodiversity could be used as a qualitative motivator.

3.2.3 Social Benefits

Interestingly, these five benefits are also expected to provide indirect economic advantages to investors through the increased value and the marketable potential of property [15]. First, thermal and sound insulation potentials of green roofs may decrease or eliminate extra costs of insulation works in the construction phase and energy expenditures in the operating stage. On the one hand, it is difficult to calculate the thermal insulation effect because it depends on climate, the water content of layers, the water flow in the drainage layer, and the wind velocity [15]. On the other hand, the annual energy saving amount through the thermal insulation for extensive green roofs was calculated 57.6 kWh/m^2 [28]. In terms of sound insulation, the annual monetary equivalent of this effect was accepted approximately \$0.34/m^2 [12]. Second, sedums in a roof are water retaining plants and might decrease the risk of fire. However, as this risk in one particular reinforced concrete building is extremely small, the fire protection feature of green roofs is neglected in life cycle costing analysis [12]. Third, the increased green recreation area especially by intensive roofs could improve the quality of life of residents [26]. It is a fact that green roofs do not provide positive social effects as much as parks do [20], but the reduction of stress and illnesses and an improved productivity [41]. Overall, regional differences seem to have a significant impact on all social benefits. Fire protection and thermal insulation is directly related with climate while green space, noise reduction, and aesthetic view is affected by the urbanization level. All of these arguments denote a regional aspect. As it seems difficult to obtain reliable input data, social benefits can constitute the qualitative aspect supporting the investment decision of potential building owners.

4. CONCLUSIONS

As initial investment and maintenance costs of a green roof can be much higher than those of a conventional wooden or flat roof, many clients may be reluctant to invest in such a roof. This study is an attempt to reveal the findings of past researches about cost parameters and benefits of green roof investments in their life cycles. In doing this, an emphasis was naturally placed on the regional characteristic of such investments, which is a must to be taken into account in any life cycle costing analysis.Generally speaking, there are three causes of the green roof choice of clients and they have financial drivers as an expected outcome. Looking at unit construction costs, they cannot be standardized and may have high variability. Therefore, current market prices of construction materials to be used and regional labor costs should be assessed in a detailed manner. Similarly, some economic factors (i.e., land cost, property value, and the effect of sunlight on the roof life) and all environmental benefits/policies (i.e., storm water management practices, the amount of the polluting compounds in the air and the related environmental regulations, the amount of the UHI mitigation, and the increased biodiversity) seem to be highly sensitive to regional characteristics and need for an in-depth investigation. This is also valid for all social benefits (i.e., fire protection, thermal insulation, green space, noise reduction, and aesthetic view). However, although these benefits can interestingly bring indirect financial gains via the increased value and the marketable potential of property, they can encourage the investment decision of potential clients qualitatively since it is difficult to compile reliable and concrete input data. On the contrary, life cycle costing methods do not change with region and NPV seems to be the most common approach in this regard. In this computation, the average lifespan of any kind of green

roofs can be accepted 40-50 years. However, despite the fact that interest rates used up to date are low and stagnant, these rates may have a role to adversely affect the decision of potential green roof investors especially in undeveloped regions. Similarly, although energy saving amount and its monetary value do not have a regional effect, the monetary value may tend to rise in current global financial conditions and this may motivate potential customers more. In this context, governments may provide an additional motivation through tax reduction and/or subsidies to increase green areas.Consequently, given the aforementioned results, it is seen that most of benefits and life cycle costing parameters are open to variation as the literature suggests and that life cycle costing evaluation of green roofs can be described case-sensitive. In other words, industrial professionals and potential green roof customers should consider parameters and benefits specific to that case and then calculate the economic viability of their particular investments. Keeping all these issues in mind, this study may enable industrial practitioners and potential clients to have a useful source of economic, environmental, and social information about green roofs and researchers to encourage for more region-specific studies.

ACKNOWLEDGMENT

The authors gratefully acknowledge financial supports provided by Committees on Research Grants of Bulent Ecevit University and Akdeniz University.

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19 - 23 April 2017, Sarajevo

Sustainability of International Construction Projects through Exim Bank Loans: Comparative Practices of Turkey and China

Serdar Ulubeyli[1], Aynur Kazaz[2], Volkan Arslan[1]

Abstract

In today's highly competitive business environment, governments in general and companies in particular are in search for an easy access to international markets. In this regard, loans that have low interest rates are of extreme importance for private firms. In fact, Exim Bank, as an export credit agency, officially provides this opportunity in many countries, based totally on public resources. International construction projects are well-suited mediums for exporting the goods and services. Thus, main contractors and subcontractors who undertake projects in the international arena may use Exim Bank credits. However, this practical application is almost far from the attention of academic researchers. Therefore, the aim of the present study is to fill this gap in the related literature by taking into account current Exim Bank practices in Turkey and China whose contractors are very active in the international construction market. Through such a research effort, the role of Turk and China Exim Banks in the superior performance of their international contractors was revealed. As a result, it seems that both Turkish and Chinese contractors benefit from Exim Bank loans. However, Turkish contractors use these export opportunities in a limited manner while Chinese contractors utilize them to a much greater extent. Consequently, in case of the intensive use of export credits in the future through more attractive opportunities to be provided by Turk Exim Bank, Turkish contractors will likely show better performance in terms of the number and turnover of international projects. In addition, this can also lead to market sustainability.

Keywords: China, Exim Bank, foreign construction projects, market sustainability, Turkey.

1. INTRODUCTION

As both the quantity and sophistication of goods and services produced by industry of the economy increase, country businesses will seek expanded sales opportunities for their products abroad. Such export sales, however, will require capital on the part of both the domestic exporter and the foreign purchaser [1]. In this regard, Exim Banks present a good opportunity for many developed and developing countries all over the world.The primary goal of Exim Bank loans is both an opportunity to improve diplomatic relations between lending and borrowing countries and a market entry tool for the lending country companies' goods and services [2]. Exim Bank does not compete directly with private sector lenders [3]. In developed countries, Exim Banks merely support private firms with insurance and guarantee programs and the role of granting credit programs is carried out by the commercial banking system. Based on these universal characteristic, Turk Exim Bank uses public resources and thus is the sole official export credit agency in the country, providing credits, insurance, and guarantee programs [4]. Similarly, China Exim Bank is wholly state-owned policy bank and as such does formally play a broader foreign political agenda as well [5-6].International contracting business is one of the notable industries in Turkey in terms of its economic contribution, and Turkish contractors represented by 40 firms took the second place in the list of top 250 international contractors in the world in 2016. Also, Chinese contractors were represented by 65 firms and took the first place in this list [7]. Based on these figures, the support and current practices of Turk and China Exim Banks have great importance for international construction projects undertaken by Turkish and Chinese contractors. Therefore, the present study aims to evaluate Turk and China Exim Banks' programs towards international contracting services and to identify the level of contribution of these Exim Banks in supporting international contracting services.

2. MATERIALS AND METHODS

In the literature, there are only a few studies concerning Turk and China Exim Banks, and none of them were specifically about the contracting industry. Accordingly, this study was based on the information gathered both from past studies that mention the contracting industry in the context of Exim Bank and from official web sites of Turk and China Exim Banks [8,9].

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3. TURK EXIM BANK

Turk Exim Bank was founded in 1987 [8] and has provided some economic benefits and advantages for construction contractors up to date. Based on the latest official data, in 2015, Turk Exim Bank continued to support Turkish contractors doing business abroad through its International Project Financing Program. Under this program, projects undertaken by Turkish firms in other countries receive financing on terms of up to ten years either with Turkish Treasury guarantees or within the framework of limits which Turk Exim Bank allocates to banks in those countries based on its own analysis and assessment of their reputability. African countries in particular are emerging as an increasingly more important market in this business line. In addition to a project in Ethiopia, the biggest undertaking that the bank has financed so far in a foreign country, Turk Exim Bank is also financing a number of projects in Ghana, Senegal, and (most recently), Congo [10].

3.1 Letter of Guarantee Program for Overseas Contractors' Services

This non-cash facility aims to enable Turkish contractors to sustain their current share in international markets and thus encourage them to enter into new markets. Within this program, Turkish overseas contractors who participate in tenders abroad are provided letters of guarantee by the Exim Bank under the counter-guarantee of Turkish commercial banks. Under this program, the Exim Bank issues a bid-bond, performance-bond, and advance guarantee letter through a bank or directly to cover Turkish contractors' responsibilities for possible projects against the employer or employer's bank. The commission rate and the payment term are determined by the Exim Bank for each transaction. In this program, the total amount of guarantee to be issued in favor of a firm in return for the counter-guarantee of Turkish commercial banks does not exceed $25 million. The letter of guarantee can be given up to 25% of the tender price or the total amount in the contract. However, this amount cannot exceed the firm limit. The Exim Bank takes a commission of 0.5% per year to give a letter of guarantee to the tendering authority or its bank. The amount of the aforementioned commission is collected in cash per three months from related Turkish banks on behalf of the contractor [8].

3.2 Bridge Credit for Overseas Contractor Services

In case of a debt of an international project owner since 2008, credits are made available for Turkish contracting firms who have been executing those international projects. The Bridge Credit Program for Overseas Contractor Services aims to mitigate the impact of financial crises on the Turkish contracting industry and to protect Turkish contractors' investments and their long-term competitive strength in other countries' markets by keeping construction sites and mobilization-engine parks functioning. The firm limit is $25 million, and the credit period is maximum 720 days. During 2015, Turk Exim Bank extended a total of $32 million as credit under this program [8, 10].

3.3 Insurance Program for Unfair Calling of Bonds

This program was introduced at the beginning of 2004 in order to support the contracting services. It covers applications for bid-bonds, advance payments, and performance-bonds of international Turkish contractors in order to eliminate the risk of unfair calling of bonds which are issued by a bank in favor of a public buyer based in a borrowing country. Under this policy, Turk Exim Bank is responsible for indemnifying Turkish contractors due to a call made under a bond for an event or a circumstance beyond the contractor's control [8].

3.4 International Project Loans

Projects undertaken by Turkish contractors in foreign countries are financed by loans and guarantees under this program. In a project, up to 85% of goods and services to be exported from Turkey can be financed. The maximum repayment period is often 10 years in infrastructure and superstructure projects while some exceptions may be made due to the nature of the project, such as, up to 12 years of maturity for energy plants except for nuclear, 14 years for railway projects, 18 years for renewable energy, climate change mitigation, and water projects. The principal is repaid in equal semi-annual installments throughout the life of the facility. First repayment date is 6 months after the project completion period. Up to date, International Project Credits **including guarantees** and letters of intent have been employed for construction projects in many developing countries around the world, such as Azerbaijan, Belarus, Cameroon, Congo, Ethiopia, Ghana, Kazakhstan, Kyrgyzstan, Libya, Moldova, North Cyprus, Pakistan, Russia, Senegal, Sudan, Turkmenistan, and Uzbekistan. Within the framework of the International Credits Programs, the total amount of the credit risk exposure at year-end 2015 was $598.3 million and that of credit disbursements was $308.5 million [8, 10].

3.4.1 Guarantee

If projects undertaken in foreign countries by Turkish contractors are financed by foreign or local banks, the Exim Bank may issue a letter of guarantee to the lending bank in favor of the borrower in order to secure repayments [8].

3.4.2 Letter of Intent

A letter of intent indicating that the project may be financed under the International Project Loans Program can be issued to contracting firms which will undertake projects or participate in international tenders. In 2015, Turk Exim Bank issued 91 letters

of intent pertaining to the financing of projects and business deals which Turkish firms planned to undertake in 35 countries in Africa, Asia, and Europe. Under these letters, the Bank declared its intentions to supply a total of $12.9 billion worth of credit to finance payments for goods and services to be exported from Turkey [8, 10].

4. CHINA EXIM BANK

China Exim Bank is the world's third largest export credit agency [11]. It was established in 1994 [12]. It provides financing packages including China's credits for a borrowing country and export seller's short-term credits for a Chinese company. Loans subsidized by Chinese Ministry of Commerce are typically based on two agreements: a framework agreement between two governments and an agreement between the Exim Bank and the borrower, typically a foreign government [12-14]. On the other hand, in particular, smaller bartering arrangements may take place between companies with little government involvement [6].In its lending practices, financing that includes strict requirements may be roughly divided into commercial financing and financing typically subsidized from China's development aid budget [6]. Although its modus operandi suggests that commercially-oriented deals are more central [12], all of the Exim Bank's loans are offered to foreign governments on concessionary terms [11]. In this context, it should importantly be noted that the commercial focus of Exim Bank causes tensions with diplomatic goals of the Ministry of Foreign Affairs [12].China Exim Bank is the sole agency for the provision of Chinese government concessional loans, distinguished from commercial inclinations by their zero or lower-than-market interest rates, a long grace period, or both [5]. The concessional loan is designed to finance the procurement of Chinese products, complete sets of equipment, technology and service, and other goods by the borrowing country [2]. The World Bank has a Memorandum of Understanding with the China Exim Bank regarding the financing infrastructure in developing countries [5, 12]. More than 80% of its loans were made to African countries such as Angola, Nigeria, Zimbabwe, and Sudan [15]. Up to date, it has had success in facilitating the entry of Chinese construction companies into foreign markets [5]. For instance, it has provided critical funding for many large dams [16]. An estimated 60% of a Chinese hydropower dam building company's medium- and long-term loan activity is for China Exim Bank transactions [16].China's involvement in host country accords China preferential status as a trade and investment partner [5]. The Exim Bank's primary function is to stimulate demand for Chinese goods and services abroad [17]. Although it remains wary of African projects due to the perceived high level of risk involved, it has no regard for commercial risk [5]. A wide variety of diplomatic support reduces companies' political risks in operating abroad [18]. In other words, the Exim Bank is heedless of risk and is a mechanism to facilitate Chinese access to domestic oil and political favor [5].China's pursuit of oil assets is through state-to-state oil-for-infrastructure based financial deals [11]. This means that Chinese-financed projects or loans for large-scale infrastructure projects are repaid or collateralized by the export of natural resources to China. In this regard, the Exim Bank offers financing to Chinese companies' investments abroad and participates in resource-backed financing arrangements. Typically, a company carries out a construction or an engineering project in a country using the Exim Bank financing. In return, the same or another company is given access to a natural resource in the country and the loan is then repaid using revenue from the company's mining operations [6, 17]. Finances flow directly from the Exim Bank to the companies, circumventing the recipient country government [19]. Namely, the projects are stipulated as being undertaken by Chinese contractors and paid for by shipments of the African crude oil to China [17]. Considering the Exim Bank resource-backed loan mechanism is largely through mitigating market entry risk [17], the loans extended by the Exim Bank are targeted specifically towards facilitating the public investment in the host country and are reportedly managed by the host country. With this motivation, the Exim Bank has increasingly become one of Africa's most important financiers for the infrastructure development and rehabilitation [5].However, its credit line does not encourage local participation [17]. Although its framework agreement with the borrowing country's Ministry of Finance does reportedly include a clause regarding 70% local employment [20], Chinese companies contracted to undertake construction projects financed in this way do not use local labor, materials, or any other inputs in the undertaking of their contracts. As spin-off exports of Chinese equipment, materials, technology, labor service, and management services that derive from overseas construction contracts account for no less than 15% of the total contract value of the project for concessional loans, no less than 50% of the project procurement composed of goods and services is sourced in China [17]. In other words, no less than 50% of the contract's procurement in terms of equipment, materials, technology, or services must be acquired from China [2, 21].Tied to the China Exim Bank loan is the agreement that public tenders, for construction and civil engineering contracts, are awarded primarily (70%) to Chinese enterprises approved by Beijing [5]. It means that the only condition imposed by the Exim Bank is that 70% of the construction be performed by Chinese firms [11]. For concessional funding, agreed projects are put out to tender for at least three Chinese companies [2, 6]. The company awarded must be able to afford a down-payment of 15% of the contract [17]. Of the remaining tenders, 30% have reportedly been allocated to the private sector in the host country to encourage the domestic participation despite the fact that this may only extend as far as ensuring that 30% of contracted labor is domestic [5]. Namely, only up to 30% of the contracts' value could be subcontracted to borrowing country's firms [17]. In addition, up to 60% of tenders awarded to Chinese companies may also be subcontracted to local partners [5].

5. RESULTS AND DISCUSSION

Although 706 of "first 1000 exporters" of Turkish Exporters Assembly are customers of Turk Exim Bank [4] and the total amount of new international projects undertaken by Turkish contractors in 2016 is approximately $10 billion [22], it surprisingly appears that Turkish construction companies take a negligible place among these customers. In fact, six causes behind this reality can be summarized in the following paragraphs.As the first reason, Turk Exim Bank does not meet customers' expectations regarding the quality of service provided. In fact, this gap does not differ by the sector, employee number, and their position of the exporting firms [4].

Second, because of the lack of a correspondent bank in some countries, the letter of guarantee given by Turk Exim Bank, which was established in 1987, is considered insufficient. Moreover, both the low speed of the issuing process of the letter of guarantee and the obligation to have mortgage are considered as other significant problems. Turkish overseas contractors are tried to provide a letter of guarantee in very difficult and expensive ways, and thereby, loses potential contracts.Third, the credit program applied by Turk Exim Bank for Turkish overseas contracting services is not a project financing program. Also, the amount of a project credit provided by Turk Exim Bank is as much as the amount of goods and services exported from Turkey. In addition, this amount cannot exceed a specified ratio of the project cost. However, this ratio seems to be insufficient and it is expected from the credit to cover all project costs. The same procedure is also valid for projects in Turkey. Although it is desired to provide a credit that covers all project costs, Turk Exim Bank cannot give such a credit owing to its legislation.Fourth, considering the inadequacy of currents programs' limits for countries, firms and projects, Turk Exim Bank seems to have no significant role in supporting international Turkish contracting services. Therefore, these limits regarding current credit, warranty, and insurance programs should be reviewed. In parallel with international construction industry trends, limits for new countries should be allocated and current limits should be increased.Fifth, there are only four countries where correspondent banks of Turk Exim Bank exist. Their numbers are very few, considering the number of countries where Turkish contractors have undertaken projects. Therefore, the number of correspondent banks in different countries should be increased to expedite the process of any Turk Exim Bank credit program.Sixth and lastly, there have been very limited applications from international construction contractors from Turkey for the utilization of Exim Bank programs due to aforementioned drawbacks, given these contractors' total annual turnover and applications. However, international contractors from China are consciously supported by Exim Bank loans in a very intensive manner because of both the strategic approach of Chinese governments and the economic system available in China.

6. CONCLUSIONS

Harsh competition in international markets forces governments and firms to employ different economic instruments for broader turnover, employment, and thereby wealth. As a strategic device in economic and political terms, the official export credit agency of a country, called Exim Bank, plays an important role in this respect. Especially (i) loans with low interest rates, (ii) guarantees, and (iii) insurances are among the main services Exim Bank gives for companies in the private sector. Today, in many countries around the world, there is an Exim Bank financed by public resources completely.In order to do more business by exporting the goods and services through Exim Bank credits, international construction investments present a beneficial tool for developed and developing economies. In this context, current Exim Bank practices in China and Turkey were taken into account in this study. This is because the total number of their contractors and subcontractors was ranked first and second, respectively, in the list of top 250 international contractors in 2016.In conclusion, it appears that Turkish and Chinese contractors utilize Exim Bank programs. However, it is also almost evident that Turkish contractors can benefit from these programs in a relatively limited manner due to some problems and difficulties in the programs when compared with their great use by Chinese contractors owing to the significant support of Chinese governments. Overall, to be able to perform better in the international construction market in the future, Turk Exim Bank should rehabilitate its own system by solving the problems and removing the difficulties for an intensive use of financial advantages provided for Turkish contractors. In fact, this will likely sustain and increase the total foreign market share of Turkish companies.

ACKNOWLEDGMENT

Authors gratefully acknowledge financial supports provided by Committees on Research Grants of Bulent Ecevit University and Akdeniz University.

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19 - 23 April 2017, Sarajevo

Economic Sustainability of Construction Projects: A Comparison of FIDIC Red Book and Turkish Public Procurement Legislation

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Abstract

Public construction projects financed by World Bank or other international institutions and executed according to FIDIC-type contracts provide a considerable value-added input to developing and developed economies through their parties in these projects. Based on this widely recognized characteristic of FIDIC around the world, it can be accepted as fundamental terms and conditions of construction contracts. In this context, domestic legislation is expected to be in harmony with FIDIC to facilitate the adaptation of domestic parties and to establish the identity of national and international applications. In fact, this may decrease the number of disputes between contracting entities and prevent related negative consequences such as time and cost overruns. Therefore, Turkish Public Procurement Legislation was compared with FIDIC Red Book to determine the Legislation's possible shortcomings. As a result, a total of eight problematic areas in theory and practice were identified. These can be listed as commencement, e-communication, value engineering, interim or advance payments, force majeure, suspension of works, delay fine, and dispute resolution. Finally, some recommendations concerning these issues were made to remove or minimize potential conflicts that can likely be encountered in Turkish public construction investments in the future. Consequently, all these results may enable owners and contractors to keep the sustainability of construction projects in economic terms.

Keywords: construction projects, economic sustainability, FIDIC, Public Procurement Legislation, Red Book, Turkey.

1. INTRODUCTION

Especially in developing economies, insufficient financial resources allocated for public construction investments can require foreign credits. In international commercial practices, several guidelines concerning construction contracts are employed. FIDIC-type contracts, one of these guidelines, can be accepted as fundamental terms and conditions of international public construction contracts, based on their widely recognized characteristic. These types of contracts constitute about 30% of construction contracts around the world [1]. Similarly, based on agreements between municipalities and international credit institutions, many infrastructure projects in Turkey have been completed to date according to FIDIC rules. From this perspective, it can be stated that FIDIC-type contracts have been used and are still used extensively in Turkey.In public construction investments financed by World Bank or other similar international credit institutions, contracts between employers and main contractors are prepared according to FIDIC rules. Similarly, in Turkey, according to the third article of Public Procurement Law [2], FIDIC-type contracts can be used for public construction works. One of main reasons to change the former Legislation into the current Public Procurement Legislation (PPL) was to provide its adaptation to the rules of international institutions such as World Bank and European Union. In other words, for FIDIC-type contracts, the regulation of the domestic Legislation in line with FIDIC specifications can be considered as a must to ensure the similarity of applications of both parties and to adapt domestic parties to conditions of the contract.From another point of view, some articles in PPL seem to be very risky as adverse effect creators especially for main contractors, and thus, disputes may arise between parties during the execution period of the contract. Moreover, these disputes may even lead to the bankruptcy of contractors. As a result of these negative actions, public construction projects may not be completed within the triple constraint (i.e., time, cost, and quality). Therefore, existing incompatibilities between PPL and FIDIC rules should be determined to avoid potential disputes in public-financed construction projects in Turkey.In this context, the aim of this study is to determine fundamental shortcomings of PPL vis-a-vis FIDIC and to make some corresponding recommendations. Consequently, it can be claimed that PPL of which gaps are filled may prevent cost and time overruns by minimizing potential conflicts between employer and main contractor and thus by decreasing long-lasting judicial processes.

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2. MATERIALS AND METHODS

In this comparative analysis, Conditions of Contract for Construction [3] known as Red Book were taken into account as it is one of the most commonly used books of FIDIC in practice. The Turkish counterpart used is PPL which is composed of Public Procurement Law [2], Public Procurement Contracts Law [4], Application Regulation on Public Procurement of Construction Works [5],Public Procurement General Bulletin [6], and Regulation on Inspection and Acceptance of Public Construction Works [7].

3. RESULTS AND DISCUSSION

3.1 Commencement

According to Red Book, the following statements must be fulfilled for the commencement of the work,"Unless otherwise stated in the particular conditions, the commencement date shall be within 42 days after the contractor receives letter of acceptance (article 8.1, p. 26). The contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of the time completion if any delay caused by the employer, employer's personnel, or employer's other contractors on the site (article 8.4, p. 27)."In PPL, according to the chapter titled "General Specification of Construction Works" in the Application Regulation on Public Procurement of Construction Works [5], the following statements exist,"After signing the contract, employer shall deliver the site to the contractor in the period of time stated in the contract in order the contractor to start works on time (article 6.1). If the employer fails to deliver the site to the contractor on time, a time extension shall be given for the time of completion to cover the time lost (article 6.6)."In PPL-based works, the need for indicating the maximum time necessary to deliver the site to the main contractor in the contract may lead to a pressure on the employer while determining this time. In case of an unrealistic estimation of the time needed for the delivery of the site, the main contractor may not execute the project in accordance with the planned schedule. Hence, the main contractor may face some unexpected financial difficulties because of the fact that he/she has to make extra payments for idle times of labor and equipment. Therefore, similar to Red Book, PPL should express the standard time required to deliver the site. In fact, such an arrangement may be beneficial for the main contractor to compensate his/her time and money losses before physical works.

3.2 E-communication

In accordance with Red Book, the following statement regarding e-communication must be fulfilled,"Wherever these conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be transmitted using any of the agreed systems of electronic transmissions and delivered, sent or transmitted to the address for the recipient's communications as stated in the Appendix to Tender (article 1.3, p. 5)."However, there is no such arrangement about e-communication in PPL. Since techniques of communications improve rapidly in today's highly developing technological devices, it can be appropriate to utilize e-mail as one of the official communication means between the employer and the main contractor in PPL-based projects. Thus, corresponding time savings obtained can be provided by eliminating the official correspondence and the extensive paperwork.

3.3 Value Engineering

The following statement in Red Book may be fulfilled for value engineering,"The contractor may, at any time, submit to the engineer a written proposal which (in the contractor's opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost to the employer of executing, maintaining or operating the works, (iii) improve the efficiency or value to the employer of the completed works, or (iv) otherwise be benefit to the employer (article 13.2, p. 37)."As can be seen from the above expression, an opportunity for the main contractor is provided to propose economically beneficial solutions to the employer. In addition, Red Book says the following statements,"If this change results in a reduction in the contract value of this part, the engineer shall determine a fee, which shall be included in the Contract Price. This fee shall be half (50%) of the difference between the reduction in contract value, resulting from change, excluding adjustments under Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost] and the reduction (if any) in the value of the employer of the varied works, taking account of any reductions in quality, anticipated life or operational efficiencies (article 13.2, p. 37)."In fact, such arrangements not only increase the productivity but also encourage contractors to develop cost-reducing practices during the project execution period. However, for such cases in PPL-based works, main contractors cannot make claims or take advantage of the potential reduction in the contract price. This shortcoming forms an obstacle in front of contractors to improve their technical capabilities. Therefore, it can be asserted that it is necessary to make similar arrangements in PPL to create opportunities in providing financial advantages both for the employer and for the main contractor.

3.4 Interim or Advance Payments

In Red Book based works, the following detailed statements concerning interim or advance payments must be fulfilled,"If the contractor does not receive payment in accordance with Sub-Clause 14.7 [Payment], the contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay. This period shall be deemed to commence on the date for payment specified in Sub-Case 14.7 [Payment], irrespective (in the case of its sub-paragraph (b)) of the

date on which any interim payment certificate is issued (article 14.8, p. 44). If the engineer fails to certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] or the employer fails to comply with Sub-Clause 2.4 [Employer's Financial Arrangements] or Sub-Clause 14.7 [Payment], the contractor may, after giving not less than 21 days' notice to the employer, suspend work (or reduce the rate of work) unless and until the contractor has received the payment certificate, reasonable evidence or payment, as the case may be and as described in the notice. If the contractor suffers delay and/or incurs cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the contractor shall give notice to the engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and payment of any such cost plus reasonable profit, which shall be included in the contract price (article 16.1, p. 49). After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] has taken effect, the employer shall promptly pay to the contractor the amount of any loss of profit or other loss or damage sustained by the contractor as a result of this termination. The amounts payable for any work carried out for which a price is stated in the contract and any other cost or liability which in the circumstances was reasonably incurred by the contractor in the expectation of completing the works (article 19.6, p. 57)."However, in PPL, there are no such arrangements about entitlements of the main contractor in case of the employer's failure in payment. Therefore, delayed interim or advance payments can result in the main contractor's financial and related productivity losses. As a result, an arrangement that better allocates monetary risks between the main contractor and the employer can be added to PPL.

3.5 Force Majeure

In case of force majeure, Red Book says the following statements,"If the contractor is prevented from performing any of his obligations under the contract by force majeure of which notice has been given under Sub-Clause 19.2 [Notice for Force Majeure], and suffers delay and/or incurs cost by reason of such force majeure, the contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of time for any such delay, if the completion will be delayed and payment of any such cost (article 19.4, p. 57). If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason force majeure of which notice has been given under Sub-Clause 19.2 [Notice for Force Majeure], or for multiple periods which total more than 140 days due to the same notified force majeure, then either party may give to the other party a notice of termination of the contract. In this event, the termination shall take effect 7 days after the notice is given, and the contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment]. Upon such termination, the engineer shall determine the value of the work done and issue a payment certificate which shall include the amounts payable for any work carried out for which a price is stated in the contract (article 19.6, p. 57)."In PPL based contracts, although the main contractor is entitled to demand an extension of time for any delay caused by force majeure, there is no arrangement for him/her to terminate the contract in case of the continuous force majeure. From the main contractor's point of view, it is an unfavorable situation to be forced to maintain an unprofitable contract. Therefore, similar arrangements about the rights of the main contractor in case of force majeure can be added to PPL.

3.6 Suspension of Works

The following statements on the suspension of works in Red Book must be fulfilled,"If the engineer fails to certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] or the employer fails to comply with Sub-Clause 2.4 [Employer's Financial Arrangements] or Sub-Clause 14.7 [Payment], the contractor may, after giving not less than 21 days' notice to the employer, suspend work (or reduce the rate of work) unless and until the contractor has received the payment certificate, reasonable evidence or payment, as the case may be and as described in the notice (article 16.1, p. 49). If the contactor suffers delay and/or incurs cost as a result of suspending work (or reducing the rate of work) the contractor shall give notice to the engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claim] to an extension of time for any such delay, if the completion is or will be delayed, under the Sub-Clause [Extension of Time for Completion], and payment of any such cost plus reasonable profit, which shall be included in the contract price (article 16.1, p. 49)."In fact, the entitlement of the suspension of works seems to strengthen the main contractor's hand against the employer in order to execute the works in accordance with the contract. However, in PPL, there is no arrangement concerning the right of the main contractor for suspending the works or for decreasing the rate of the works in case of the payment failure of the employer. In conclusion, such entitlements seem to be necessary for the main contractor in PPL based contracts.

3.7 Delay Fine

Based on Red Book, the following statements concerning the delay fine must be fulfilled,"If the contractor fails to comply with Sub-Clause 8.2 [Time for Completion], the contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay delay damages to the employer for this default. These damages shall be the sum stated in the appendix to tender, which shall be paid for everyday which shall elapse between the relevant time for completion and the date stated in the Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the appendix to tender (article 8.7, p. 28)."However, Regulation on Inspection and Acceptance of Public Construction Works [7] says the following statements,"If acceptance committee detects incomplete or defective productions which are not an obstacle for acceptance, the committee shall make an official report of defects and determine a reasonable time considering technical features of the work to correct these defects. A copy of the official report shall be given to the main contractor and the building control officer (article 7.b)."In practical applications, this time given to the main contractor is usually perceived as an additional time, and

thereby, from the beginning, the main contractor may not feel any pressure to deliver the work to the employer on time in accordance with the contract. In order to overcome this problem in PPL based contracts, an arrangement that obligates the main contractor to face a fine for each day of time overrun can be made.

3.8 Dispute Resolution

In case of any dispute between the employer and the main contractor, Red Book says the following statements,"Dispute shall be adjudicated by a Dispute Adjudication Board (DAB) in accordance with Sub-Clause 20.4 [Obtaining Dispute Adjudication Board's Decision] (article 20.2, p. 59). If either party is dissatisfied with the DAB's decision, then either party may, within 28 days after receiving the decision, give notice to the other party of its dissatisfaction. If the DAB fails to give its decision with the period of 84 days (or as otherwise approved) after receiving such reference, then either party may, within 28 days after this period expired, give notice to the other party of its dissatisfaction (article 20.4, p. 61). Unless settled amicably, any dispute in respect of which the DAB's decision (if any) has not become final and binding shall be finally settled by international arbitration (article 20.6, p. 61)."However, in PPL, the chapter titled "General Specification of Construction Works" in the Application Regulation on Public Procurement of Construction Works [5] says the following statements,"In case of a dispute between the main contractor and the engineer, the main contractor shall appeal to the employer by a petition including claim reasons within 15 days after the dispute arises. Within 2 months after receiving the petition, the employer shall respond the main contractor (article 51). In case of the main contractor's objection, the employer can have a written opinion of Directorate of High Technical Board affiliated to Ministry of Environment and Urbanization. If the main contractor is dissatisfied with the decision, the main contractor may go to the related court in accordance with the contract."This long process of the dispute resolution in PPL causes time losses for the main contractor and the employer. For the sake of the contract, it seems to be necessary to make an arrangement similar to that in Red Book.

3.9 Overall Evaluation of Findings

Table 1 presents all the findings obtained through the comparison of Red Book and PPL.

Table 4. Comparison of Red Book and PPL from the main contractor's point of view

Subject	**Red Book**	**PPL**
Commencement	Maximum 42 days after the letter of acceptance	No time specified
	Time extension and payment for expenses and possible profit in case of any delay	Time extension only in case of any delay
E-communication	By e-mail	Not by e-mail
Value engineering	50% of the difference between reductions in contract value and in the value of the employer	No financial advantage
Interim or advance payments delay	Time extension and financing charges compounded monthly on the amount unpaid (if any additional costs, reasonable profit)	No advantage
	Right to suspend, reduce the rate of or terminate the work	No right
	Amount of any loss of profit or other loss or damage sustained as a result of termination	No right to terminate
Force majeure	Duration to be waited available	No duration to be waited
	A notice of termination of the contract	No notice of termination
	Amount of any loss of profit or other loss or damage sustained	Time extension only
Suspension of works	May suspend the work or reduce its rate	No right to suspend the work or reduce its rate
	Extension of time for any such delay, payment of any such cost plus reasonable profit	No advantage
Delay fine	A fine given	Time extension only
Dispute resolution	DAB and arbitration	Courts

4. CONCLUSIONS

Consequently, a number of arrangements can be made in PPL as follows, based on competent articles of Red Book,

- A standard period of time should be determined by the employer to deliver the construction site to the main contractor.
- In case of any delay in the delivery of the site to the main contractor, some arrangements should be made to meet the expenses of the main contractor throughout the delay.
- As another means of the formal communication between the employer and the main contractor, e-mail should also be able to be used.
- Value management practices in which the main contractor can present his/her technical proposals that may accelerate the work or improve its quality during the execution process should be applied to encourage the main contractor in return for a reasonable profit margin.
- In case of any delay in interim or advance payments, there should be both time extension and payment of any such cost plus profit for the main contractor.
- If the employer fails to carry out his/her responsibilities of payment, then the main contractor should be able to suspend the work, to reduce its rate, or to terminate the contract entirely.
- In case of the termination of the contract by the main contractor because of the employer's payment difficulties, the main contractor should collect payments of the work done and of any such cost plus a reasonable profit.
- In case of force majeure, there should be exact numerical data for the maximum duration to be waited in an idle position.
- The main contractor should be entitled to give notice of termination due to force majeure.
- Based on force majeure, the main contractor should be entitled to take payments of any loss of profit or of other loss or damage sustained.
- The main contractor should be able to terminate the contract based on valid and rightful reasons.
- In case of the suspension of works owing to valid and rightful reasons, the main contractor should take payments of any loss of profit or of other loss or damage sustained.
- In case of time overrun for completion, delay fine should be taken from the main contractor for each day of the overrun.
- In case of any dispute between the parties of the contract during the execution process, there should be a DAB before litigation.
- Parties should be able to resolve the conflicts between them by arbitration.

ACKNOWLEDGMENT

The authors gratefully acknowledge the financial supports provided by the Committees on Research Grants of Bulent Ecevit University and Akdeniz University.

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BIOGRAPHY

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

A Structured Selection Process for Small and Medium Enterprises in Construction Industry: Case of International Projects

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Abstract

Construction industry in most countries relies heavily on small and medium enterprises (i.e., subcontractors). Therefore, in today's highly competitive construction business, it is inevitable to select suitable subcontractors which physically execute almost all of production activities in construction projects. In this context, through a proper selection process, their competences should be guaranteed as much as possible. In fact, this becomes a more significant issue if the project undertaken is performed abroad. In this regard, it should be noted that Turkish construction companies have been significantly active in the international arena for decades. Based on these arguments, subcontractor characteristics to be considered in international projects should be revealed clearly. Accordingly, this paper proposes a structured process for subcontractor selection in international construction projects. Toward this aim, a questionnaire survey was applied to 96 construction companies, all of which are members of Turkish Contractors Association, and the corresponding numerical results were evaluated via descriptive statistics and 95% confidence interval. Thus, a three-step selection procedure together with their specific criteria was suggested from the conceptual point of view. These steps include (i) shortlisting with ten criteria, (ii) negotiation with seven criteria, and lastly (iii) final selection with seven criteria. Hence, this study can provoke potential researchers to find similarities or differences of such criteria between their countries and Turkey. Also, it can help both main contractors to execute the whole construction process in a financially sustainable environment and subcontractors to increase business opportunities in the international market.

Keywords: construction projects, international projects, selection criteria, small and medium enterprise, subcontractor, sustainability.

1. INTRODUCTION

Subcontracting is a recognized function of the construction industry. It refers to sub-letting some portions or complete units of the work in the total project to subcontractors. Since the physical capital investment and technology requirements are quite low for most subcontracting trades and an access to productive factors is an easy task, the entry barrier to the subcontracting business is minimum in the industry. In other words, the cost of entering the market is not high relative to other sectors. Many of these subcontracting companies do not have any necessary expertise to undertake a work satisfactorily and, as a consequence, are unable to give their clients a service they require.Subcontracting has also a significant aspect in executing construction activities in international projects which are generally performed in uncommon regions and conditions. In fact, this may lead to some unexpected risks. Thus, a main contractor's ability to select suitable subcontractors in international projects is a key competitive advantage [1]. However, in the literature, improvements in subcontractor selection criteria have not received the attention that one would expect from a significant contribution to the construction industry. Therefore, the present study aims to introduce subcontractor selection criteria in international construction investments.

2. MATERIALS AND METHODS

The data presented in this study were obtained by a two-stage questionnaire survey that was given to members of Turkish Contractors Association [2]. First, a pilot survey was carried out with 30 members selected by random sampling to remove practical concerns on questions. After the pilot study, modifications were incorporated into the final version of the questionnaire. This sample group was selected because it is an accepted list of firms within the Turkish construction industry. Member firms of this Association perform approximately 70% of total investments made in Turkey, and have also undertaken 90% of the work done abroad in the field of construction. There are 139 members in total, of which 96 firms (69.06%) positively responded to the survey request. The number of companies interviewed is statistically adequate ($n \geq 30$) to represent the whole. Furthermore, Babbie [3] suggested that any return rate over 50% can be reported, that over 60% is good, and that over 70% is excellent. Respondents were contractors' professional managers who choose subcontractors. Interviews were conducted face-to-face at interviewees' offices and ranged from 1 to 2 hours, with each interview being tape-recorded. They were carried out in an open and

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semi-structured manner, allowing respondents to introduce whatever information was felt to be relevant. In order to make the interviewing more effective and to save the time of interviewees, respondents were briefed about overall objectives and the methodology of the survey before interviews through either (i) an e-mail or (ii) a telephone conversation. The fact that each company's business philosophy could guide the interviewee's personal opinion was also stressed.The survey was statistically evaluated by the 95% confidence interval of results [4]. To this aim, respondents were asked to assign a value between 0 (extremely unimportant) and 100 (extremely important) to each stage of selection. For the analysis of this method, mean values and standard deviation were initially obtained. Upper and lower limits were then calculated. In order to apply these equations, SPSS (Statistical Package for Social Sciences) was used.Demographic features of surveyed firms, including both respondents' characteristics and structures of construction companies, were revealed by survey results. Tender Managers made up 81.25% of participants and 18.75% were Chairmen of the Board of Directors. The statistical data indicated that participants had adequate business experience in the construction industry to answer the questionnaire satisfactorily. The mean work experience of respondents was 17.69 years, the standard deviation was 10.05 years, and the median was 13.5 years. Minimum and maximum values of the work experience were 7 and 36 years, respectively. A diversified group of decision makers who currently perform subcontractor qualifications participated in the study. Each participant had taken part in the selection process of at least one subcontractor, 25% had taken part in more than 50 selection processes, 18.75% had participated in fewer than 5 selections, 18.75% had been involved in 6-10 selections, 25% had been involved in 11-20 selections, and 12.5% had taken part in 21-50 selections.Besides individual characteristics of respondents, features of surveyed firms are also very important. Considering their average annual revenues, a vast majority of companies (81.25%) can be considered as being in the large scale (> $20 million) category while 6.25% of main contractors were middle scale firms ($10-20 million) and 12.5% were small scale firms (< $10 million). The fact that large scale firms are likely to have high standards in terms of the internal organization and project characteristics both indicates the reliability of the survey and has led to further research projections for the future. Surveyed companies had undertaken foreign construction projects in more than one field of construction to date. According to types of international projects, 81.25% of main contractors had performed engineering projects (highways, bridges, harbors, tunnels, dams, and infrastructure). The fact that international projects are composed of engineering investments in general is an expected finding. In addition, 62.5% of companies had executed industrial investments (power plants, refineries, and pipelines) and 62.5% had completed building projects (residential, commercial, schools, hotels, and hospitals). This indicates that main contracting firms have not specialized in only one specific project type and that subcontracting has become an inevitable tool of trade contracting for main contractors in the international construction industry. Considering the firms' business experience, 18.75% of them had been in the global construction market for 1-5 years, 25% for 6-10 years, 6.25% for 11-20 years, and 50% for more than 20 years. A significant portion of main contractors (56.25%) have been undertaking international projects for more than 10 years. This points out that they have adequate experience in foreign markets. Another indicator of the surveyed firms' international experience is the number of projects undertaken abroad. Of firms, 18.75% had served as a main contractor in 1-5 projects, 15.62% in 6-15 projects, 15.62% in 16-25 projects, and 12.5% in 26-50 projects. The fact that 37.5% of main contractors had successfully completed more than 50 foreign projects is an important finding, which shows their widespread experience. Similarly, it was found out that main contractors had successfully concluded many large scale foreign projects. Considering the maximum size of the labor force, 12.5% of main contractors had employed fewer than 100 workers in a project, 18.75% had employed 100-500 workers, 25% had employed 501-1000 workers, 31.25% had employed 1001-5000 workers, and 12.5% had employed more than 5000 workers. Firms had concurrently undertaken construction projects in three different continents. Former Soviet Countries (75%), Middle East (62.5%), and North Africa (43.75) are especially vital and strategic markets for Turkish construction companies.

3. SUBCONTRACTOR SELECTION CRITERIA

The literature review was instrumental in the identification and the design of factors affecting the selection decision of main contractors about subcontractors in international projects. Respondents were also encouraged to add to the list any other criteria they considered to be important. Since subcontractors are a kind of contractor, factors used for the main contractor selection are also utilized. More criteria could have been taken into account in the model, and the complexity of the selection procedure could have been increased using additional evaluation techniques. However, criteria ignored by respondents in the pilot survey were not factored into the model to avoid negligible details. In fact, infinite numbers of criteria can be suggested without considering their importance weights in any decision problem. Conversely, restricting the number of evaluation variables to, for example, three or five is simply too few to run a robust, thorough, and reliable qualification. Another aspect for improvements of the model is the number of criteria. The number and importance of criteria used for contractors to select a good subcontractor during the tender evaluation may vary from one to another. For this reason, the present research concentrated on a set of 'standard' criteria. This may raise problems of 'inadequacy' and 'irrelevance' of criteria when implemented to different types of project. Nevertheless, an attempt has been made to select and find the most 'suitable' set of criteria via a survey.In most instances, the sole deciding factor is the tender amount, and subcontractors that do not meet price requirements are excluded from further consideration. Because of the considerable weight which most contractors attach to price, the influence of other factors is 'hidden' in reality. However, if price alone dominates the specialist selection, then it is unlikely that requirements of a small subcontracting firm and a main contractor will be satisfied because this behavior (that is, single criterion decision making) is not conducive to harmonization and good relationships between two parties, which is in turn resulted in a poor project performance. As such, relying singularly on tender price alone can be fatal as the capability of the tenderer may not be adequately assessed. A single criterion cannot give a full expression of goals pursued by various contractors. In other words, taking solely cost figures into account raises quality

problems during and upon the completion of the project. However, the lowest tender price tends to attract a contractor's interest as superior to other criteria, and thereby, some contractors simply award contracts to lowest tenderers for the sake of cost savings. Subcontractors are forced to make a profit by providing the 'cheapest' possible construction, and 'low bid' based selections have been common. In practice, generally subcontractors who submit lowest tender prices obtain subcontracts. However, the lowest tender may not necessarily deliver prompt and good quality works. Awarding contracts to low bidders usually results in a poor performance in terms of quality and excessive delays. This means that a price that is too low likely inhibits the attainment of contractor's other objectives of quality and speed. Most of such cases end up in litigation. As a result, selecting the lowest bidder in a sealed tender auction can sometimes result in serious performance problems after the contract is awarded. Moreover, stiff competition causes subcontractors to cut their margins to get jobs and subcontractors trying to win a contract often lower the bid price. In fact, lower profit margins bring higher risks and lower levels of quality. Outcries against substandard construction (for example, in Turkey) or escalating construction claims have been often traced to the selection of lowest priced tenders. Another disadvantage of using the lowest bid as a principal discriminating criterion is that some subcontractors (e.g., those facing a shortage of work) may enter unrealistically low bid prices. Namely, low bids as the sole criterion for selection encourage unqualified subcontractors to submit bids. Of course, competitions are expected to drive costs down, but a low price cannot ensure quality standards expected by a contractor, because a subcontractor can reduce costs at the expense of the product's quality or can desperately quote low prices by reducing their quality of work. It means that low price awards motivate subcontractors to provide minimally acceptable construction products and that a low bidder can become a very expensive proposition. The practice of awarding tenders on a basis of the low tender price eventually will lead to ultimate quality problems. Therefore, a best value procurement should focus on selecting a suitable subcontractor with an offer that is most advantageous to a contractor when price and other important factors are appropriately combined. In terms of public investments, however, public clients have to aim to demonstrate the accountability for public funds and even-handedness to suppliers and contractors.Characteristics of subcontractors and guidelines in the selection procedure examined in this study are largely based on subjective rather than objective criteria, as explained in detail as follows. Since the model developed as illustrated in Figure 1 suggests three different stages as shortlisting, negotiation, and final selection, all criteria were classified according to these groups. Such a three-tier tendering structure prevents subcontractors bidding for subcontracts outside their capabilities.

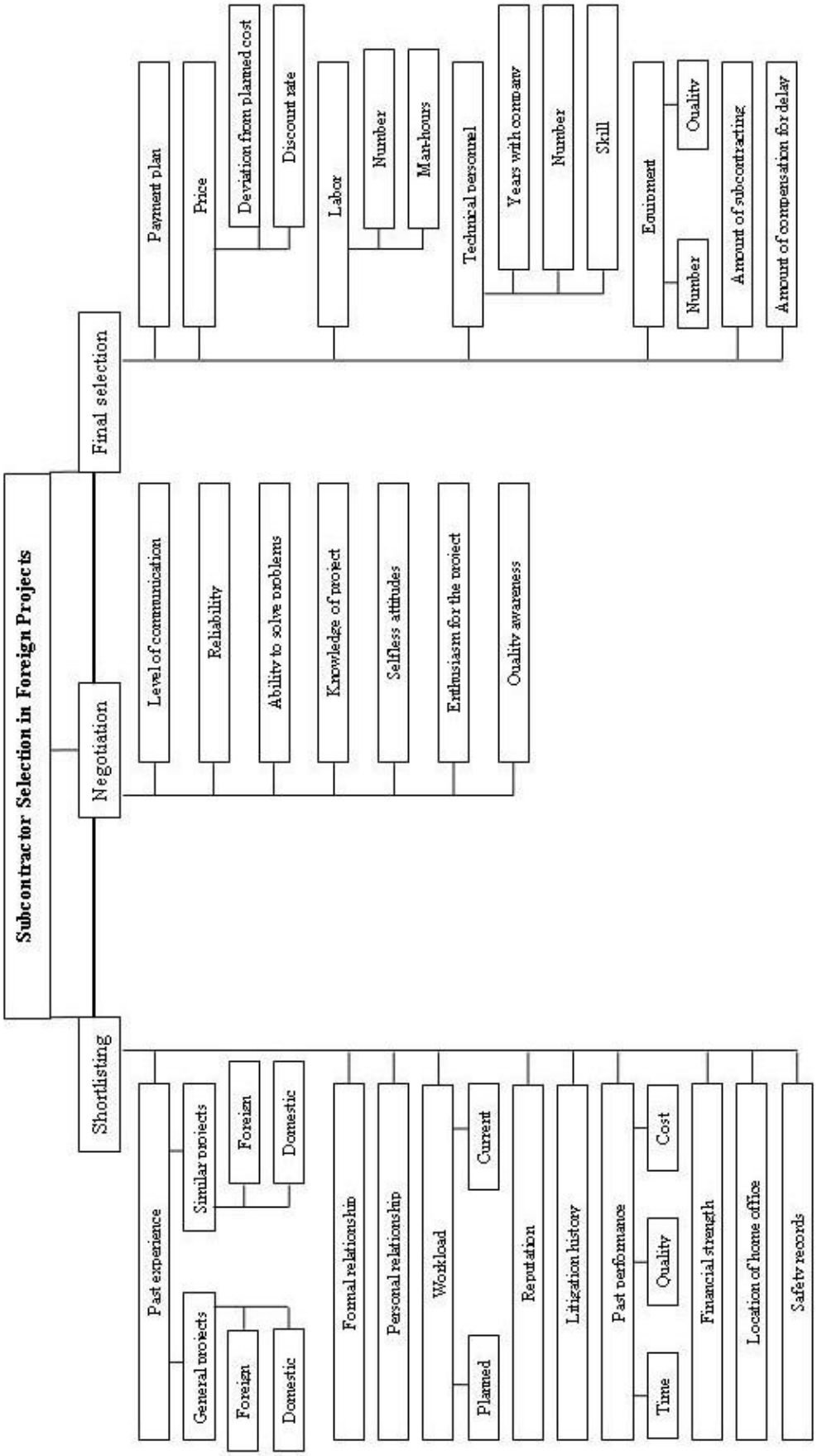

Figure 1.Subcontractor selection criteria in foreign projects

3.1 Shortlisting Criteria

This initial appraisal step is a preliminary vetting or restricting process of potential subcontractors. It is therefore preferable to identify those subcontractors deemed to satisfy project requirements and only then invite them to submit a tender. In other words, a pre-tender screening allows a contracting authority to sort potential operators into those of high and low expected quality before the tendering actually takes place. Such separation is important because if low and high quality subcontractors bid simultaneously, difficulties will arise in distinguishing low bids that are due to cost efficiency from those that involve the reduced quality of service. In this phase, basic characteristics of candidates on their professional backgrounds are considered in particular. Aims of this pre-tender process used to investigate and to assess capabilities of subcontractors to carry out a subcontract satisfactorily if it is awarded to them are as follows:

- To determine the possible subcontractor's competence, ability, skill, and efficiency for participating in the project bid and thereby for providing an early warning of the subcontractor's likely performance,
- to remove the risk of the project failure,
- to minimize the amount of the unrealistic tendering of incapable subcontractors,
- to filter out incompetent subcontractors from the bidding process quickly and thus to identify subcontractors with whom a main contractor could enter into a subcontract. Also note that main contractors disqualified from bidding for a project in their own capacities due to prequalification criteria in the international bidding often end up as subcontractors,
- to minimize the possibility of the subcontractor default, together with the cost and time involved in the bidding. It is worth noting that costs of the bidding incurred by potential subcontractors are sunk – they cannot be recovered if the bid is unsuccessful. Hence, by screening out subcontractors who are unlikely to be selected irrespective of their bid prices, total sunk costs can be significantly reduced.

In the shortlisting stage, subcontractors are first invited to submit their bids. Information about criteria 'past experience', 'workload', 'financial strength', 'location of home office', and 'safety records' is obtained from firms wishing to be included on the project tendering list via an application form from the main contractor. For information concerning criteria 'reputation', 'litigation history', and 'past performance', main contractors and subcontractors that have previous working relationships with the related subcontractor are contacted. 'Formal relationship' and 'personal relationship' are evaluated by means of the main contractor's own experience. Candidates must get through this step to be eligible for second and third phases of the selection. Related tender documents of the package such as drawings and specifications are then given to qualified candidates. To find out the importance level of this first stage, respondents gave numerical weights between 0 (extremely unimportant) and 100 (extremely important). As can be seen from Table 1, main contractors assigned a weight of 69.69 as a mean value. Considering other two stages, shortlisting is the least important stage.

Table 5. Importance weight of the shortlisting stage

Mean	Standard deviation	Minimum value	Median	Maximum value	Error	%95 confidence interval	
						Lower limit	Upper limit
69.69	22.54	25	70	100	5.64	57.67	81.70

3.2 Negotiation Criteria

In this step, candidates on the approved list are first interviewed. This and other two stages are executed by a selection committee including project manager, site manager, and other technical managers. To avoid individual biases, it is recommended that a minimum of three evaluators is required for each scoring activity. To come to a conclusion, it is aimed to make a group decision. Before proposal meetings, subcontractors submit their detailed project proposals and thus the committee has an opportunity of pre-appraisal. The related information should always be treated as a matter of utmost confidentiality. An importance weight of 72.81 was suggested for this stage by participants, as can be seen in Table 2.

Table 2. Importance weight of the negotiation stage

Mean	Standard deviation	Minimum value	Median	Maximum value	Error	%95 confidence interval	
						Lower limit	Upper limit
72.81	26.27	15	72.5	100	6.57	58.82	86.81

3.3 Final Selection Criteria

More specialized factors directly related with the project to be awarded are examined in this third stage whereas general capability levels of candidates are determined in former two stages. Therefore, 'final selection' is perceived as the most important stage by main contractors in the industry. A clear indicator of this judgment is that the mean value of the importance weight for this stage was calculated as 79.69, as given in Table 3. First steps of this stage are executed together with the negotiation stage. Respondents assigned a weight of 79.69 as a mean value. Given all three stages, the final selection was found to be the most significant stage.

Table 3. Importance weight of the final selection stage

Mean	Standard deviation	Minimum value	Median	Maximum value	Error	%95 confidence interval	
						Lower limit	Upper limit
79.69	26.68	20	90	100	6.67	65.47	93.90

4. CONCLUSIONS

This paper presents a structured selection process for subcontractors to take part in international construction investments. In conclusion, a three-step selection procedure and their criteria was determined. The steps are composed of (i) shortlisting of ten criteria, (ii) negotiation of seven criteria, and (iii) final selection of seven criteria. Also, it was found out that the final selection was found to be the most significant stage, followed by negotiation and shortlisting, respectively. Consequently, this research can have considerable implications on potential researchers, main contractors, and subcontractors.

ACKNOWLEDGMENT

The authors gratefully acknowledge numerous chairpersons, managers, and other technical/administrative staff of surveyed companies for their generous collaboration and contributions. The authors also would like to thank financial supports provided by Committees on Research Grants of Bulent Ecevit University and Akdeniz University.

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BIOGRAPHY

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Investigation of Heat Insulation Cost in Terms of Energy Efficiency in Housing

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Abstract

Energy demand is at the top of all major problems in all countries. More efficient use of energy is at the forefront of all countries' energy policies. In the countries of the International Energy Agency (IEA), about 1/3 of the final energy is consumed in residential and commercial buildings. When the Sectoral Distribution of World Energy Consumption and Primary Energy Sources are examined; 37% of the primary energy sources are Petrol, 27% Coal, 24% Natural Gas, 6% Nuclear energy and 6% Hydroelectric energy whereas the world energy consumption is 40% in industrial, 31% in residence, 19% in transportation, 5% in agriculture and it is known to be used in other areas at 5%. The primary energy sources in Turkey are; 32% (imported 97%) of natural gas, 31% (imported 93%) of petroleum, 20% (imported 20%) of coal, 9% of hydraulic resources and 8% of other sources. In Turkey, which is an externally dependent country in about 65% of energy use, 40% of energy is used by industry, 32% by housing and services, 20% by transportation, 5% by agriculture and 3% by other sectors. About 80% of the energy consumed in houses in Turkey is used for heating purposes. However, the prejudice that the cost of heat insulation is excessive and unnecessary in the buildings is still going on and no importance is attached to heat insulation. This is the case in Duzce, which was destroyed by earthquakes of August 17 and November 12, 1999 and experienced intensive construction. In this study, the projects of 22 apartment type residential buildings completed in 2015 were examined and the thermal insulation costs and total construction costs were calculated, and the total financial effects of the thermal insulation costs were calculated for the years 2013 -2016, and the findings were analyzed multivariate.

Keywords: Energy efficiency; Heat insulation; Housing; Insulation Costs.

1. INTRODUCTION

1.1 Heat Insulation

The heat loss that occurs in winter months and the processes that are done to reduce heat gains that occur in summer are called heat isolation. Heat insulation, comfort, warming is done in order to live in more comfortable environment by decreasing the energy we spend in summer. In this frame, heat insulation, walls, roof, flooring, glass, joinery and heating, cooling, ventilation etc. facing the unheated parts of buildings outside or garage, applied.

1.2 General Benefits of Heat Insulation

25% of the total energy produced in the world is consumed in industrial production, 25% in the use of motor vehicles and 50% in buildings. As can be understood from these ratios, the amount of consumption in the buildings represents a size as much as half of the total amount of energy produced. We know that the vast majority of the amount of energy consumed in the buildings is used for heating and cooling our buildings. Efficient use of energy provides significant contributions in the process of preventing adverse environmental effects. The warming of the earth leads to the erosion of the polar glaciers and climate changes, and thus the natural life is gradually disappearing. Heat insulation reduces greenhouse gases such as carbon dioxide (CO2), sulphurdioxide (SO2), which are emitted to the atmosphere because it allows buildings to be heated and cooled with less fuel. Thus, the greenhouse effect in the atmosphere contributes to the struggle with global warming and climate change. Thermal insulation to be carried out in accordance with the Regulations;

- It saves at least 60% of the expenses for heating or cooling purposes, allowing warming up better in winter and cooler in summer.
- Contributes to the prevention of environmental pollution and global warming by reducing fuel consumption and therefore emissions.
- Reduce our country's external dependency on energy with efficiency.

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- Avoid condensation, which causes molds, black stains and fungi in houses.
- Prevent the corrosion of the iron in the concrete, protect the building against to earthquake.
- Creates comfortable and healthy spaces by creating balanced room temperatures within living spaces.

Distribution of world energy consumption by sectors and primary energy resources are given in Figure 1.

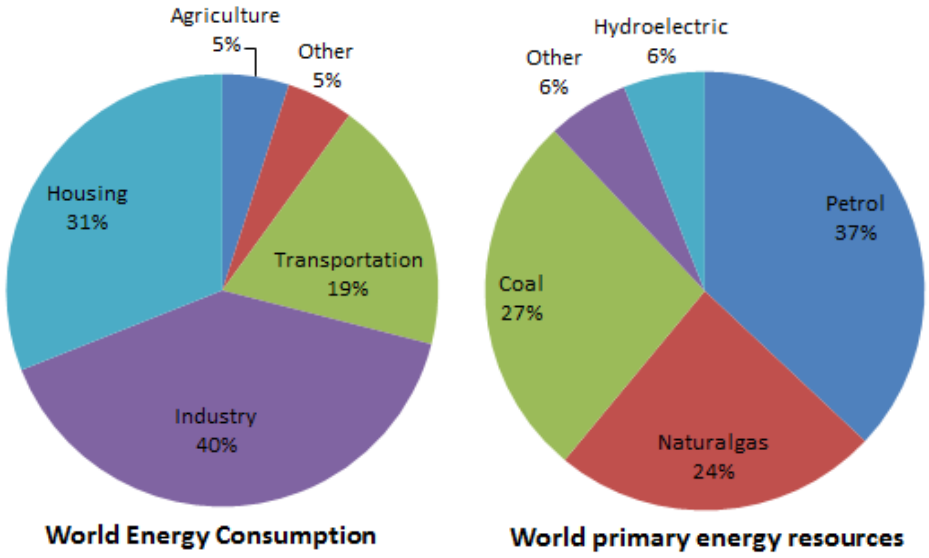

Figure1. Distribution of world energy consumption by sectors and primary energy resources.

1.3 Benefits of Heat Insulation to Our Country

Our country is not at a sufficient level in terms of energy production, with an important potential in terms of certain energy sources. Turkey imports about 75% of the energy it needs today. Calculations have shown that, if all the residences are insulated in accordance with the standards and regulations, our country can save about 10 billion TL annually. In this context, the reduction of our energy dependency on the outside, the revival of the economy, the increase in employment, the increase in tax revenues along with production and implementation are among the important benefits. When we consider that saving is the transfer of education, health and other necessary requirements, insulation is a reality that will have important contributions to our social prosperity. The distribution of energy consumption of our country by sector and the ratios of primary energy sources are given below.

1.4 Legal Regulations on Heat Insulation in Turkey

Legislative arrangements were made with the Energy Efficiency Law No. 5627 and the Condominium Ownership Law No. 634 published in the Official Gazette No. 26510 on 2 May 2007. Accordingly, an arrangement has been made that one of the floor owners will have heat insulation, the number of floor owners and the majority of the land share will be decided upon. In accordance with the "TS 825" Thermal Insulation Rules in Buildings "standard, the main areas of repair, modification and additions to be made to new buildings and existing buildings or existing buildings in accordance with the" Energy Performance Regulations of Buildings "published in the Official Gazette dated 5 December 2008 and numbered 27075 It must be insulated. Energy efficiency cannot be deteriorated in the amendments to existing buildings. In new buildings and all existing building stock until 2017; It is imperative that the Energy Identity Certificate showing the amount of energy consumed and the amount of greenhouse gas emissions causing global warming and climate change in the visible places of buildings. Through this document, you will see whether you will buy or lease the effects of fuel and electricity billing on the environment, depending on the energy efficiency of the buildings.

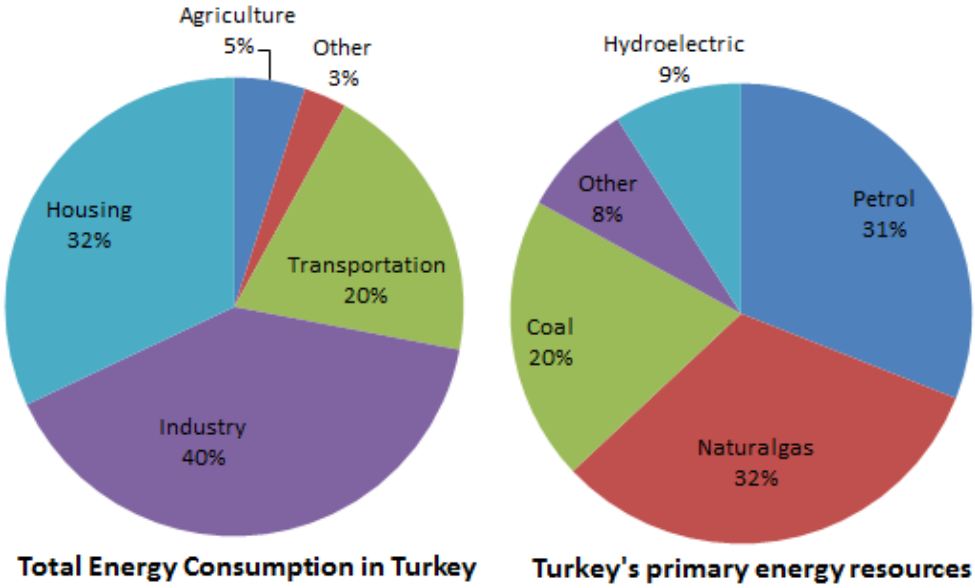

Figure2. Sectoral Distribution of Energy Consumption in Turkey and Primary Energy Sources

1.5. Energy Performance in Buildings

It is aimed to limit greenhouse gas emissions and protect the environment in terms of the primary energy and carbon dioxide (CO^2) of the buildings with the "Energy Performance Regulations in Buildings" prepared by the Ministry. The EU Directive 2002/91 / EC on "Energy Performance Directives of Buildings" (BEP) is based on the drafting of the Regulation. Two main regulations (BEP and MISSIGP) prepared in 2008 constitute important stages of the EU Directive Certification application. The purpose of the BEP Regulation is; To determine the calculation rules to be used to evaluate all energy use of a building considering the external climatic conditions, indoor requirements, local conditions and cost effectiveness, to classify in terms of primary energy and carbon dioxide (CO2) emissions, to determine the minimum energy performance for existing buildings to be renovated To assess the applicability of renewable energy sources, to control heating and cooling systems, to limit greenhouse gas emissions, to set performance criteria and principles of implementation, and to protect the environment. The Energy Performance Regulations of the buildings are in existing and new buildings;

- In relation to the use of building energy such as architectural design, mechanical installation, lighting, electrical installation, and to the calculation methods related to the preparation and implementation of building projects and energy identity documents, standards, methods and minimum performance criteria,
- Regulation of energy identification (EKB), authorization for building controls and inspection activities,
- To meet energy needs from the cogeneration system and renewable energy sources,
- Includes business and operations related to training and awareness-raising activities aimed at the creation and updating of building inventory throughout the country, as well as the development of energy culture and productivity awareness in the community.

Building Energy Performance Software (BEP-TR), the software of the national calculation method to be used in the preparation of the Energy Identity Certificate (EKB) under the Regulation, was completed at the end of 2010. According to the Energy Efficiency Law, all buildings must obtain an Energy Identity Certificate by 2 May 2017. However, it is foreseen that the existing buildings in our country will be given by the proprietor to the new user during the building purchase and sale and lease phase in order to receive the Energy Identity Certificate by 2017. As also foreseen in the European Union Directive 2010/31 / EU, it is aimed to increase the use of renewable energy sources in our country with the application of the Energy Performance Regulation and Energy Identity Certificate. In line with this goal, the Energy Identity Certificate shows how much renewable energy source the building uses, and the BEP-TR data base aims to increase the use of renewable energy sources according to years by evaluating the data related to this issue.

1.6 Energy Efficiency in Buildings

The energy used in buildings is mostly spent in heating and cooling systems. It is expected that the buildings should be heated well in order to achieve the expected thermal comfort and necessary ventilation and cooling in the summer months. In Turkey where energy consumption is so limited, it is necessary to ensure the necessary energy efficiency conditions in Turkey and to minimize the consumption of building envelope with heat insulation and natural sources. Works are carried out in the buildings,

power plants, transportation, industry and electricity sectors to increase energy efficiency.In the countries of the International Energy Agency (IEA), approximately one-third of the final energy is consumed in residential and commercial buildings. The most effective way of ensuring energy sustainability is to design buildings in energy efficient systems at the beginning. It is foreseen that the various technical equipment to be applied in the buildings and the saving measures to be taken can increase the energy efficiency in large quantities. The most important way to improve energy efficiency in buildings is to improve the energy efficiency of building outer shell (walls, roof, floors and frames), to reduce thermal permeability of building elements, to increase thermal resistance, to take architectural design of building and measures in house devices. Insulation measures are the most important step in energy efficiency, especially since 80% of the energy consumed in homes is consumed in warming. In Turkey, approximately 500,000 buildings have been built from 2000 until the day when the energy efficiency initiative was activated in the buildings. According to observations made since 2000, it is possible to say that fully effective heat saving measures have been implemented and saved in about 10-15% of all new buildings since it is not yet implemented effectively. The thermal comfort of the building envelope requires minimal energy expenditure. When we look at the heat losses in the building envelope (Figure 3), in single storey structures; 22% from the roofs, 25% from exterior walls, 20% from upholstery, 20% from door windows and 13% from air leaks.

Figure 3 Average Heat Loss Ratios in Single Storey Buildings

Heat losses in multi-storey buildings are 7% heat loss from the roof, 40% from the outer walls, 6% from the upholstery, 30% from the door windows and 17% from the air leaks [20]. As can be seen in Figure 4, heat losses in multi-layer structures occur at different points due to heat losses occurring in low-rise structures. For example, most of the loss in the low-rise buildings forms roofs whereas in multi-storey buildings it occurs in the outer walls according to the surface area.

Figure4 Average Heat Loss Ratios in Multi-Storey Buildings

2. MATERIAL AND METHOD

2.1 Material

This study covers a total of 22 reinforced concrete dwellings built in Duzce city center. The zoning status and structural characteristics of the dwellings examined, parcel area, ground area, total construction area, fringe jeans, number of floors, exterior surface areas according to directions, Total surface areas, net surface areas, void areas and void area / total area ratios were determined and tabulated (Table1).

Table1. Descriptive statistics for the zoning and structural characteristics of the houses

	N	Range	Min.	Max.	Sum	Mean	Std. Deviation	Variance
Parcel area	22	2794,12	305,88	3100,00	25866,31	1175,74	969,33	939608,15
Ground area	22	424,16	147,84	572,00	6329,03	287,68	114,20	13041,56
Total construction area	22	2044,02	443,52	2487,54	25319,91	1150,9050	500,098	250097,92
Height of buildings	22	4,60	9,30	13,90	218,05	9,9114	1,22	1,50
Number of floors	22	2,00	3,00	5,00	81,00	3,6818	,716	,513
South facade area	22	330,83	124,25	455,08	4839,22	219,9645	76,03	5781,37
North facade area	22	219,67	116,19	335,86	4617,55	209,8886	66,85	4469,41
East facade area	22	284,05	91,36	375,41	4136,05	188,0023	78,67	6189,27
West facade area	22	246,84	91,36	338,20	4040,84	183,6745	67,81	4598,76
Total exterior area	22	792,08	541,86	1333,94	17633,66	801,5300	212,92	45335,35
Void space	22	390,51	55,23	445,74	3866,64	175,7564	79,17	6268,65
Clear outer surface area	22	904,84	373,87	1278,71	13767,02	625,7736	196,88	38763,98

From Table 1, it can be seen that the parcel area of 22 houses is changed between 305,88 and 3100 m^2, the floor areas vary between 147.84 and 572 m^2, the total construction areas vary between 443.52 and 2487.54 m^2, the fringe elevations change between 9.3 and 13.9 m, and the floor number varies between 3 and 5 times.

2.2. Method

Construction and architectural features of 22 reinforced concrete houses provided with architectural projects are determined and data obtained have been tabulated. The construction costs of each building are calculated separately for the years 2013, 2014, 2015 and 2016 according to the unit prices of the Ministry of Environment and Urban Planning. However, total exterior areas, space areas and net areas of the buildings were also calculated via the project. The insulation costs of each building are calculated by multiplying the unit cost of insulation by the calculated net exterior areas. The calculated isolation costs are compared to the construction cost and the ratio of the insulation cost to the construction cost for each year is determined as%. Correlation analysis was performed to determine whether there is a relationship between building cost, insulation cost, isolation cost ratio of building cost and other construction and architectural properties, and if there is a relation, to determine importance levels of relations. As a result of the correlation analysis, the levels of relationship between all the parameters were determined and tabulated. Relations between building cost and insulation cost with respect to years and other construction and architectural parameters are also determined and displayed in a table. It is also determined whether the cost of building and the cost of insulation are different from the facades of the buildings and they are shown in the relations between them.

3. COST ANALYSIS IN BUILDING

3.1. Cost Analysis and Evaluations

The descriptive statistics of insulation cost, building cost and insulation cost / building cost ratio of 22 reinforced concrete buildings examined according to years are shown below (Table 2).

Table2. Descriptive statistics for the costs of the constructions and insulation according to years

Years	Coasts	N	Range	Minimum	Maximum	Sum	Mean
2013	Insulation cost	22	27045,67	11174,97	38220,64	411496,24	18704,37
	Costs of the constructions	22	1371680,50	297632,97	1669313,47	16991425,29	772337,51
	insulation cost / building cost ratio	22	3,18	1,56	4,74	58,11	2,64
2014	Insulation cost	22	29479,69	12180,68	41660,37	448529,51	20387,70
	Costs of the constructions	22	1518788,62	329553,10	1848341,72	18813698,49	855168,11
	insulation cost / building cost ratio	22	3,13	1,54	4,67	57,23	2,60
2015	Insulation cost	22	32194,21	13302,29	45496,50	489830,57	22265,026
	Costs of the constructions	22	1568580,95	340357,25	1908938,20	19430491,25	883204,15
	Insulation cost / building cost ratio	22	3,30	1,63	4,93	60,52	2,75
2016	Insulation cost	22	33551,47	13863,10	47414,57	510481,09	23203,68
	Costs of the constructions	22	1662115,31	360652,72	2022768,03	20589129,89	935869,54
	Insulation cost / building cost ratio	22	3,25	1,60	4,85	59,50	2,70

When the ratio of insulation cost to construction cost is taken into consideration, it is seen that the lowest ratio is 1.54% in 2014, whereas the highest ratio is in 2015 with 4.93%.

3.2. Relations between Properties of Buildings and Costs of Construction and Insulation

Correlation analysis was carried out in order to determine whether there is a relation between the reconstruction properties, architectural features, building costs and insulation costs of the buildings and to determine the importance levels of relations. Correlation analysis results are tabulated (Table3).

Table3. Correlation Coefficients

	Parcel area	Ground area	Total construction area	Fringe height	Number of floor	Total outer surface area	Clear surface area	Space area	Space area/ Total area
Parcel area	1,00	-0,14	-0,24	-0,34	-,51*	-0,38	-0,41	-0,01	0,27
Ground area	-0,14	1,00	,89**	-0,26	0,25	,75**	,58**	,58**	0,17
Total construction area	-0,24	,89**	1,00	-0,03	0,40	,83**	,67**	,57**	0,13
Fringe height	-0,34	-0,26	-0,03	1,00	,71**	0,24	0,36	-0,26	-0,37
Number of floor	-,51*	0,25	0,40	,71**	1,00	,57**	,58**	0,10	-0,21
Total outer surface area	-0,38	,75**	,83**	0,24	,57**	1,00	,93**	0,38	-0,18
Clear surface area	-0,41	,58**	,67**	0,36	,58**	,93**	1,00	0,01	-,51*
Space area	-0,01	,58**	,57**	-0,26	0,10	0,38	0,01	1,00	,80**
Space area/Total area	0,27	0,17	0,13	-0,37	-0,21	-0,18	-,51*	,80**	1,00
Isolation Cost	-0,41	,58**	,67**	0,36	,58**	,93**	1,00**	0,01	-,51*
Building costs	-0,24	,89**	1,00**	-0,03	0,40	,83**	,67**	,57**	0,13
Isolation Cost / Building costs	0,07	-,62**	-,67**	0,24	-0,13	-0,29	-0,03	-,73**	-,69**

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

When the correlation table is examined, it is found that there is a very high positive correlation between the building cost and the building floor area, and that the building cost is increased as the floor area is increased, and there is a very high correlation between the building cost and the total exterior cost area with 0,83. It is seen that the structure cost is increased and the construction cost is in a positive correlation with the net surface area and void space at 0,67 and 0,57 levels respectively. On the other hand, it is found that there is a moderate positive correlation between insulation cost and construction floor area with 0.58, a moderate positive correlation with the total construction area with 0,67, a positive correlation with floor number and 0.58, It is observed that there is a very high positive correlation with the outdoor area and 0.93, and a moderate negative correlation with the space area / total area and the insulation cost with -0.51.

3.3. Relations between Properties of Buildings and Costs of Construction and Insulation

The relationships between the construction and structural features of the buildings and the construction costs and insulation costs calculated for 4 years are shown below (Table 4). When the table is examined, it can be seen that there is a high correlation between building cost and floor area and total outdoor area for 4 years with 0,89 and 0,83 in the positive direction, with construction cost, net surface area and space area with 0,67 and 0,57 It appears that there is a positive relationship in the middle level. On the contrary, the insulation cost is moderately related to the floor area, the number of floors and the total construction area in the positive direction with 0,58 and 0,67, with a very high correlation between the total exterior area and the insulation cost with 0,93 in the positive direction on the other hand, there is a negative correlation between the space area / total area ratio and the insulation cost at -0.51 and moderate level.

Table4. Correlation Coefficients for 4 years

	Parcel area	Ground area	Total construction area	Fringe height	Number of floor	Total outer surface area	Clear surface area	Space area	Space area/Total area
Insulation cost for 4 years	-,40	,58**	,67**	,36	,58**	,93**	1,00**	,010	-,51*
Building cost for 4 years	-,24	,89**	1,00**	-,03	,40	,83**	,67**	,57**	,13
Insulation cost /Building cost for 4 years	,07	-,62**	-,67**	,24	-,13	-,30	-,02	-,73**	-,69**

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

3.4. Relations between Structural and Insulation Costs of Facades of Buildings

The results of the correlation analysis conducted to determine whether there is a relationship between the building facades of the buildings examined and the building cost and insulation cost are shown below (Table5).

Table5. Relations between building facades and building and insulation costs

	North area	East area	West area	South area
Insulation cost for 4 years	,81**	,71**	,76**	,44*
Building cost for 4 years	,59**	,70**	,59**	,58**
Insulation cost/building cost for 4 years	-,05	-,26	-,18	-,39

It is seen from the table that the insulation costs of the 22 buildings inspected are positively correlated with high values of 0.81, 0.76 and 0.71 between the south facade, the eastern face and the northern face, respectively, but the correlation with the western face is weak with 0.44. On the contrary, it is seen that the building cost and the south, east and west facades are positively related to 0.59 level in the middle level, but it is seen that there is a high correlation between the building cost and the north face in the positive direction with 0.70.

4. CONCLUSIONS AND RECOMMENDATIONS

The results of this study are as follows for the purpose of examining the relations between building costs and insulation costs for the 2013, 2014, 2015 and 2016 of 22 reinforced concrete houses according to the building and architectural characteristics of the buildings. According to this;

- It has been found that the parcel area of 22 houses varies between 305,88 and 3100 m2, the floor areas change between 147,84 and 572 m2, the total construction areas vary between 443,52 and 2487,54 m2, between 9,3 and 13,9 m And the number of floors changed between 3 and 5 times.
- When the ratio of insulation cost to construction cost is taken into consideration, the lowest ratio is 1.56% in 2013 and the highest ratio is 4.74 in 2014 and it is found that these ratios are between 1.54 and 4.67 in 2014, between 1.63 and 4.93 in 2015 and between 1.60 and 4.85 in 2016.
- It is found that there is a very high positive correlation between building cost and building floor area with 0.89 and that there is a very high correlation between building cost and total cost of building and 0.83 as a result of increasing floor area and building cost increases as total exterior area increases, It is seen that the structure cost is correlated with the net surface area and the space area at 0,67 and 0,57 levels respectively in the moderate positive direction.
- There is a moderate positive correlation between insulation cost and construction floor area with 0.58, a moderate positive correlation with 0,67 with the total construction area, a moderate correlation with positive value at floor 0 and 0.58, There is a very high positive correlation with the external surface area at 0.93 level.
- It appears that there is a moderate negative correlation between vacancy area / total area and insulation cost -0.51.

- The construction cost for 4 years, a high correlation between the floor area and the total exterior area with 0.89 and 0.83 is a positive correlation with the construction cost, the net surface area and the space area and the medium area with 0,67 and 0,57 levels It was seen that there was a relationship in the positive direction at the level.
- The insulation cost for 4 years is moderately related to the floor area, the floor area and the total construction area in the positive direction with 0,58 and 0,67, a very high correlation between the total outdoor area and the insulation cost with 0,93 in the positive direction has been detected.
- The costs of isolation of the buildings were found to be highly positive with 0.81, 0.76 and 0.71 between the south facade, the eastern face and the northern face, respectively, but it was found that this relationship with the west face was weak with 0.44.
- It was determined that the costs of the buildings and the south, east and west facades were positively correlated with 0.59 level in the middle level, but a high correlation was found between the building cost and the north face with 0.70 in the positive direction.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Investigation of Relationship between Soil Properties and Water Pollution from Permeability, Duzce Sample

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Abstract

There is a risk of increasing environmental pollution in Duzce Plain and the surrounding area, where most of the population lives in Duzce province. High mountains surrounding the plain, lack of good air circulation, existence of pollution-producing industry, heavy traffic, population and industrial growth increase the risk of pollution of surface waters and ground waters. In water pollution surveys; there is pollution in the surface waters and in the lower parts, with the rivers turning into bodies with much polluted water. There is usually an increase in pollution as there is no reduction in known pollutants such as domestic and industrial waste water, irregular garbage reservoirs, fertilizers and medicines used in agriculture. It is these factors that can cause pollution in groundwater other than surface waters. Particularly in the permeable zone, super-city waters in urban centres and surrounding areas can be poured down with rain and melting snow waters to pollute underground waters. Duzce has become a water basin to meet Istanbul's water needs due to its rich water resources and the construction of the Melen Dam for this purpose. Due to these characteristics, Duzce Plain was declared as a protected area on January 21, 2017 (accordance to the Official Gazette numbered 29955). In this study, the data obtained from soil investigation reports in Duzce were examined in terms of soil properties and water pollution-related permeability. For this purpose, soil investigation reports of 42 drilling wells were examined, and engineering properties of investigated soils and permeability were evaluated in terms of water pollution. According to the results obtained, the soil at the points examined were ranked from the highest permeability to the lowest in terms of permeability properties, and the sections where the risk of contamination of ground water was high were determined, and a risk map was established.

Keywords: Energy efficiency; Heat insulation; Housing; Insulation Costs.

1. INTRODUCTION

141 large plains throughout the country have been designated as protected areas by the official gazette number 29955 dated January 21, 2017, with high potential for agricultural production, rapid loss of land and land degradation due to various reasons such as erosion, pollution. In this context, Duzce Plain was taken under official protection. The most important reason why the Duzce plain is taken under protection is that Istanbul's drinking water needs will be met with a large amount of Duzce plain. For this reason, contamination in Duzce plain was evaluated in terms of Contamination of ground waters, Liquid wastes and Potential environmental problems.

1.1 Liquid Wastes

As it is about the air pollution of Duzce, it is also very high in terms of water pollution. Population and industry density, inadequacy of infrastructure, inadequacy of treatment facilities in particular, irregular urbanization, irregular storage of solid wastes, air pollution, agricultural fertilization and disinfection creating pollution both in surface waters and in rich groundwater reserves in Duzce. Surface waters are divided into four quality classes as high quality, less polluted, contaminated and highly polluted water in terms of pollution status. The largest sources of contaminants in the waters are household and industrial waste fluids that are used and deteriorated. Water is defined as the wastewater that has changed since its use by humans and has been left in the receiving environment. As is the case throughout Turkey, in Duzce, rivers and streams are mostly used as the receiving environment for wastewater. Thus, rivers with increased pollution load reach the sea or the lake. The waters of the Duzce basin are collected and poured into the Black Sea with the Great Melen River. The Efteni Lake and the Hasanlar dam are also used as the receiving environment for pollution in the environment. Drinking water will be provided to Istanbul with the dam built on the Great Melen River. This situation made it necessary to protect surface and underground waters of Duzce plain from pollution and Duzce plain was officially protected. With this project, it is planned to meet Istanbul's drinking and utility water requirements by 2040 (dsi.gov.tr, 2002). According to the Water Pollution Control Regulation, the absolute protection area of the strip 300 m wide from the maximum water level of the drinking water reservoirs, the strip short distance protection area 700 m wide from this

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border, the 1000 m wide strip middle protection area, the remaining part of the water collection basin is defined as a long distance protection area. Due to the high potential of pollution, systematic and continuous measurements should be made on the pollution of streams (surface waters) in Duzce and measures should be taken accordingly. On the upstream (upstream) side, class I, very clean waters become increasingly polluted IV. Class (very polluted water). Not only the rivers but also the Hasanlar dam and the Efteni Lake are polluted. When Little Melen comes to the Hasanlar dam, it is class I, and when it comes to Efteni Lake, IV. Class. Today Aksu and Ugur water are poured into Efteni lake and polluted but most of the pollution is due to the Little Melen. The pollution of the waters continues due to lack of sewerage and rain water sub-structures in residential areas or inadequacy of existing sub-structures.

1.2 Potential Environmental Problems in Duzce Insulation

There is a potential for increasing environmental pollution in the Duzce plain and its surroundings where most of the population lives in Duzce. Increases in air pollution may occur in excess of the limit values due to reasons such as being surrounded by high mountains, lack of good circulation of air, presence of pollution-producing company, heavy traffic, fuels used for heating, lack of required heat insulation factor in buildings, population and industrial growth . Surveys of water pollution show that there is pollution in surface waters, the quality of the streams in the lower parts IV. quality (very dirty water). There is usually an increase, as there is no significant reduction in sources such as household waste water and industrial waste water, irregular garbage dumps, agricultural fertilizers and medicines, polluted air, which are known pollutants. These factors can also cause pollution in groundwater other than surface waters. In particular, the surface waters in urban centers and surrounding areas can penetrate the permeable ground with rain and melt snow waters and pollute the ground waters. However, the present situation is unknown because there is no investigation of pollution in groundwater in Duzce plain with rich reservoir of groundwater.If no measures are taken, pollution will increase in rivers; this pollution will increase pollution in Efteni lake and sea water. The only treatment plant that treats household wastewaters in Duzce Plain is the biological treatment plant in the center. It is estimated that this facility becomes inadequate due to permanent residences added to the system after the earthquake. The elimination of deficiencies in treatment facilities, regularization of landfills, keeping air pollution below the limit and the main ways of reducing and preventing water pollution are more important in Duzce. In particular, the density of the population in the plain where the Duzce Center is located, air pollution may increase due to the presence of a large part of the existing industry and the surrounding area of the plain being surrounded by high mountains.Unless adequate capacity and properly operating treatment facilities are installed, contamination of surface and groundwater may increase due to household and industrial waste water left untreated, unregulated solid waste landfills, agricultural manure and drug use. In the absence of these problems, if the treatment plants are not built, it will be inevitable to increase the water pollution only due to population increase. As it is to this day, in order to meet the increasing demand of housing in Duzce and the demands of the land of new industrial establishments IV and preferably, instead of the upper classes, I and II the use of class agricultural land can be expected. Due to seismicity, the construction of buildings with maximum four floors in Duzce plain instead of multi-storey buildings will increase the use of agricultural land for non-agricultural purposes.

1.3 Duzce Water Basin

Duzce has become one of the most important water resources of Istanbul with the "Melen water" project. Approximately 67% of the water collected from the Melen Dam and the Duzce basin, which is constructed on the melen water, is transmitted to Istanbul. Within the scope of the project, a 105 km long pipeline was laid between Melen Stream and Istanbul. The incoming water was transferred to Yesilcay system in Sile Agva and then transferred to Yavuz Selim Treatment Plant. 700,000 m³ of water a day is given to Istanbul from the Melen River. The total volume of 14 reservoirs operating in Istanbul is 877 million m³. The Melen Dam corresponds to 80% of the dams that feed Istanbul with a water volume of 694 million m³. The small Melen Stream, which collects the waters of the eastern side of the city center and has Hasanlar Dam on it, is poured into the lake of Efteni. Other streams pouring into the lake; Asar, Aksu, Ugur, Sigirlik, Samandere and Torque merge with the lake and come out with the name of the Great Melen. The Melen river reaches the Black Sea after taking the Lahna stream from Kocaali. The dam is 7 km far from where the Melen River flows into the Black Sea. All the waters of Duzce plain combine at Efteni Lake to form the Melen River.

2. MATERIAL AND METHOD

2.1 Material

In this study, the data from the soil investigation reports obtained from 42 drilling wells were examined and the relations between these parameters and the permeability properties of the ground were analyzed. Examined soil parameters; Plastic limit, plasticity index, water content, soil bearing coefficient, SPT-N values, modulus of sub grade reaction, allowable bearing capacity of the ground and permeability. The soil properties of the wells were compared and evaluated. The locations of the wells examined and their permeability values are shown below (Figure 1).

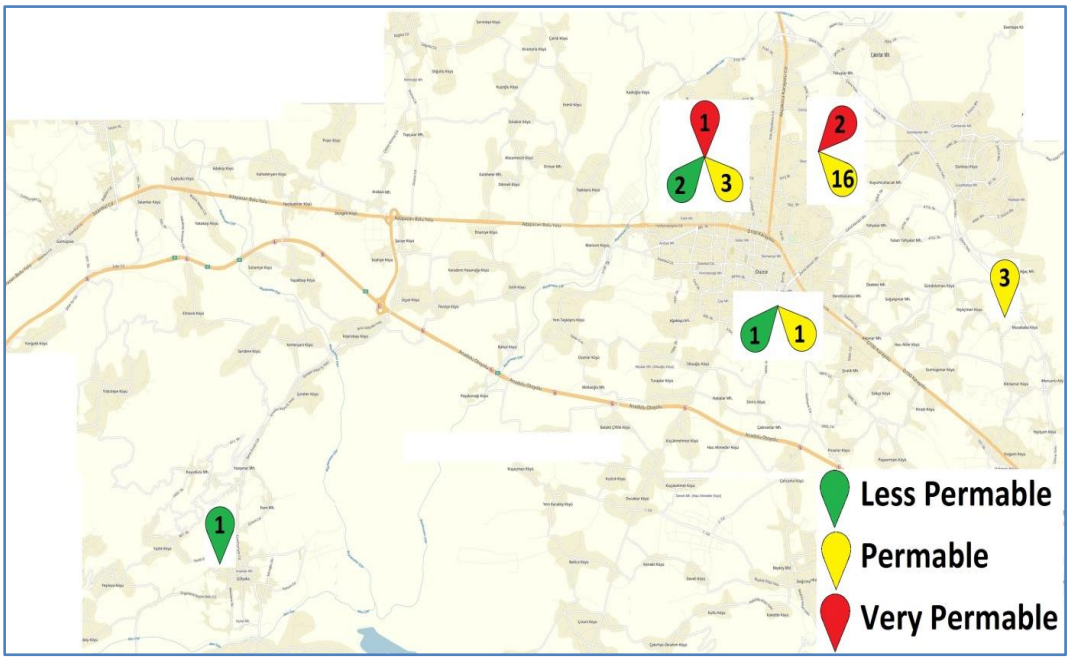


Figure 1.The locations of the wells examined and their permeability values.

2.2 Method

From some of the floor survey reports made in Duzce; Liquid limit, plastic limit, plasticity index, water content, modulus of sub grade reaction, SPT-N values, settlement values of the ground, allowable bearing capacity of the ground and calculated permeability values were determined for 42 wells and these data were tabulated. The permeability values of the soils can be determined by field and laboratory experiments as well as by various relationships. The permeability values of the examined soils were calculated by the relation given by Allen Hazen, depending on the average grain diameter, and they were used together with other parameters. Ground parameters and calculated permeability values for each well are shown in the generated tables. Descriptive statistical values of all data obtained are calculated and presented in a summary table. Correlation analysis was performed with the aim of determining the relationships between the soil properties that have been made into a table and the relationships among all the parameters were determined and tabulated. In terms of permeability, the same and different drilling wells are shown in groups.

3. PERMEABILITIES OF SOILS

The soil is a void environment and the gaps are connected to each other. The water can flow either through the interstices (moving underground water conditions, flow conditions), as well as in stationary (stagnant water) conditions in the voids of the ground environment. Darcy (1856) showed that in laminar flow conditions, the velocity in a saturated watery environment is proportional to the hydraulic gradient. Groundwater flows are usually laminar (with low velocity). If a soil sample of L length, A cross section, is subjected to a water level difference of h1-h2, the Darcy Law can be written as follows.

v = k.i or q = v.A v = q/A so because q = Aki

The v-velocity in the correlation is the filter speed (flow rate), which is the average imaginary velocity that is named by considering the flow of water in all directions of the A-section of the ground. In reality, water does not flow at every point of the floor, but flows through a part of the space between the particles, with the velocity of the leak (actual velocity) vs. However, the definition of speed in this way is suitable for studying water currents. The following relation is given between the leakage speed and the filter speed.

vfilter = n.vs

“n” is the porosity of the soil, and n<1, the filter speed is less than the leak rate vf <vs.

“k” is the coefficient of permeability of the soil, which reflects the waterproof property of the ground and is of a velocity size (m/s). The hydraulic gradient (between two points on the water current), “i” is defined as follows.

$$i = \frac{\text{Difference in water levels}}{\text{Lenght of flow}} = \frac{h_1 - h_2}{L} = \frac{\Delta h}{L}$$

Hydraulic slope, i, is dimensionless. q, is the flow rate and specifies the amount of water passing through a section (section perpendicular to the direction of flow) (m3/s etc.). Depending on the nature of the water flow, the position of the L may be horizontal, vertical, oblique and the like.

3.1 Factors Affecting Permeability in Soil

The permeability coefficient, k, mainly depends on the following factors:

a)Dependent on the average grain diameter of the substrate, roughly proportional to the

square of grain diameter. Allen Hazen (1892) gave the following link; $k = CD_{10}^2$ k (m/s), D10 (mm): Effective particle diameter of soil. C, is a coefficient about 10000.

b)k, Depends on the ratio of the voids to the soil and is proportional to the following

expressions of the ratio of the voids.

$$e2\,,\ \frac{e^3}{1+e}\ ,\ \frac{e^2}{1+e}\ ,\ \log e$$

c) k, is inversely proportional to the viscosity of the liquid, directly proportional to the unit weight of the void liquid (water). Muscat (1937) defines a general term for absolute or physical permeability (kp), which is independent of the properties of the voids fluid and depends only on the physical state of the void medium:

Physical permeability $kp = k\frac{\eta_{su}}{\gamma_{su}}$ unit of kp is m2 etc.

k: permeability coefficient for water (m/s etc.) (Permeability coefficient)

: Viscosity of liquid (kNs/m2 etc.),

: Unit weight of liquid (kN/m3 etc.).

It is important that the viscosity change with temperature, while the temperature change of the water unit weight can be neglected. d) It depends on the arrangement of the granules on the ground; the "k" may be different depending on the same voids, the different arrangement of the ground grains (ground formation or compaction etc.). Otherwise, the same soil can have different permeability coefficients in horizontal and vertical directions.

3.2 Determination of Permeability Coefficient in Soils

The soils have different permeability coefficients under natural conditions and current conditions. These permeability coefficients also represent permeability states of the soils. Accordingly, the soils are very permeable, permeable, less permeable, very little permeable or impermeable soil. In general, soil types, permeability coefficients and permeability conditions are shown below (Table 1).

Table 1. Soil types, permeability coefficients and permeability conditions

Soil types	k, m/s	Permeability conditions
Gravel	$>10^{-1}$	very permeable
Sand	10^{-1} - 10^{-5}	permeable
Silty	10^{-5} - 10^{-7}	less permeable
Clay	$<10^{-7}$	very little permeable or impermeable soil

The permeability of the soil can be determined in various experiments in the laboratory or in situ. Experiments that can be done in laboratory and field are shown below (Figure 1).

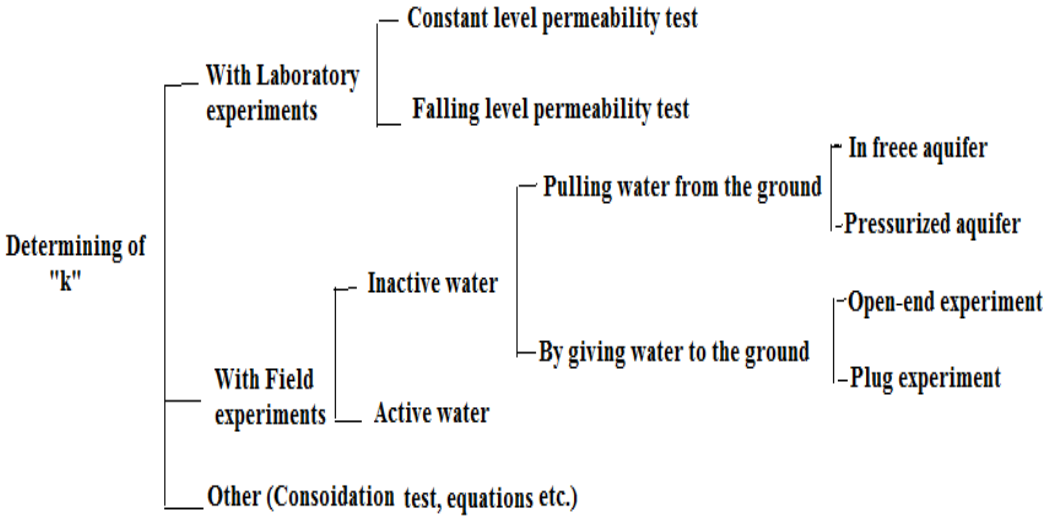


Figure 2. Laboratory, field and other methods used in determining k.

3.2.1. Determination of Permeability by Laboratory Experiments

3.2.1.1 Constant Level Permeability Test

Water coming from a fixed water reservoir is collected in a volume-partitioned container, passing through the soil sample. After a stable flow is obtained, the amount of water (ΔQ) collected at the container is determined in a certain time (Δt). In the transparent pipes (piezometer pipes) connected to the bottom, top and middle parts of the soil sample, the water levels are observed, read, recorded. "K" is calculated from Darcy's Law (Figure 2).

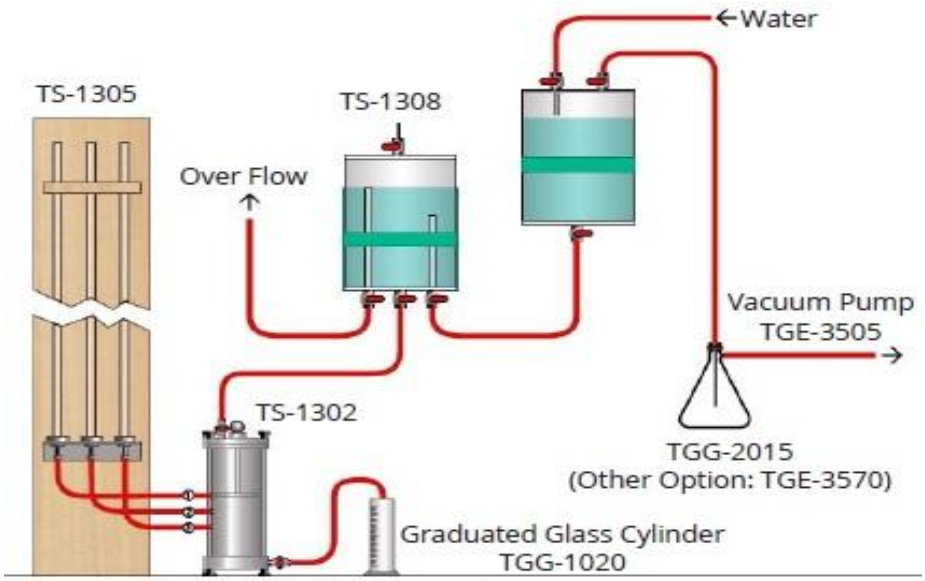


Figure 3. Constant level permeability test

Permeability coefficient; A-B, B-C or A-C, The experiment is preferably repeated averaging for different constant levels.

$$k = \frac{q}{Ai} \quad q = \frac{\Delta Q}{\Delta t}, \qquad i_{AB} = \frac{\Delta h_{AB}}{l_{AB}}, \quad i_{BC} = \frac{\Delta h_{BC}}{l_{BC}}, \qquad i_{AC} = \frac{\Delta h_{AC}}{l_{AC}}$$

3.2.1.2 Falling Level Permeability Experiment

The water that is filled into the upper pipe flows out through the floor. After the steady flow is obtained; the permeability coefficient of the ground is calculated from the water heights at the beginning and end of the experiment, the elapsed time and the cross-sectional areas (Figure 3).

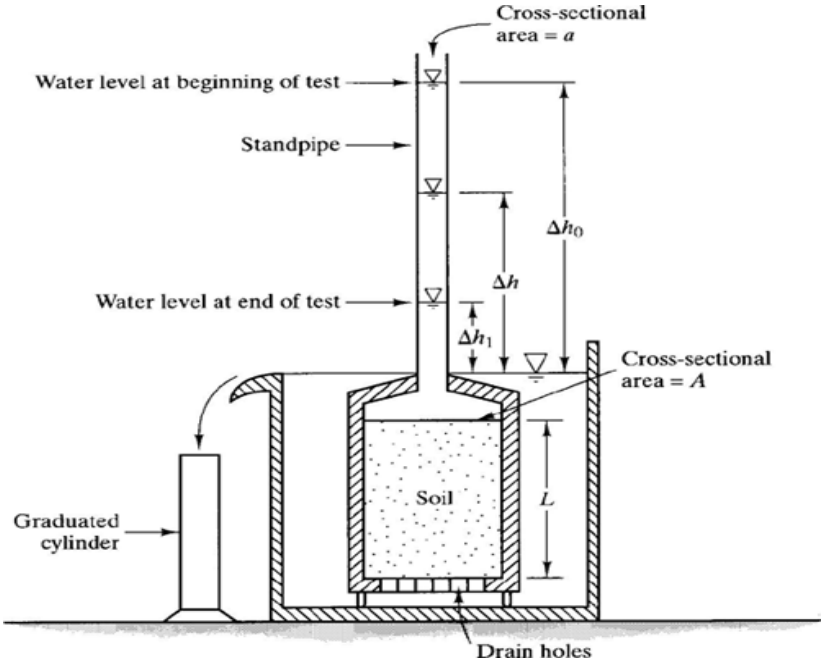


Figure 4. Falling level permeability experiment

When the water level in the pipe is h; at Δt time, decrease the water level in the pipe by Δh, According to Darcy Law,

$$q = \frac{\Delta Q}{\Delta t} = \frac{a\Delta h}{\Delta t} = \frac{adh}{dt} = Ak\frac{h}{L} \quad \text{and} \quad -a\int_{h_1}^{h_2}\frac{dh}{h} = \frac{Axk}{L}\int_{0}^{t_1}dt \quad \text{then} \quad k = \frac{aL}{At_1}\ln\frac{h_1}{h_2}$$

a: The cross-sectional area of the upper tube (glass tube, hose),

L: length of sample,

t1: time of experiment,

h1: Initial water height,

h2: Water height at the end of t1 time,

The test is preferably repeated with different diameter pipes, different initial heights and different test times, and the average value for k is calculated.

3.2.2 Determination Of Permeability By Field Experiments

3.2.2.1 Pulling Water From The Ground In Free Aquifer

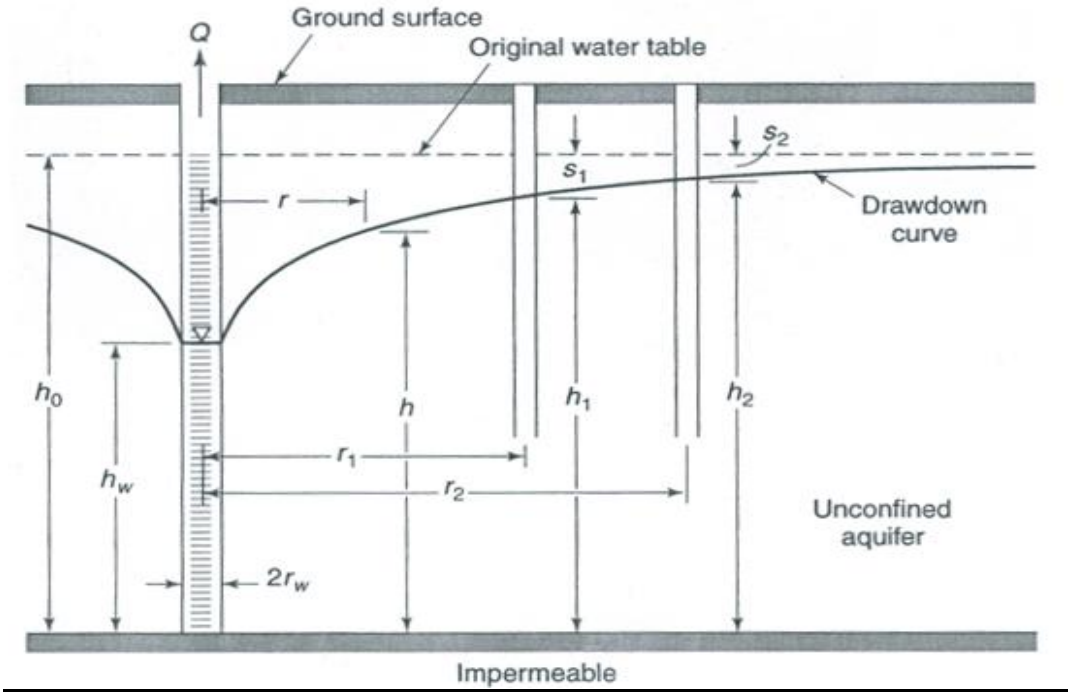


Figure 5. Determination of permeability by pulling water from the ground in free aquifer

Let us consider a section with a radius r from the center of the well. The Darcy Law is written for this section and if it is integrated;

$i = \frac{dh}{ds} \approx \frac{dh}{dr}$ Darcy law, $q = Aki = 2\pi r h k \frac{dh}{dr}$ and $q\int_{r_1}^{r_2} \frac{dr}{r} = 2\pi k \int_{h_1}^{h_2} h dh$

$$k = \frac{q \ln(r_2 / r_1)}{\pi (h_2^2 - h_1^2)}$$

3.2.2.2 Pulling Water From The Ground In Pressurized Aquifer

Similar to the opening of the well by pulling a constant q, after the steady state has been achieved, water levels in the observation wells are measured (Figure 5).

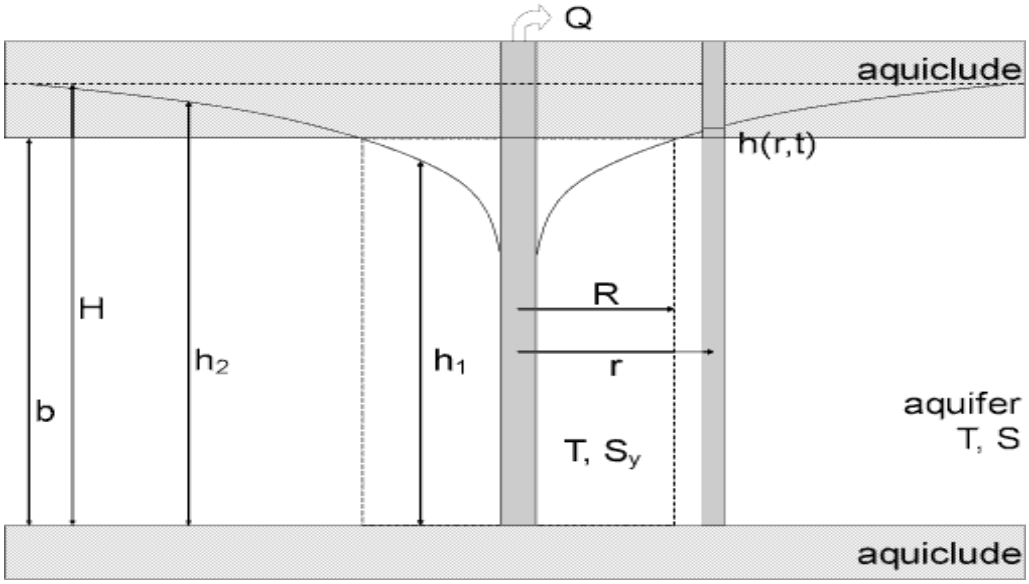


Figure 6. Determination of the permeability in pressurized aquifer

Let us consider a section with a radius r from the center of the well. The Darcy Law is written for this section and if it is integrated;

$$q\int_{r_1}^{r_2}\frac{dr}{r} = 2\pi k b\int_{h_1}^{h_2} dh \qquad k = \frac{q\ln\frac{r_2}{r_1}}{2\pi b(h_2 - h_1)}$$

3.2.2.3 ByGiving Water To The Ground

Water is sent to the floor with fixed or falling levels from the bottom of a drilling well or from the side of a certain uncoated length of the drilling hole using seals. From the test results, empirical relations (Cedergren, 1969), the permeability coefficient of the ground is calculated. Permeability experiments with water are divided into two parts: Open end experiments and Packer experiments (Figure 6).

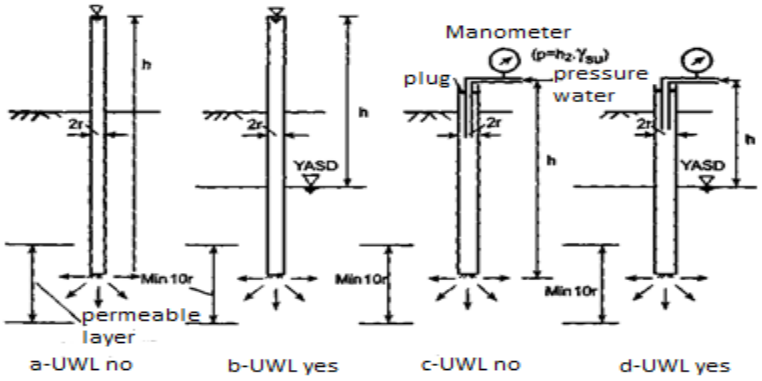


Figure 7 Open end experiments

In the open end experiments, water is sent from the end of a pipe to the ground to a fixed level ground (Figure 6). The fixed flow rate sent to the ground is measured. The permeability coefficient of the ground is calculated by the empirical relation below.

$$k = \frac{q}{5.5rh}$$ h: Difference in water levels, q: Constant flow, r: Inner radius of the pipe.

In packer experiments, a fixed level of water is sent from the sides of a certain length of the uncoated or perforated coating of a borehole to the ground (Figure 7).

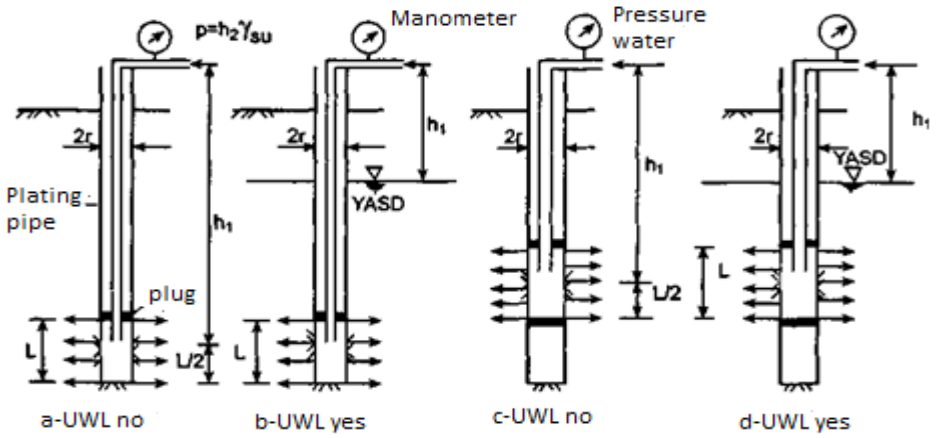


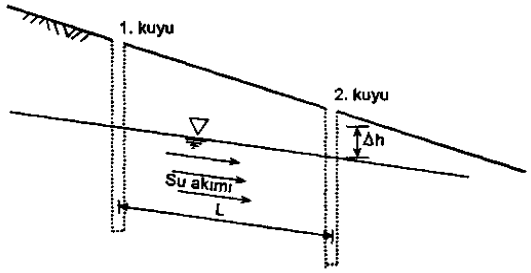
Figure 8 Packer experiments scheme

A certain length is provided by a single or double plug (sealing element). The constant of the supplied water is measured. The permeability coefficient of the ground is determined by the following empirical relations.

$$k = \frac{q}{2\pi L h}\log\frac{L}{r}$$

3.2.2.4 Moving Groundwater Condition

If the groundwater is moving, two wells open in the flow direction (Figure 8). From the first well, salt, painted material, radioactive isotope etc. are given. Their arrival time (Δt) to the second well is measured in the second well. If the soil's porosity is n, k is calculated as follows.



$$k = \frac{v}{i} = \frac{n v_{siz\,int\,i}}{i} = \frac{nL/\Delta t}{\Delta h/L} = \frac{L^2 n}{\Delta t \Delta h}$$

Figure 9. Moving groundwater condition

3.3.3 Calculation of Permeability with Various Relationships

Permeability values of soils can be determined by field and laboratory studies as well as by various relations. The relationships are given by the ratio of the void space (e) and the effective grain diameter (D10). Permeability values of soils can also be calculated depending on the Consolidation test results. From these;

- Hazen (1911); k= c*(D10)2 — c: coefficinet,)
- Terzaghi; k= 200*e2*(D10)2 — D10: Effective particle diameter (mm)
- Das (1997); k=C*(e3/1+e) — e: the ratio of the void,
- Form consolidation test results; — ɣw: Water unit volume weight

  k=ɣw*mv*cv — mv: Volumetric compression coefficient

  cv: Consolidation coefficient.

4. ANALYSIS OF DATA

4.1 Descriptive Statistics

Descriptive statistical values of soil properties obtained from soil investigation reports are shown below (Table 2).

Table2. Descriptive statistics for properties of soils

	N	Range	Min.	Max.	Sum	Mean		Std. Deviation	Variance
						Mean	Std. Error		
LL	68	34,30	23,70	58,00	2969,70	43,67	1,02674	8,466	71,686
PL	68	13,90	13,10	27,00	1454,60	21,39	,37949	3,129	9,793
PI	68	34,90	3,10	38,00	1512,00	22,23	,88531	7,300	53,296
Water content	97	34,35	2,27	36,62	1745,23	17,99	,80126	7,891	62,275
Coefficient of subgrade reaction	84	3603,71	583,00	4186,71	103921,54	1237,16	84,34182	773,005	597537,559
SPT-Nort	212	993	7	1000	10950	51,65	5,052	73,562	5411,385
D_{10}	44	5,43	,07	5,50	33,12	,75	,16785	1,113	1,240
Settlement	53	2,35	,46	2,81	92,34	1,74	,09484	,690	,477
Min. Bearing capacity	66	9,63	,80	10,43	193,26	2,92	,22449	1,823	3,326
Max. Bearing capacity	9	2,85	2,75	5,60	33,53	3,72	,36709	1,101	1,213
Permeability	44	,30245	,00005	,1296	,78245	,017	,00808	,053	,003

Several permeability calculations were made in some wells and the average permeability was obtained in these wells and 44 permeability data were obtained. However, permeability calculations could not be made in these wells because some of the wells could not reach the permeability calculation. The results are tabulated in Table 4.3 in Section 4.3.

4.2 Correlation Analysis

Correlation analysis was performed in order to determine the relationship levels of the examined soil properties and also to determine the permeability relations of all parameters and the results are shown below (Table 3).

Table3. Correlation coefficients between soil properties

	LL	PL	PI	Water content	*Coefficient* of sub grade reaction (k).	SPT-Naver.	D_{10}	Settlement	Min. Bearing capacity	Max. Bearing capacity	Permeability
LL	1	,53**	,93**	,18	,45*	,25	,53	,10	,06	-,62	,37
PL	,53**	1	,19	,18	-,01	,23	,59	,23	-,07	,73	,49
PI	,18	,18	,13	1	,00	-,26*	-,29	,18	-,10	-,70	-,42*
Water content	,18	,18	,13	1	,00	-,26*	-,29	,18	-,10	-,70	-,42*
Coefficient of sub grade reaction (k)	,45*	-,01	,48**	,00	1	,25	-,63	-,56**	,92**	.a	-,59
SPT Nort	,25	,23	,18	-,26*	,25	1	-,07	-,34	,38*	,95**	-,00
D_{10}	,53	,59	,39	-,29	-,63	-,07	1	,66	-,74	-1,00**	,95**
Settlement	,10	,23	,01	,18	-,56**	-,34	,66	1	-,76**	.a	,55
Min. Bearing capacity	,06	-,07	,09	-,10	,92**	,38*	-,74	-,76**	1	,99**	-,66
Max. Bearing capacity	-,62	,73	-,86*	-,70	.a	,95**	-1,00**	.a	,99**	1	-1,00**
Permeability	,37	,49	,24	-,42*	-,59	-,00	,94**	,55	-,66	-1,00**	1

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

4.3 Permeability Values of Drilling Wells

The permeability values of the drilling wells are calculated with Hazen [(k = c * (D10) 2] and the results are tabulated. However, since some drilling wells do not provide the necessary data. The permeability coefficients were not calculated in these wells. The calculated values are shown below (Table 4).

Table4. Well numbers, permeability values and permeability situation.

Well No	Permeability (k)	Permeability Situation	Well No	Permeability (k)	Permeability Situation	Well No	Permeability (k)	Permeability Situation
1	0,00925	Permeable	15	0,00032	Permeable	29	X	X
2	0,00499	Permeable	16	0,00037	Permeable	30	0,00012	Less permeable
3	0,00472	Permeable	17	0,00498	Permeable	31	0,00032	Permeable
4	0,10609	Very permeable	18	0,00535	Permeable	32	X	X
5	0,00050	Permeable	19	0,00102	Permeable	33	X	X
6	0,00477	Permeable	20	0,00015	Permeable	34	X	X
7	0,01917	Permeable	21	0,00057	Permeable	35	X	X
8	0,01105	Permeable	22	X	X	36	X	X
9	0,00373	Permeable	23	X	X	37	0,00005	Less permeable
10	0,04625	Permeable	24	X	X	38	0,160	Very permeable
11	0,12960	Very permeable	25	0,00006	Less permeable	39	0,00038	Permeable
12	0,00029	Permeable	26	X	X	40	0,00006	Less permeable
13	0,00136	Permeable	27	X	X	41	0,01283	Permeable
14	0,00459	Permeable	28	X	X	42	0,00722	Permeable

5. CONCLUSIONS AND RECOMMENDATIONS

In this study, which is designed as an approach to determine soil properties and soil permeability of Duzce plain, The data obtained from the results of soil drilling were used and the permeability values of the ground were calculated according to these data. The results obtained are as follows. According to this;

- According to the Water Pollution Control Regulation, the absolute protection area of the strip 300 m wide from the maximum water level of the drinking water reservoirs, the strip short distance protection area 700 m wide from this border, The 1000 m width strip medium distance protection area is defined here and the remaining part of the water collection basin is defined as the long distance protection area.
- Duzce plain was officially declared a protected area on January 21, 2017 because Istanbul's drinking water supply was met with a considerable amount of Duzce plains.
- In Duzce, not only the rivers but also the Hasanlar dam and Efteni Lake are polluted. When Little Melen comes to Hasanlar dam, it is in the 1st class, when it comes to Efteni Lake Class IV qualification has gained.
- Aksu and Ugur Creek, which are poured into Efteni Lake in Duzce, are also contaminated to a certain extent, but most of the pollution is caused by Little Melen.
- 700,000 m³ of water a day is given to Istanbul from the Melen River. The total volume of 14 reservoirs operating in Istanbul is 877 million m³. The Melen Dam corresponds to 80% of the dams that feed Istanbul with a water volume of 694 million m³.
- It has been determined that the minimum water content is 2.27% and the maximum water content is 36.62%. *Coefficient* of sub grade reaction (k) changes between 583 t/m^3 and 4186,7 t/m^3, the SPT-$N_{average}$ value changes between 7 and 100, the effective soil particle diameter D_{10} value changes between 0.07 and 5.5, It was found that the settlement value of soil changed between 0.46 cm and 2.81 cm.
- The permeability of the ground examined ranged from 0,00005 m/s to 0,3025 m/s, While the minimum bearing capacity values were found to vary between 0.8 kg/cm^2 and 6.46 kg/cm^2.
- As a result of this analyzes made, there are positive medium-level relationship between the permeability and LL, PL, settlement and effective soil particle diameters. It was found that there was a very high positive correlation between the effective grain diameter and permeability with 0.95.
- As a result of the analyzes made there are negative direction medium-level relations with permeability and PI, water content, bearing capacity, and c*oefficient* of sub grade reaction (k).
- To determine the areas such as new residential areas, industrial, commercial, residential areas to be built in Duzce plain and to take into account the permeability properties of the ground in terms of zoning studies, It is evaluated that possible water pollution can be prevented by certain measures in case of selection according to soil properties with low or high permeability.
- It is evaluated that similar studies can be made with more experiments and more analyzes, especially micro area studies can contribute to prevention of environmental pollution, underground and surface water pollution.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

A Comparison of Impedance Based and Single-Ended Traveling Wave Fault Location by using Real Fault Data taken from Distance Relay

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Abstract

This work aims to proof that the Single-Ended Travelling Wave (TW) Fault Location Detection Method has batter accuracy then the Impedance Based Method for High Voltage (HV) Transmission Lines. Real fault data taken from Patnos Substation in Agri (Turkey) for 154 kV Patnos-Ercis Transmission line is considered. The fault is modelled in MATLAB-SIMILINK to apply the TW Method.

Keywords: Fault Location, Transmission line, Travelling Wave, Wavelet Transform.

1. INTRODUCTION

Locating fault in Transmission Lines is vital for reliable, sustainable and efficient delivery of electrical energy. Faults occurred in Transmission lines may cause long power outages. Fault location accuracy in transmission lines affect the consumed time for clearing the fault by maintenance crew. The accuracy in impedance based methods is limited by factors like fault resistance, load flow and compensated lines etc. An example of ±1% error in fault location for a 500 km line means the maintenance crew have to search the fault within 5 km span of the line. This means approximately 30 towers.

$$\%\ Error = \left| \frac{(Actual\ \ Location\ \ -Computed\ \ Location\ )}{Total\ Line\ lengt\ h} \right| \cdot 100 \qquad (1)$$

Proactive Relays are used to locate line faults in transmission system. The methods used to locate fault in these relays can be either impedance based (Distance Relay) or Traveling Wave (TW) based. TW based algorithms use high-frequency (10 kHz - 600 kHz) transients occurred during fault [1]. TW propagate along the transmission line with a velocity near the speed of light. The propagation initiate at the same time with the fault and it is reflected by every discontinuity. In the case of transmission line fault, substations in each side of the line and fault location are discontinuities. The difference of arrival times of first and second TWs to the relay at the substation is extracted from overall fault (current or voltage) signal by means of signal processing methods like wavelet transform [2] or deviation method [3]. Difference of these extracted times is used in calculation of fault location. Since Single-Ended Method require data only from one side of the line, time synchronization of the relays at each side of line is not required. This leads cost-reduction in positioning fault location for transmission lines.This study shows how to compute fault location with Single-Ended Travelling Wave Fault Location Method using wavelet transform by means of simulating a real fault occurred in the transmission line in MATLAB-SIMULINK.

2. MATERIALS AND METHODS

2.1 Location Detection Methods for HV Transmission Lines Faults

Common fault location methods can be categorized as impedance based methods [4] and travelling wave based methods [5]. Also fault location methods can be classified as single-ended and double-ended [6]. Single-ended methods use data from single end of the line. Double-ended method use data from both side of the line. Due to this Double-ended methods need time synchronization of both end data. Impedance-based methods have lower accuracy and less cost compared to TW-based ones. Single-end methods have lower accuracy and less cost compared to double-end ones. TW based methods need supplemental logic to classify fault type and locate fault for all fault types [7].

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2.2 Travelling Waves in HV Transmission Lines

Abnormalities like A fault, a lightning strike, opening or closing the circuit breaker etc. causes high-frequency (10kHz to 600kHz) voltage and current transients moving towards both ends of the line. These transients called Traveling Waves (TW). TWs propagate along the line with the velocity near the speed of light, 300.000 km/s.

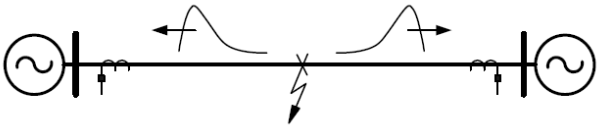

Figure 1. Travelling Waves in case of transmission line fault

TW propagation initiate at the same time with the abnormality. This first wave is called incident TW. At every discontinuity point, that is a high impedance point wave is divided three parts: some reflected back, some is transmitted through the point and some is absorbed by the point. In the case of transmission line fault, busbars at each side of the line and fault point are discontinuities. Figure 2 shows how travelling waves be formed due to a fault occurred in the line, also called Bewley's lattice diagram [8].

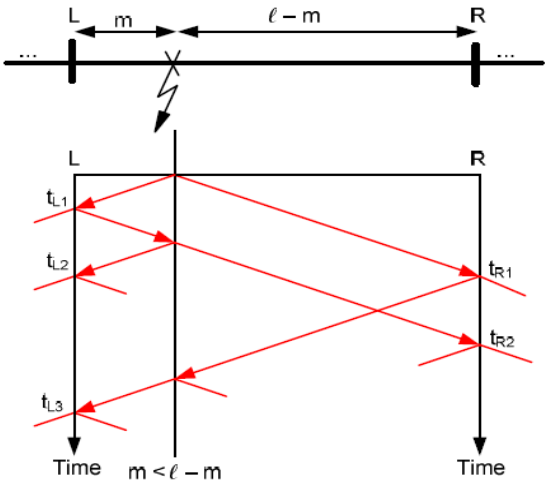

Figure 2. Bewley's lattice diagram showing incident TWs.

2.3 Single-end TW Fault Location Method

A fault occurred in the point m, in Figure 2, causes TW moving towards both ends of the line. L and R are line ends. t_{Li} and t_{Ri} are successive reflection times of the TWs reaching corresponding end of the line. Fault location can be calculated by using arrival times of indecent TW and the first reflected TW to the same. Fault location calculated by:

$$m = \left(\frac{t_{L2}-t_{L1}}{2}\right) \cdot v \qquad (2)$$

and

$$v = \frac{1}{\sqrt{L \cdot C}} \qquad (3)$$

where: m: fault point (km)
t_{L2}, t_{L1} : arrival times of first reflected and incident TW respectively (s)
v : velocity of TW propagation (km/s)
L : Unit line inductance (H/km)
C : Unit line capacitance (F/km).

2.4 Case Study

Real fault data taken from Line Distance Protection Relays at Patnos Substation in Agri for 154 kV Patnos-Ercis Line (in Turkey) is considered. The fault is modelled in MATLAB-SIMILINK to apply the Single-Ended TW Method. Phase B to Ground fault (B-G) occurred in December 2, 2016 is examined. Line length is 46,587 km and fully transposed. First 5,281 km is double circuit with 795 MCM DRAKE conductor and the rest is single circuit with 477 MCM HAWK conductor Fault occurred at 7,31 km

from Patnos. The cause was the broken insulator. SEL 421, as Distance Relay, is used for line protection in Patnos Substation. The Relay computed distance for the fault as 5,38 km. The output of the relay is given in Figure 4.

Figure 3. The Fault in December 2, 2016

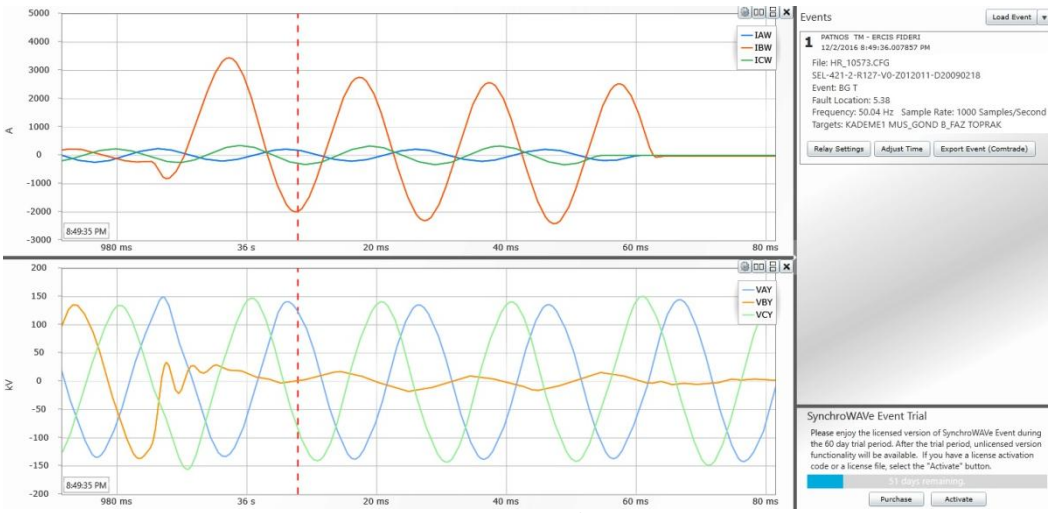

Figure 4. Relay Output for the Fault

2.5 Line Parameters

Line parameters are obtained by using 'Powergui Compute RLC Line Parameters Tool' (MATLAB), conductor type and measurements of the tower type. Ground resistivity is neglected. 154 kV Patnos-Ercis Transmission Line parameters are given in Table 1.

Table 6. 154 kV Patnos-Ercis Transmission Line parameters

Single Circuit Section			Double Circuit Section		
Parameter	**Positive Seq.**	**Zero Seq.**	**Positive Seq.**	**Zero Seq.**	**Zero Seq. Mutual**
R (Ohms/km)	0.12046	0.14231	0.71534	0.8777	0.16236
L (H/km)	0.0013977	0.0022224	0.0012629	0.0038516	0.0022446
C (F/km)	8.5138e-09	6.1677e-09	9.4507e-09	5.534e-09	-1.8159e-09

2.6 MATLAB-SIMULINK Simulation of the Fault

The simulation is created in MATLAB- SIMILINK using Simscape Power Systems Tool. The simulation is shown in Figure 5.

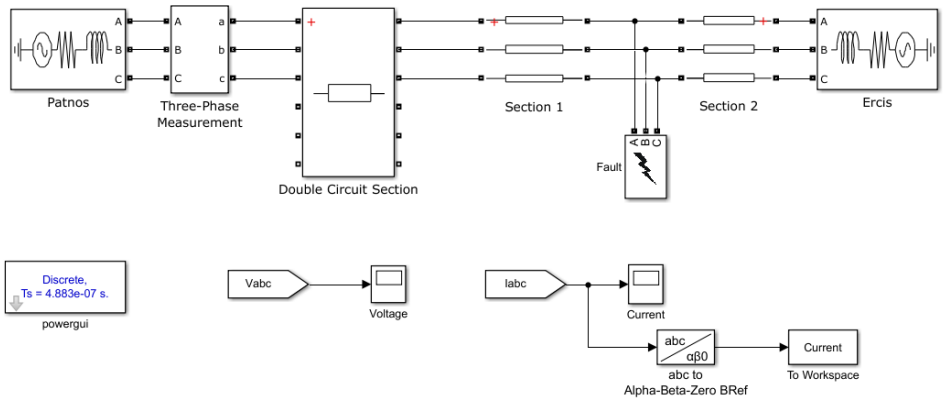

Figure 5. SIMULINK Model of the Fault in December 2, 2016

"Patnos" and "Ercis" sources represent busbars at each side of the line. Source impedance is driven from Three Phase Short Circuit Parameters. The parameters are taken from TEIAS (Turkish Electricity Transmission Corporation). The simulation lasts for 200 ms. The fault is programed from 100th ms to 150th ms. Sampling Rate is 2.048 MHz. Fault resistance is chosen as 40 ohms; 20 for arc resistance and 20 for tower resistance and tower footing. Distributed line Model is used. The line divided to sections according to double circuit line section and actual fault location. Base voltage is 154 kV and base power is 100 MVA. In real applications of TW methods Current Transformer (CT) output is used to compute fault location because of their better frequency responses compared to Capacitance Voltage Transformer (CVT) [9]. That is way current waves are chosen for further computations.Since we do not need load impedance for the method, the load flow is not involved in the SIMULINK model. The method is independent from load flow and that makes the method more useful compered to impedance based ones. Figure 5 shows simulation output for the fault.

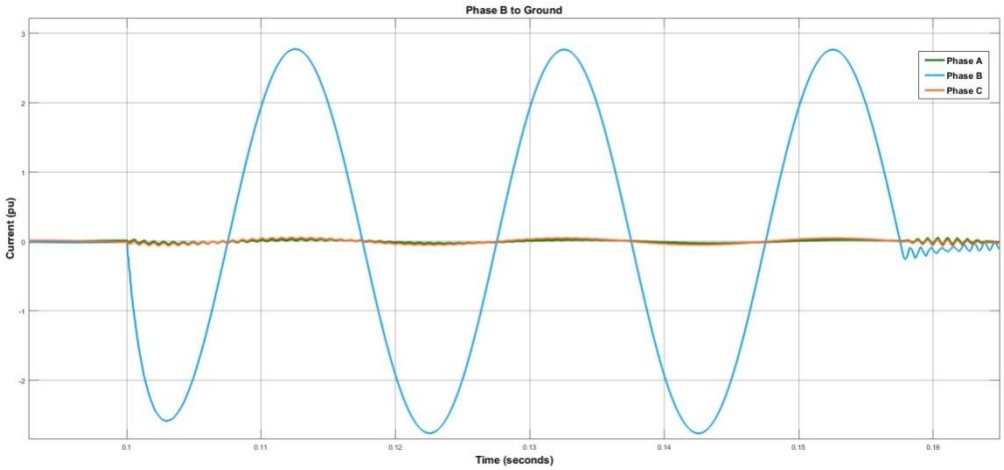

Figure 6. Simulation output for the Fault in December 2, 2016

2.7 Modal Transform

In three phase transmission lines, the travelling waves are coupled and a single wave velocity does not exist. In order to implement the method in three phase systems, the phase domain signals are first decomposed into their modal components using Clarke's Transformation [10]. This transformation is also make simulation more efficient since we do not establish any transposition in the model. The Clarke components calculated with reference to Phase A work well for AG and BC faults but will not work optimally for other fault types. In order to cover all fault types, we use three sets of Clarke components with reference to Phase A, Phase B, and Phase C:

$$\begin{bmatrix} I_\alpha^A \\ I_\beta^A \\ I_o^A \end{bmatrix} = \frac{1}{3}\begin{bmatrix} 2 & -1 & -1 \\ 0 & \sqrt{3} & -\sqrt{3} \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} \quad (4)$$

$$\begin{bmatrix} I_\alpha^B \\ I_\beta^B \\ I_o^B \end{bmatrix} = \frac{1}{3}\begin{bmatrix} -1 & 2 & -1 \\ -\sqrt{3} & 0 & \sqrt{3} \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} \quad (5)$$

$$\begin{bmatrix} I_\alpha^C \\ I_\beta^C \\ I_o^C \end{bmatrix} = \frac{1}{3}\begin{bmatrix} -1 & -1 & 2 \\ \sqrt{3} & -\sqrt{3} & 0 \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} \quad (6)$$

α and β components are called aerial-mode components, 0 component is called zero-mode component. α–mode of the signal is chosen for further computations and the wave velocity can be calculated as:

$$v_\alpha = \frac{1}{\sqrt{L_1 \cdot C_1}} = \frac{1}{\sqrt{0.0013977 \cdot 8.5138e-09}} = 289888{,}7059 \text{ km/s} \quad (7)$$

where L_1 and C_1 are positive sequence unit inductance (H/km) and the capacitance (F/km) of the line respectively.

2.8 Wavelet Transformation

In signal processing, Wavelet transform helps to obtain frequency-time resolution of any signal. In other words, it gives us which high frequency component at which time period. Since we know that the TWs in the transmission line has relatively high frequencies of 10 kHz to 600 kHz then the system frequency of 50 Hz and we need to estimate the arrival times of TWs to the end of the line; wavelet can be a proper choice for our application. We use Discrete Wavelet Transform function (dwt) with Daubechies mother wavelet db2 [11]. DWT decomposes original signal into approximation coefficients that is a convolution of the signal with low pass filter and detail coefficients that is a convolution of the signal with high pass filter. The sample number of the signal is lowered by ratio of 2 with each filtering operation. This is called downsampling. Figure 6 shows block diagram of dwt for first level.

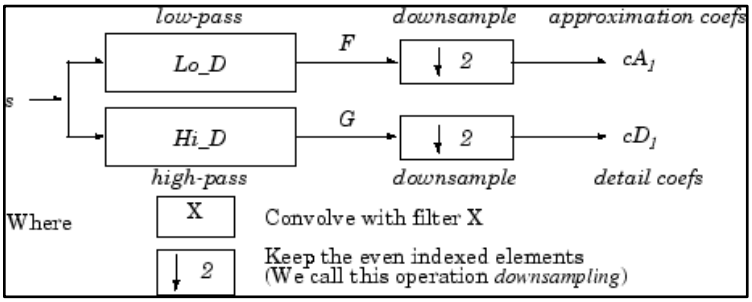

Figure 7. Block diagram of dwt for first level

Mathematical expression for dwt is [12]:

$$W_{\psi,s}(m,n) = 2^{\frac{-m}{2}} \sum_k s(k)\psi(k2^{-m} - n) \quad (8)$$

Where, W is dwt, m is scale parameter, n is time shift parameter, ψ is mother wavelet and s is the signal.16384 points of the α-mode signal are extracted from overall signal starting just before fault time (100^{th} ms.). This is approximately half period of the current signal. Since the sampling period is 2,048 MHz. Since 16384 can be written as 2^i, where i is an integer, the signal can be processed for wavelet transform.Figure 8 shows discrete wavelet transforms of the fault signal measured at Patnos side. First one is α-mode of the signal, second is approximation coefficients, and last one is detail coefficients. Observe that the sudden change in the signal can be seen in the detail coefficients with the exact same time.

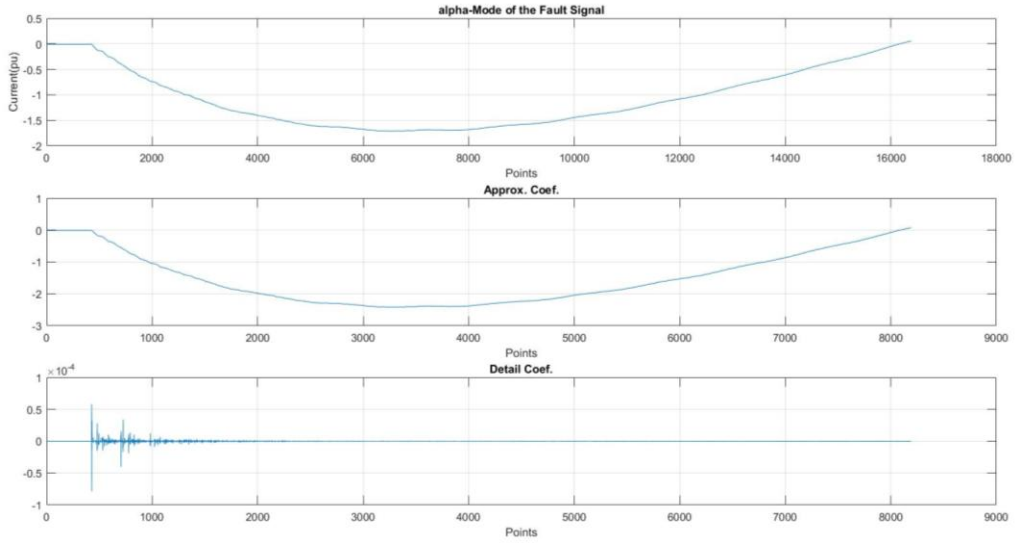

Figure 8. Dwt of the Fault Signal at Patnos Side

3. RESULTS

By wavelet transform we can obtain the difference of arrival times of incident TW and first reflected TW. The peaks in Detail Coefficients of first level DWT represent sudden changes in the signal. The difference of sample number of first peak and second opposite polarity peak gives us the time difference of arrival times of incident TW and first reflected TW. The fault location expression with α-mode velocity for downsampled detail coefficients:

$$m = (p_2 - p_1) \cdot \frac{v_\alpha}{f_s} \qquad (9)$$

where m is fault location, p_1 is sample number of first peak with highest amplitude, p_2 is sample number of second peak with opposite polarity than p_1, v_α is wave propagation velocity in km/s and f_s is sampling rate in Hz.Figure 9 shows first peaks with sample numbers at each side.

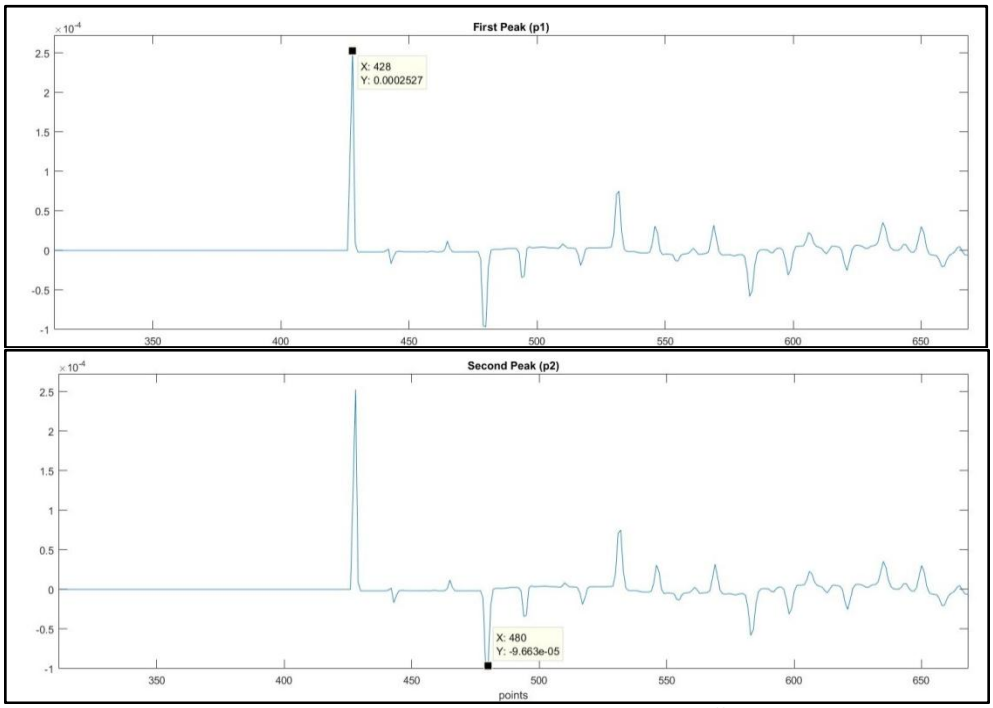

Figure 9. p_1 and p_2 and their sample numbers in detail coefficients

The fault distance can be computed as:

$$m = (p_2 - p_1) \cdot \frac{v_\alpha}{f_s} = (480 - 428) \cdot \frac{289888{,}7059}{2048000} = 7{,}36\ km$$

Since the fault occurred at the tower, the actual location can be obtained by construction list of the line. Actual fault location is 7,31 km from Patnos Substation. The percentage error of the computed location is:

$$\%\ Error_{computed} = \left|\frac{(7{,}36 - 7{,}31)}{46{,}587}\right| \cdot 100 = 0{,}1\%$$

And the percentage error of Distance Relays:

$$\%\ Error_{Relay\ (Patnos\ )} = \left|\frac{(7{,}31 - 5{,}38)}{46{,}587}\right| \cdot 100 = 4{,}14\%$$

Maximum error with the TW Method:

$$\%Error_{max} = \frac{v_\alpha}{2f_s} \cdot \frac{100}{line\ lenght} \approx 0{,}15\% \Rightarrow 70\ meters$$

4. CONCLUSION

The error of distance relay is 1930 meters, where the error of simulating same fault with Single-Ended TW Method is 50 meters. Although Patnos-Ercis HV Transmission line is a short line, 46,587 km, the method has significantly better accuracy than the Distance Relay.

ACKNOWLEDGMENT

This work is driven from M. Sc. Thesis of Mustafa Akdag. Prof. Dr. Sabir Rustemli is the thesis advisor. The work is supported by Scientific Research Projects Unit of Bitlis Eren University (BEBAP).

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Transmission Line Fault Location: Accuracy Analysis of Distance Relay and Travelling Wave Method

Sabir Rustemli[2], Zeki Ilcihan[1] and Mustafa Akdag[2]

Abstract

This work aims to proof that the Double-Ended Travelling Wave (TW) Fault Location Detection Method has batter accuracy then the Impedance Based Method for High Voltage (HV) Transmission Lines. Real fault data taken from Line Distance Protection Relays at the both side of 154 kV Tatvan-Mus Line (in Turkey) is considered. The fault is modelled in MATLAB-SIMILINK to apply the TW Method.

Keywords: Fault Location, Transmission line, Travelling Wave, Wavelet Transform.

1. INTRODUCTION

Locating fault in Transmission Lines is vital for reliable, sustainable and efficient delivery of electrical energy. Faults occurred in Transmission lines may cause long power outages. Fault location accuracy in transmission lines affect the consumed time for clearing the fault by maintenance crew. The accuracy in impedance based methods is limited by factors like fault resistance, load flow and compensated lines etc. An example of ±1% error in fault location for a 500 km line means the maintenance crew have to search the fault within 5 km span of the line. This means approximately 30 towers.

$$\%\ Error = \left| \frac{(Actual\ \ Location\ \ - Computed\ \ Location\ )}{Total\ \ Line\ \ lengt\ h} \right| \cdot 100 \qquad (1)$$

Proactive Relays are used to locate line faults in transmission system. The methods used to locate fault in these relays can be either impedance based (Distance Relay) or Traveling Wave (TW) based. TW based algorithms use high-frequency (10 kHz - 600 kHz) transients occurred during fault [1]. TW propagate along the transmission line with a velocity near the speed of light. The propagation initiate at the same time with the fault and it is reflected by every discontinuity. In the case of transmission line fault, substations in each side of the line and fault location are discontinuities. The arrival time of first TW to the relay at each side of the line is extracted from overall fault (current or voltage) signal by means of signal processing methods like wavelet transform [2] or deviation method [3]. Difference of these extracted times is used in calculation of fault location. Since Double-Ended method require data from both side of the line, time synchronization of the relays at each side of line is necessary. Time synchronization established by means of GPS modules. The method is most accurate among all fault location methods.This study shows how to compute fault location with Double-Ended Travelling Wave Fault Location Method using wavelet transform by means of simulating a real fault occurred in the transmission line in MATLAB-SIMULINK.

2. MATERIALS AND METHODS

2.1 Location Detection Methods for HV Transmission Lines Faults

Common fault location methods can be categorized as impedance based methods [4] and travelling wave based methods [5]. Also fault location methods can be classified as single-ended and double-ended [6]. Single-ended methods use data from single end of the line. Double-ended method use data from both side of the line. Due to this Double-ended methods need time synchronization of both end data. Impedance-based methods have lower accuracy and less cost compared to TW-based ones. Single-end methods have lower accuracy and less cost compared to double-end ones. TW based methods need supplemental logic to classify fault type and locate fault for all fault types [7].

2.2 Travelling Waves in HV Transmission Lines

Abnormalities like A fault, a lightning strike, opening or closing the circuit breaker etc. causes high-frequency (10kHz to 600kHz) voltage and current transients moving towards both ends of the line. These transients called Traveling Waves (TW). TWs propagate along the line with the velocity near the speed of light, 300.000 km/s.

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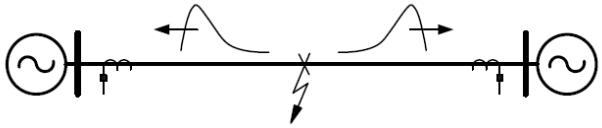

Figure 1. Travelling Waves in case of transmission line fault

TW propagation initiate at the same time with the abnormality. This first wave is called incident TW. At every discontinuity point, that is a high impedance point wave is divided three parts: some reflected back, some is transmitted through the point and some is absorbed by the point. In the case of transmission line fault, busbars at each side of the line and fault point are discontinuities. Figure 2 shows how travelling waves be formed due to a fault occurred in the line, also called Bewley's lattice diagram [8].

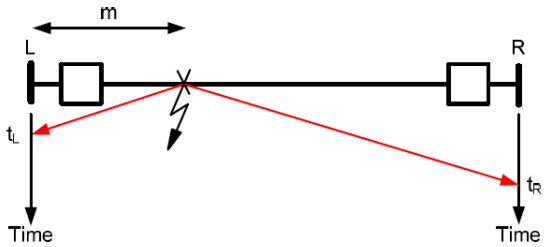

Figure 2. Bewley's lattice diagram showing incident TWs.

2.3 Double-end TW Fault Location Method

A fault occurred in the point m, in Figure 2, causes TWs moving towards both ends of the line. L and R are line ends. t_L and t_R are incident times of the TWs reaching corresponding end of the line. Fault location can be computed by using arrival time of indecent TWs to both side of the line. Fault location calculated by:

$$m = \frac{1}{2} \cdot [\ell + (t_L - t_R) \cdot v] \quad (2)$$

and

$$v = \frac{1}{\sqrt{L \cdot C}} \quad (3)$$

where: ℓ : line length
m: fault point (km)
t_L , t_R : arrival times of Incident TWs respectively (s)
v : velocity of TW propagation (km/s)
L : Unit line inductance (H/km)
C : Unit line capacitance (F/km)

2.4 Case Study

Real fault data taken from Line Distance Protection Relays at the both side of 154 kV Tatvan-Mus Line (in Turkey) is considered. The fault is modelled in MATLAB-SIMILINK to apply the Double-Ended TW Method. Phase C to Ground fault (C-G) occurred in March 3, 2017 is examined. Line length is 71,3357 km and fully transposed. The line is single circuit with 477 MCM HAWK conductor. Fault occurred at 9,8157 km from Mus. Stork nest caused short circuit between Phase C and the Tower. Distance Relay at Tatvan Substation gave the fault distance as 62,65 km, and 10,15 km at Mus Substation.

Figure 3. The Fault in March 3, 2017

2.5 Line Parameters

Line parameters are obtained by using 'Powergui Compute RLC Line Parameters Tool' (MATLAB), conductor type and measurements of the tower type. Ground resistivity is neglected. 154 kV Tatvan-Mus Transmission Line parameters are given in Table 1.

Table 7. 154 kV Tatvan-Mus Transmission Line parameters

Parameter	Positive Seq.	Zero Seq.
R (Ohms/km)	0.12046	0.14231
L (H/km)	0.0013977	0.0022224
C (F/km)	8.5138e-09	6.1677e-09

2.6 MATLAB-SIMULINK Simulation of the Fault

The simulation is created in MATLAB- SIMILINK using Simscape Power Systems Tool. The simulation is shown in Figure 4.

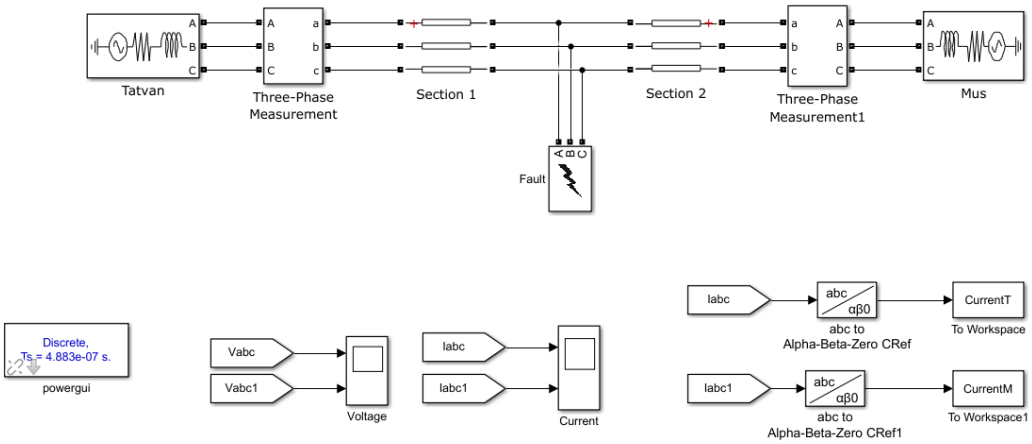

Figure 4. SIMULINK Model of the Fault in March 3, 2017

"Tatvan" and "Mus" sources represent busbars at each side of the line. Source impedance is driven from Three Phase Short Circuit Parameters. The parameters are taken from TEIAS (Turkish Electricity Transmission Corporation). The simulation lasts for 200 ms. The fault is programed from 100th ms to 150th ms. Sampling Rate is 2.048 MHz. Fault resistance is chosen as 40 ohms; 20 for arc resistance and 20 for tower resistance and tower footing. Distributed line Model is used. The line divided to section according to actual fault location. Base voltage is 154 kV and base power is 100 MVA. In real applications of TW methods Current Transformer (CT) output is used to compute fault location because of their better frequency responses compared to Capacitance Voltage Transformer (CVT) [9]. That is way current waves are chosen for further computations.Since we do not need load impedance for the method, the load flow is not involved in the SIMULINK model. The method is independent from

load flow and that makes the method more useful compered to impedance based ones. Figure 5 shows simulation output for the fault.

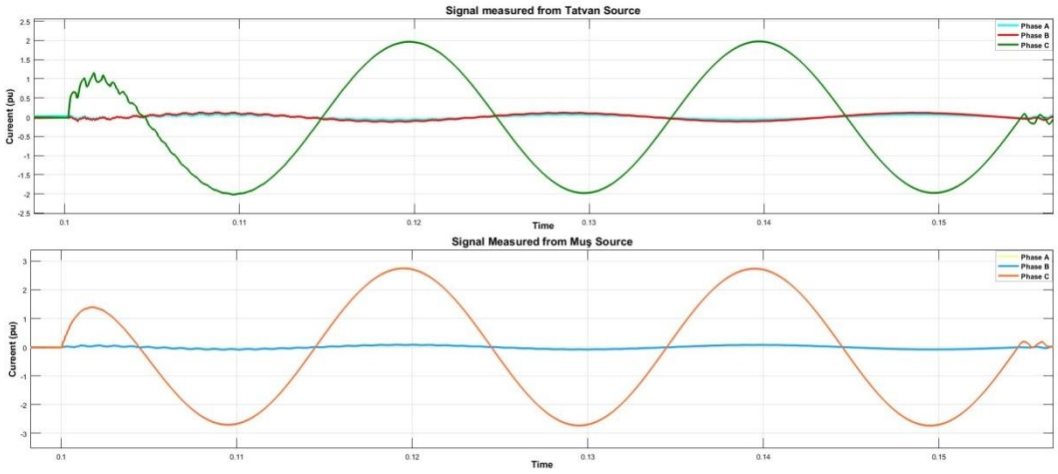

Figure 5. Simulation output for the Fault in March 3, 2017

2.7 Modal Transform

In three phase transmission lines, the travelling waves are coupled and a single wave velocity does not exist. In order to implement the method in three phase systems, the phase domain signals are first decomposed into their modal components using Clarke's Transformation [10]. This transformation is also make simulation more efficient since we do not establish any transposition in the model. The Clarke components calculated with reference to Phase A work well for AG and BC faults but will not work optimally for other fault types. In order to cover all fault types, we use three sets of Clarke components with reference to Phase A, Phase B, and Phase C:

$$\begin{bmatrix} I_\alpha^A \\ I_\beta^A \\ I_o^A \end{bmatrix} = \frac{1}{3}\begin{bmatrix} 2 & -1 & -1 \\ 0 & \sqrt{3} & -\sqrt{3} \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} \quad (4)$$

$$\begin{bmatrix} I_\alpha^B \\ I_\beta^B \\ I_o^B \end{bmatrix} = \frac{1}{3}\begin{bmatrix} -1 & 2 & -1 \\ -\sqrt{3} & 0 & \sqrt{3} \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} \quad (5)$$

$$\begin{bmatrix} I_\alpha^C \\ I_\beta^C \\ I_o^C \end{bmatrix} = \frac{1}{3}\begin{bmatrix} -1 & -1 & 2 \\ \sqrt{3} & -\sqrt{3} & 0 \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} \quad (6)$$

α and **β** components are called **aerial-mode** components, **0** component is called **zero-mode** component. α–mode of the signal is chosen for further computations and the wave velocity can be calculated as:

$$v_\alpha = \frac{1}{\sqrt{L_1 \cdot C_1}} = \frac{1}{\sqrt{0.0013977 \cdot 8.5138e{-}09}} = 289888{,}7059 \text{ km/s} \quad (7)$$

where L_1 and C_1 are positive sequence unit inductance (H/km) and the capacitance (F/km) of the line respectively.

2.8 Wavelet Transformation

In signal processing, Wavelet transform helps to obtain frequency-time resolution of any signal. In other words, it gives us which high frequency component at which time period. Since we know that the TWs in the transmission line has relatively high frequencies of 10 kHz to 600 kHz then the system frequency of 50 Hz and we need to estimate the arrival times of TWs to the end of the line; wavelet can be a proper choice for our application. We use Discrete Wavelet Transform function (**dwt**) with Daubechies mother wavelet **db2** [11]. DWT decomposes original signal into **approximation coefficients** that is a convolution of the signal with low pass filter and **detail coefficients** that is a convolution of the signal with high pass filter. The sample number of the signal is lowered by ratio of 2 with each filtering operation. This is called **downsampling**. Figure 6 shows block diagram of dwt for first level.

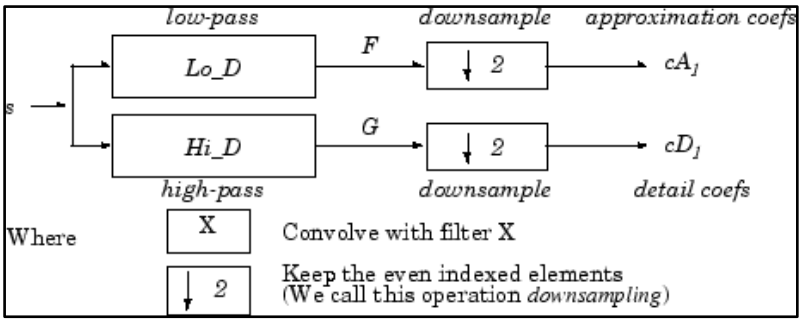

Figure 6. Block diagram of dwt for first level

Mathematical expression for dwt is [12]:

$$W_{\psi,s}(m,n) = 2^{\frac{-m}{2}} \sum_k s(k)\psi(k2^{-m} - n) \quad (8)$$

Where, W is dwt, m is scale parameter, n is time shift parameter, ψ is mother wavelet and s is the signal.16384 points of the α-mode signal are extracted from overall signal starting just before fault time (100th ms.). This is approximately half period of the current signal. Since the sampling period is 2,048 MHz. Since 16384 can be written as 2^i, where i is an integer, the signal can be processed for wavelet transform.Figure 7 and 8 show discrete wavelet transforms of fault signals measured at Mus side and Tatvan side respectively. First one is α-mode of the signal, second is approximation coefficients, and last one is detail coefficients. Observe that the sudden change in the signal can be seen in the detail coefficients with the exact same time.

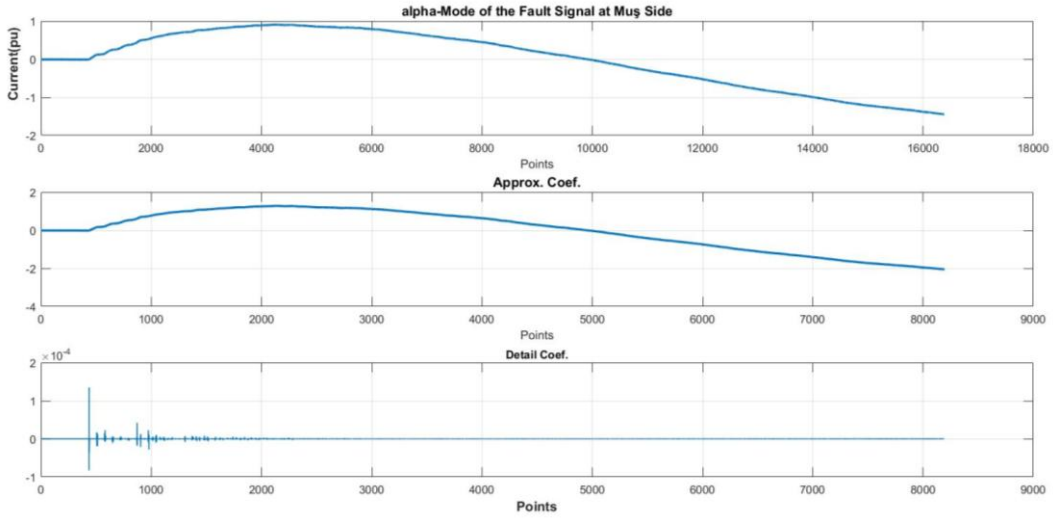

Figure 7. Dwt of the Fault Signal at Mus Side

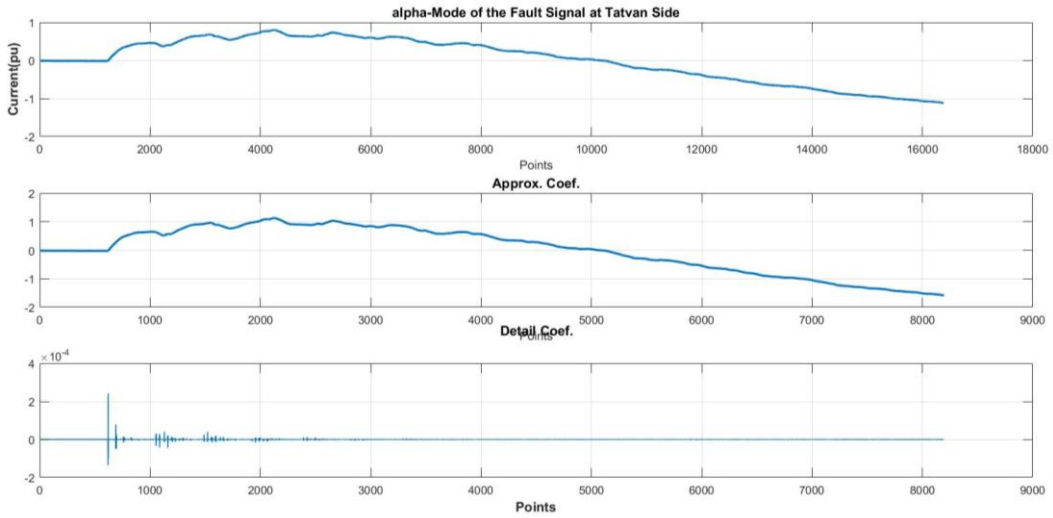

Figure 8. Dwt of the Fault Signal at Tatvan Side

3. RESULTS

By wavelet transform we can obtain the difference of arrival times of incident TWs. The peaks in Detail Coefficients of first level DWTs represent sudden changes in the signal. The difference of sample numbers of first peaks gives us the difference of arrival times of incident TWs. The fault location expression with α-mode velocity for downsampled detail coefficients:

$$m = \frac{\ell}{2} + (p_L - p_R) \cdot \frac{v_\alpha}{f_s} \quad (9)$$

where ℓ is line length, m is fault location, p_L is sample number of first peak for the L side signal p_R is sample number of first peak for the R side signal v_α is wave propagation velocity in km/s and f_s is sampling rate in Hz.Figure 9 shows first peaks with sample numbers at each side.

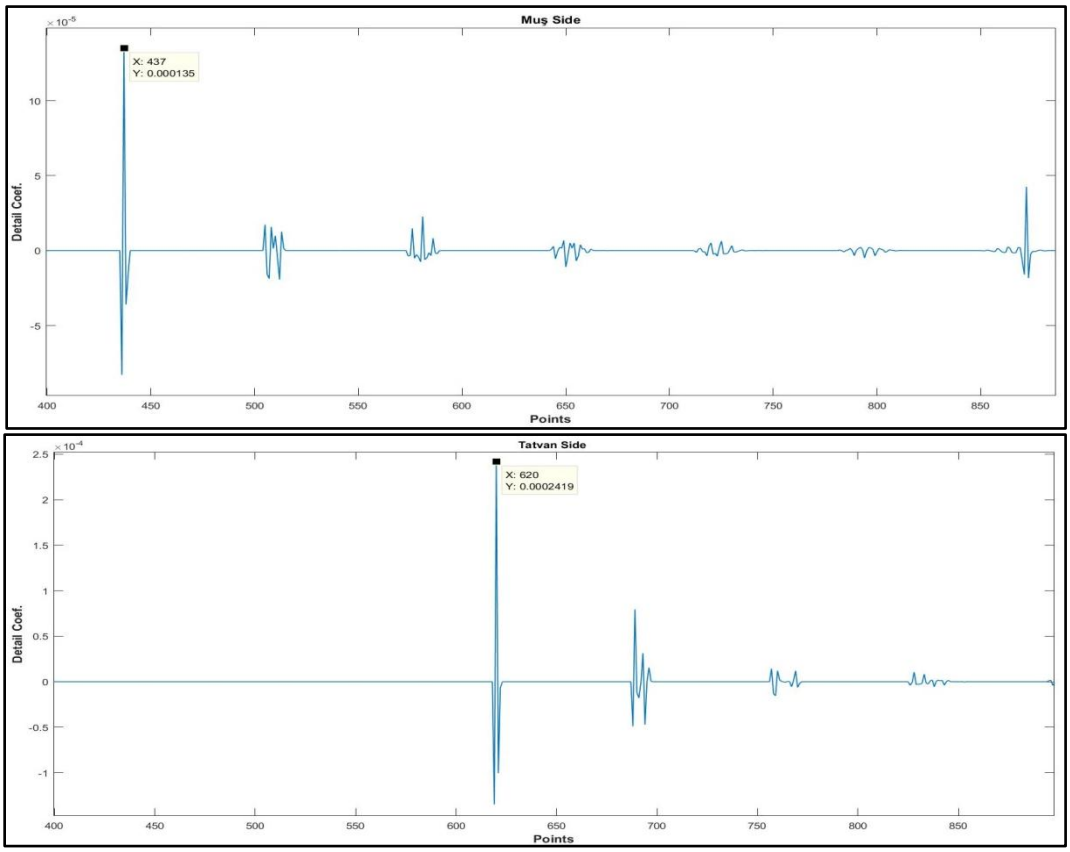

Figure 9. First peaks with sample numbers in detail coefficients

The fault distance can be computed as:

$$m = \frac{\ell}{2} + (p_L - p_R) \cdot \frac{v_\alpha}{f_s} = \frac{71{,}3357}{2} + (620 - 437) \cdot \frac{289888{,}7059}{2048000} = 61{,}57\ km \text{ from Tatvan}$$

and

$$m = \frac{\ell}{2} + (p_L - p_R) \cdot \frac{v_\alpha}{f_s} = \frac{71{,}3357}{2} + (437 - 620) \cdot \frac{289888{,}7059}{2048000} = 9{,}76\ km \text{ from Mus.}$$

Since the fault occurred at the tower, the actual location can be obtained by construction list of the line. Actual fault location is 61,52 km from Tatvan Substation. The percentage error of the computed location is:

$$\%\ Error_{computed} = \left|\frac{(61{,}57 - 61{,}52)}{71{,}3357}\right| \cdot 100 = 0{,}07\%$$

And the percentage error of Distance Relays:

$$\%\ Error_{Relay\ (Mus)} = \left|\frac{(10{,}15 - 9{,}76)}{71{,}3357}\right| \cdot 100 = 0{,}54\%$$

$$\%\ Error_{Relay\ (Tatvan\ )} = \left|\frac{(62{,}65 - 61{,}52)}{71{,}3357}\right| \cdot 100 = 1{,}58\%$$

Maximum error with Double-Ended TW Method:

$$\%Error_{max} = \frac{v_\alpha}{2f_s} \cdot \frac{100}{line\ lenght} \approx 0{,}1\% \Rightarrow 70\ meters$$

4. Conclusion

The minimum error of distance relay is 390 meters with the relay located at Mus Substation, where the error of simulating same fault with Double-Ended TW Method is 50 meters. Although, the benefits of the method may not be seen with short lines like

Tatvan-Mus line, it can be seen that the method has a considerable benefit with long lines over 250 km. It can be concluded by the work that Double ended TW Fault Location Method has significantly more accurate than the Impedance Based Method.

ACKNOWLEDGMENT

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Spatial Traces of Cultural Identity in Different Regions of Anatolia-Turkey

Selma Celikyay[1]

Abstract

Throughout the history, there are a lot of factors giving form to settlements and buildings. While geography and geology have an impact on the form of settlements, climate and natural conditions determine building materials and building techniques. But culture is the major factor not only shaping urban form but also designing architecture. On one hand, social and traditional life take shape from culture, on the other hand, life styles shape architectural styles of buildings. Therefore, architecture is one of the important indicators of cultural footprints and cultural identity in the settlements. Turkey is a country which is full of architectural traces of different socio-cultural structures in Anatolia. As tangible evidences regarding life style of community and social life in the past, architectural styles of the buildings in both urban and rural areas vary from region to region. The aim of this paper to demonstrate these architectural samples as spatial traces based on cultural life in different regions of Anatolia and to emphasize their spatial characteristics from socio-cultural sustainability point of view.

Keywords: ***Anatolia, culture, heritage, space, traditional architecture***.

1. INTRODUCTION

Throughout the history, all human settlements in the world were shaped under the effects of various factors. These factors divided to two major groups are natural and cultural factors. Geography, topography, geology and climate create natural characteristics and conditions of an area, and also guide to shaping of the certain form of settlements. In addition to these natural factors, culture as the second major factor is of great significance on shaping of settlement texture and namely on designing architecture.Scientists stated different approaches about the relation between culture and space. Shennan, on one hand commented culture as "spatial variation in human ways of life" [1], on the other hand he stated that "cultures cannot be considers as historical actors since they are not real entities" [1].Bonnemaison emphasized that "cultural differences can only be adequately understood when placed in their geographical context" [2]. All these comments show that although culture cannot be real entity, the most significant component to create "the space" on the geographical context is "culture". Culture definitely cannot be isolated from geography. However, geography describes physical and environmental characteristics of a land and surroundings on an area. Dynamic factor taking advantage from geography and shaping selected land to be settled and creating building tradition and spaces is culture. Historical settlements and historical environments are full of spatial traces shaped by culture, which contains tradition, religion and life styles, by beside of natural factors. Tangible or intangible historical heritages that we can see or cannot see in some settlements and cities are cultural properties to evidence of cultural identity. As emphasized by Kern, "some cultural developments were directly inspired by new technology" [3] in the cities. Nevertheless, future inspirations can include and sustain cultural dimension of the space. Components to make cities the centre of modernity are not only buildings but also philosophy, science, art and music [4]. In addition to these components, historical buildings and historical urban fabric, which demonstrate characteristics of civilization in a period of time, have to live and to be protected.Cultural properties have wide range of discovered archaeological finds and standing samples of traditional architecture which are used by household. In Anatolia, almost every settlement has archaeological sites, urban site or historical site. The amount of these historical and cultural properties, which some of them are in the ground and some is on the ground, demonstrates the historical and cultural heritage richness of Anatolia.Streets and districts which preserved their harmonic spatial organizations and architectural integrity same as in ancient times have been called as "urban site" [5].Urban sites are like open museums full of historical and cultural components. Traditional houses in every city are spatial evidencesof cultural identity. Their architectural styles and details tell us about culture in their age. Therefore, traditional architectural samples as visible and tangible documents on cultural identities of communities and settlements.

2. MATERIAL AND METHOD

Traditional architectural samples from seven geographical regions (Figure 1) of Turkey are main materials of this research. Their photographs definitively demonstrate their structures and architectural styles. In addition to photographs, according to the information taken from scientific resource, have been consisted in analyzing of spatial characteristics in Anatolia.

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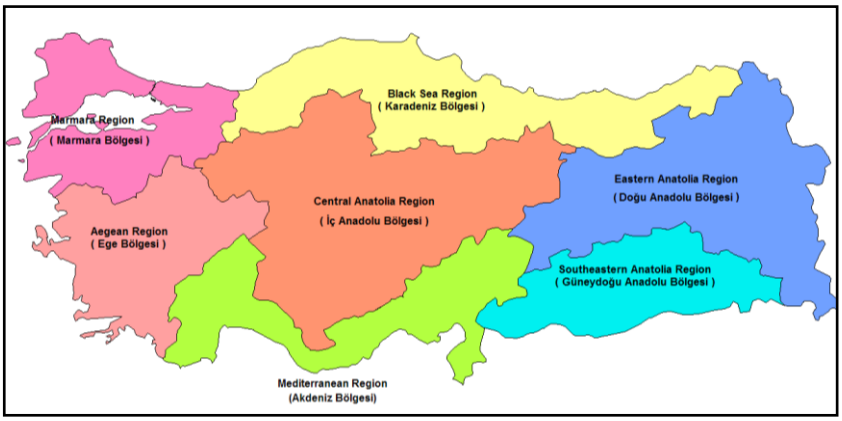

Figure 1.Seven geographical regions in Anatolia-Turkey [6].

The method of this research can be entitled with three topics;

- Data collection
- Reading of spatial characteristics and analysis
- Conclusions

Obtained data by means of the photographs and information from scientific resources about traditional architecture of selected cities in seven regions of Anatolia were analyzed. Characteristics, differences and similarities in traditional architecture in different regions were emphasized.

3. SPATIAL CHARACTERISTICS IN ANATOLIA

Figure 2. (a) Archaeological site in Cayonu[8] *(b)Archaeological site in Asikli Hoyuk* [9]

Archaeological digs testify to the fact that Anatolia was the place of the first human settlements (Cayonu and Asikli Hoyuk) being constructed in the world approximately 10-12.000 years ago [7]. From the past up today, Anatolia has been full of the traces regarding to several civilizations lived in different period. Last of them was Ottoman period shaping architecture in Anatolia. Today, the origin of "Turkish Houses" is based on not only Ottoman period but also traces to building tradition in Cayonu and Asikli Hoyuk in ancient times (Figure 2). When constructional characteristics of traditional houses have been investigated, it has been understood that as the method of providing ventilation current, a space between ground and ground floor had been created. Furthermore, this constructional custom based on the houses in the first human settlements has been comprehended (Figure 2).Settlements in Anatolia were shaped depending on traditions, regional data, natural and social conditions. The reflection of community life has been clearly seen on the formation of urban and rural architecture. Tradition, custom and religion were major factors which produced a philosophy of life [10].Traditional settlements in Anatolia have similarities from planning principles and spatial organizations point of view. Regional characteristics determined of dispersed or compact texture of the settlements. There was simplicity in everything [10]. Ordinary and nature compatible form is dominant on traditional settlements. Function was the first principle in building and the second was aesthetic value and unique details after functional design constructed. It is necessary to recognize, to protect, to renovate and to reanimate the samples of traditional architecture in the settlements, which reflect building style, building art and cultural structure of the community in their age. In this paper, traditional architecture in seven regions has been emphasized and some samples have been presented below sections.

3.1 Traditional Architecture in Marmara Region

As the capital of Byzantine Empire period and a megacity in the region, Istanbul has full of both Byzantine and Ottoman historic buildings. Mosques, churches, palaces, waterfront residences, towers, historical monuments, monumental fountains and traditional houses display architecture. Today, Istanbul is the capital of cultural properties and is one of the most attractive international destinations in the world.

Figure 3. Waterfront residences in Istanbul [11].

Figure 4. Samples of traditional architecture on different cultures in Istanbul [11].

Istanbul as a megacity located on seven hills contains thousands of traditional architectural samples to demonstrate Ottoman, Greek and also Armenian building styles (Figure 3, 4). Every one of them has a high value to be investigated and explored.

3.2 Traditional Architecture in Black Sea Region

Traditional houses in Black Sea Region, which most of them were put under protection by Ministry of Culture, reflect all the characteristics of Ottoman architecture. Thanks to the fact that the region has a lot of forests, timber was the main building material in the region. Therefore traditional houses in both urban sites and rural areas were built with timber framed techniques called "*bagdadi*". Microclimatic comfort requirements both indoors and outdoors were considered during design and constructing process of traditional houses. Climate in the region is usually warm in springs, hot in summer and cold in winter. Humidity rate is high on the seafront settlements. While cities inlands like Kastamonu and Safranbolu have continental climate, the cities in coastal region like Sinop and Trabzon have temperate climate. Together with culture and tradition, climatic conditions were also determiner factor the relation between indoors and outdoors of traditional houses. There are a lot of windows on the facades so that sunshine enters all day long (Figure 5, 6a). But in summers, in order to prevent hot sunshine to enter, most of Safranbolu houses have wooden shutters on the windows [10] (Figure 5b).

Figure 5. Samples of traditional architecture in Western Black Sea Region (a)Kastamonu house (b) Safranbolu house

Rooms were used for every daily action because of that the rooms of traditional houses were designed for sitting, taking a rest, sleeping, bathing, and also for food and beverage actions. Due to this reason there is an oven and cupboards in every room. In some traditional houses in Black Sea Region, there are geometrical motives on the timber ceilings and floral motives on the plastered walls of indoors. In Eastern Black Sea Region, Trabzon is one of the important historical, cultural and natural heritage centers in the region. It has attractive traditional architecture samples. Memisoglu estate is located in Surmene town of Trabzon city. It is popular in the region because of that it is a unique sample of stone and woodworking on the facade [12]. Large-sized eave is one of the unique details of this estate (Figure 6).

Figure 6. Samples of traditional architecture in Black Sea Region (a) Sinop house [13] *(b) Trabzon house in Eastern Black SeaRegion* [14].

3.3 Traditional Architecture in Central Anatolia Region

Ankara, Sivas and Eskisehir demonstrate traditional architecture in Central Anatolia Region. Ankara is the capital of Turkey. Hamamonu district in Ankara were renovated with all traditional samples (Figure 7). Recently, the district has been changed to a new attractive cultural and recreational center. Ground floors of these timber framed houses were made by stone walls.

Figure 7. Samples of traditional architecture in Hamamonu, Ankara [15], [16].

Figure 8. Samples of traditional architecture in Central Anatolia Region (a) Sivas house (Akaylar family estate) [17], *(b) Odunpazari houses, Eskisehir*

Sivas and Eskisehir houses can be preferred to display traditional samples in the region. As a sample of Sivas house, the estate of Akaylar family built in nineteenth century has a large garden and large-sized designed in which extended family comfortably lived (Figure 8a) [17]. Odunpazari houses are traditional samples in Eskisehir. As shown in Figure 8(b), they demonstrate dynamic architecture on their facades. Sequence of traditional houses with pavilions, exhedras, balconies and other architectural characteristics create harmony in historical texture of the city. In Odunpazari historical texture, which demonstrates Anatolian-Turkish city texture, traditional houses have back yards or side yards [18].

3.4 Traditional Architecture in Eastern Anatolia Region

Figure 9. Samples of traditional architecture in Eastern Anatolia Region, Bitlis houses [19]

As shown in Figure 4, due to harsh climatic conditions and long-lasting winter, major building material was stone in Eastern Anatolia Region. Traditional Bitlis and Erzurum houses constructed with masonry construction technique. In order to provide climatic comfort, houses with ashlar stone work have small-sized rooms indoors in Bitlis [20]. In Erzurum houses, in addition to stone material, timber was used as both constructive and decoration material [21]. Another characteristic of these original houses is that their roofs are flat and earth-sheltered (Figure 9, 10).

Figure 10. Samples of traditional architecture in Eastern Anatolia Region, Erzurum houses [22]

3.5 Traditional Architecture in Southeastern Anatolia Region

From socio-cultural aspects, spatial traces demonstrate dominantly intimacy in Southeastern Anatolia Region. This major factor shaped settlement form and traditional architecture in the region. Gaziantep houses, as one of the beautiful samples of Southeastern Anatolia architecture are hidden behind of high walls (Figure 11). They are isolated from urban public space and built facing to their inner court. Kitchen, storeroom and toilet of the house are placed around the court [23]. Most important space in the house is the inner court, as a social space, because of that women living in these houses spend time together in this court. This is a comfortable space for household especially in summers which have very hot climate.

Figure 11. Samples of traditional architecture in Southeastern Anatolia Region (a) Gaziantep houses [23]
(b) Inner court of a traditional house in Gaziantep [24]

Mardin city displays the best sample of topographic architecture in the settlement form. Buildings in Mardin leant back on each other and created topography compatible architecture and compact form of the settlement landscape. On traditional buildings in Mardin, major building material is yellow limestone. Facades of most of the traditional houses were trimmed with various motives, thanks to the fact that limestone is a high workable material (Figure 12). Houses are surrounded with high walls to isolate them from streets and the others. Behind high walls, courts called “eyvan” are living place of households in daily life [27]. These kind of open spaces were created as shadowed places to sun coming from west direction.

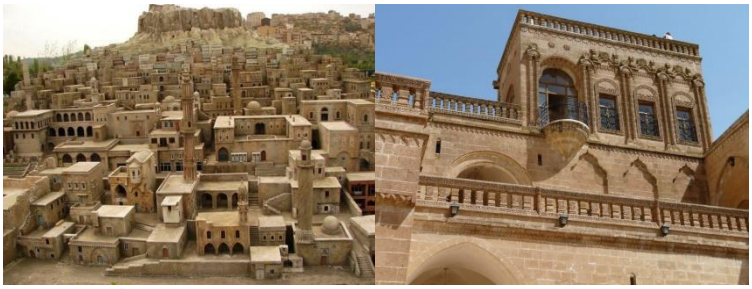

Figure 12. Samples of traditional architecture in Southeastern Anatolia Region (a) Mardin houses [25], *(b) Architectural details of a traditional house in Mardin* [26]

3.6 Traditional Architecture in Mediterranean Region

Figure 13. Samples of traditional architecture (a) in Antalya [28], [29], *(b) in Antakya* [30]

Antalya houses in Citadel district exhibit characteristics of historical texture (Figure 13a). Stone on the ground floor and timber frame on upper floors are main building materials in construction of these houses. Historical texture and architectural style with exhedras and pavilions in this district were shaped by climatic conditions and life style of the ancient community. Courts behind high stone walls, living place of households. An attractive detail on the wall construction is that bonding timbers were placed in faced masonry in order to provide stability of the wall. In east part of Mediterranean region, Antakya houses flush-seamed on both sides of the street have also courts with high stone walls. Building materials are stone for ground floors and timber framed structure for upper floors. Arcs on the middle of the streets for water drainage are indicators on ancient developed civilization in Antakya (Figure 13b).

3.7 Traditional Architecture in Aegean Region

Mugla houses are unique samples regarding Anatolian-Turkish traditional architecture. Most of them have two stories and a court. Their spatial organization was formed introverted style. Of the ground floor rooms, there is no window on the street facades of most traditional houses, but a lot of windows are directed to the courts [31].Streets in historical part of Mugla are narrow and the houses are close to each other. Mugla houses are popular with their chimneys with unique caps (Figure 14).

Figure 14. Samples of traditional architecture in Mugla [32], [33] *Unique chimney caps* [34]

Bodrum houses are unique samples of Mediterranean architecture (Figure 15). Climate is usually very hot and it rarely rains. Although Bodrum is a town consisted in Mugla, traditional houses in Bodrum have different architectural styles from Mugla. The houses in Bodrum are also built topography compatible like in Mardin. With white colors and without roofs, Bodrum houses present a unique landscape extended in peninsula where is the most attractive touristic destination in Turkey. All building materials in Bodrum house are stone, except for timber windows usually with blue color.

Figure 15. Samples of traditional architecture in Bodrum [35], [36], [37]

4. CONCLUSIONS

Culture is intangible factor, but the spatial traces of cultural identity in Anatolia are tangible heritages. These cultural heritages demonstrate differences and similarities of cultural and social life shaping architecture and also architectural details, beside natural conditions. Although there are certain boundaries among geographical regions, houses which demonstrate traditional architecture in seven different regions of Anatolia have some similarities besides of their differences. As a short result on differences and similarities; although traditional houses in Marmara, Black Sea, Central Anatolia, Mediterranean and Aegean Region were built with stone and timber structure, houses in Eastern and Southeastern Anatolia Region were built with only stone building materials. Except for Bodrum houses in Mediterranean Region, only in Eastern and Southeastern Anatolia Region traditional houses have flat roofs. As an architectural tradition, houses in Aegean, Mediterranean and Eastern Anatolia have courts, whereas houses in other regions except for in Eastern Anatolia have gardens. Pavilions and exhedras are common architectural details on the houses almost in every region, but not in every city. In some cities in Anatolia, there are unique architectural characteristics which occupy only in these cities.Traditional houses in Anatolia were built respectfully both to the nature and each other. In the construction process of these ecological houses which are not shading each other, of natural conditions were taken advantage significantly. Traditional houses built under these approaches respect to the property rights and right to benefit from nature of neighbour buildings.These traditional and ecological buildings have still guided about how architectural design is made respectfully to the nature, community and human to architects and builders whoever remembers respectfully building culture in the past and places importance them. Traditional architectural samples in Anatolia, which only a few of them have been presented in this paper, built with local materials and building techniques should be protected as spatial documents relation to the settlement culture and building culture in Anatolia, should be sustained and transmitted to the next generations. Shortly presented architectural samples in this paper have adequately emphasized cultural richness and diversity in Anatolia. Consequently, strategic importance of protection on traditional architectural heritage as evidences of cultural identity has been incontestable and more comprehensible.

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BIOGRAPHY

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ICSD INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Promoting the Sustainability of a High Street in a Turkish City, Bursa

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Abstract

Rapid urbanization has caused urban sprawl in many of the Turkish cities. The emergence of new suburban areas brought new kinds of urban environments like shopping malls, theme parks etc. as alternatives to the public spaces in the city centers. Therefore the high streets in many of the Turkish cities have faced obsolescence problems. In the content of this study, a research was conducted on the high street in the city center of a Turkish city, Bursa. The purpose of this research is to discuss the factors behind the sustainability of tis high street under the force of rapid urbanization. In the analysis of these factors, key performance indicators which were developed for "Guidelines for Planning Authorities: Retail Planning (2012) by UK Department of the Environment, Community and Local Government is used. There are two reasons for the choice of selecting these performance indicators. First is the lack of officially accepted special parameters for health check of town centers in Turkey. Second reason is that UK has in-depth policies for revival of town centers. These key performance indicators are diversity of uses, competitiveness, retailer representation and intentions to change representations, shopping rents, proportion of vacant street level property, accessibility, customer views and behavior, perception of safety and occurrence of crime, commercial yields on non-domestic property, pedestrian flows and public realm. As a result of these analysis and surveys, changing practices of the center were determined and the reasons behind its sustainability are identified. In addition to that, the possible reasons which will threat its sustainability are described as safety, parking problems, wrong transportation decisions, lack of strong ties between merchants, etc.

Keywords: Sustainability, High Street, Key Performance Indicators, Bursa, Turkey

1. INTRODUCTION

In recent years, as a result of rapidly evolving industry, migration to big cities that causes to urban growth and sprawl is increasing. Urban decentralization has caused high streets and city centers to obselescence in economic, physical, and social terms. The new suburban areas brought alternative residential places, shopping an environments and cultural facilities(such as shopping malls, themed restaurants etc.) to the traditional city centers. These new living environments have affected the vitality and viability of city centers and high streets [1].Low social and economic activity, changing retail habits, development and planning issues on high streets have accumulated. However, on the way of creating a sustainable city, the importance of high streets and city centers has become more discussed, and in many countries conceptual and planning decisions for these environments are put into effect. In the last three decades, professionals have questioned meanings, functions and problems of high streets and city centers [1],[2]. In the battle of high streets with shopping malls and suburban living environments, policymakers and researchers are in the search for guidelines and principles in order to make high streets and city centers sustainable for changing socio-economic circumstances.As a response to all those issues, some governments developed in-depth policies for revival of town centers, whilst only short term solutions were sufficient for some governments. For example Town Center Management in UK, Main Street Revival in USA and URBCOM in Portugal are current comprehensive policies for revival of town centers [3]. Purpose of all these policies takes the town centers with holistic planning approach considering all social, physical, economic revivals. In this context a number of key indicators that can be monitored over time to measure the health of a town center, are set out [4].Obsolescence of high streets in Turkish cities was taken as a problem. So some reviews were produced (such as Integrated Urban Development Strategy and Action Plan 2010-2023- KENTGES) and some strategies were developed about the problem in order to expand awareness [5]. However, all those studies are still in the proposal level and they have not become a planning policy with the laws.In many of Turkish cities there are some attempts to revive the high streets that provide temporary solutions. The main reason of this situation is having neither common high street revival policy nor key indicators in Turkey which measures the success of interventions.Bursa is the fourth biggest city in the country in terms of population and economy, has preserved its local economic and social character for centuries. During the last decade Bursa town center also has faced with obsolescence problem. As a response to this problem, incremental solutions have been developed by local governments. However, lack of key performance indicators makes difficult to measure the success of the interventions.The main purpose of this study is to find out the factors behind the sustainability of high streets in Bursa and also threats to Bursa town center that endangering its sustainability.

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2. VITALITY AND VIABILITY OF HIGH STREETS

In the last decades, rising decentralization and suburbanization in developed and developing parts of the world caused a renewed interest in city centers as the hubs of commercial, social and cultural activities. In addition to that, the importance of providing compact cities for the sustainable development has been widely discussed officially in many of the countries [2]. In parallel with these discussions and growing interest about recentralization, planning guidance documents has been prepared such as PPGs (Planning Policy Gulines) in UK, National Spatial policy in France, KENTGES in Turkey etc. Among the others, PPGs was prepared in detailed which focused on different parts of urban and rural lands [2]. As part of this policy, Planning Policy Guidance 6 (PPG 6) was prepared in 1993 by UK Government which both emphasizes the role of the town centre as an appropriate location for residential, retail, cultural and leisure development and provides a guide for the strategic development of public and private areas of town centres [6]. PPG 6 placed an increased importance on the assessment of vitality and viability of town centres. It encouraged assessment of these concepts as part of development plan preparation. The use of both terms highlights the need to consider whether a centre feels lively and whether it has a capacity for living. "Thus vitality is reflected in how busy a centre is at different times and in different parts, while viability refers to the ability of the centre to attract continuing investment, not only to maintain the fabric, but also to allow for improvement and adaption to changing needs" [7]. In this period, retail development was used as a crucial element of several urban regeneration projects, mainly through the deployment of shopping centres in central areas [6]. However, as it is defined in Vital and Viable Town Centres Report (1994:55) "For experienced traders and surveyors, the existence of vitality and viability is easy to recognise, but difficult to define"[7]. Therefore, for the assessment of viatlity and viability, English government started to incorporate a set of indicators in the main key documents of retail planning. These indicators, entitled Key Performance Indicators (KPI) have been suggested in several pieces of legislation of the country (PPG) and Planning Policy Statement (PPS). The main aim of these performance indicators is to measure the health of town centres. As it is defined in Town Centre and Retailing Methodologies Final Report (2007) these performance indicators provides a the systematic collection of information on the vitality and viability of town centres which allows a comparative analysis between centers and over time [8]. The use of indicators allows a systematic monitoring of town centre and to correct some aspect in which the centre is not working properly. Although , the collection of indicators is not mandatory in UK but only recommended, it is advised to be done systematically, allowing to trace the regular evolution the area [6].In PPG6 of 1993 only seven indicators were suggested, these were diversity of uses, retailers' representation, retailers' demand, proportion of vacant street level property commercial yields on non-domestic property and pedestrian flows. In the following year in the report titled "Vital and Viable Towns Centres:Meeting the Challenge" [7], then number of indicators unchanged although retailer representation was replaced by town centre environmental quality. After 1994, three other planning guidances were produced all of them incorporating some new indicators considered relevantto measure the vitality and viability of town centres. The 1996 revision of PPG6 extended the number of indicators to eleven, 2005 revision extended this number to thirteen and 2009 revision extended it to fourteen. The last retail planning document titled National Planning Policy Framework edited in 2012 is the first, since PPG6 of 1993, to not incorporate any indicators. Only five indicators remained during the 16 years and five key documents: diversity of uses, retailer demand, proportion of vacant street level property, commercial yields on non-domestic property and pedestrian flows [6] .

Table 1. Key Performance indicators for town centers in UK [9]

Indicators	Explanation
Diversity of Uses	How much space is in use for different functions – such as offices, shopping, other commercial, leisure, cultural and entertainment activities , pubs, cafes and restaurants, hotels, educational uses, housing – and how has that balance been changing?
Competitiveness	Is the current mix of retail stores offering choice to consumers? Is there a need for more innovative retail offerings and services for the benefit of consumers?
Retailer representation and intentions to change representations	It may be helpful to look at the existence and changes in representation, including street markets, over the past few years, and at the demand from retailers wanting to come into the center, or to contract or close their representation.
Shopping rents	Monitoring the pattern of movement in retail rents within primary shopping areas is useful and available from commercial property information sources.
Proportion of vacant street level property	Vacancies can arise even in the strongest town centers, and this indicator must be used with care. Vacancies in secondary frontages and changes to other uses will also be useful indicators.
Accessibility	The ease and convenience of access by a choice of means of travel, including the quality, quantity and type of car parking, the frequency and quality of public transport services, the range of customer origins served and the quality of provision for pedestrians and cyclists. In certain circumstances car parking surveys should be considered as the circulation and car parking management strategy of a city/town/urban area can play a pro-active role in contributing to the vitality of a center.
Environmental quality	this indicator should assess the physical condition of a town (clutter, litter and graffiti) and the environmental attributes (quality of shopfronts, landscaping and open spaces).
Public Realm	The public realm must be an integrated element in the design of the overall development of a street/area, using quality hard and soft landscaping, street furniture, public signage etc. Concerns of maintenance costs and risk management need not preclude varied and interesting design if the issues are considered and adequate measures put in place at planning stage.
Customer views and behavior	Regular surveys of customer views will help authorities in monitoring and evaluating the effectiveness of town center improvement and in setting further priorities. Interviews in the town center and at home should be used to establish views of both users and non-users of the center. This could establish the degree of linked trips.
Perception of safety and occurrence of crime	This should including views and information on safety and security.
Commercial yields on non-domestic property	This demonstrates the confidence of investors in the long term profitability of the center for retail, office and other commercial developments. This indicator will normally only be available for the larger town centers and should be used with care as investor confidence can be influenced by a number of extraneous factors unrelated to a particular center and for many smaller centers there are in any event only a limited number of investment attractions from which conclusions can be drawn.
Pedestrian flows	The numbers and movement of people on the streets, in different parts of the center at different times of the day and evening, who are available for businesses to attract into shops, restaurants, or other facilities.

3. THE FACTORS BEHIND THE SUSTAINABILITY OF THE HIGH STREET IN BURSA

Rapid urban growth, increasing mobility and the rising attractiveness of suburban settlements are the threats for the sustainability of High Streets in many of Turkish cities. Inaddition, the existing physical, social and economic conditions of these streets cannot satisfy the contemporary needs of urban dwellers. The other main factors underlying the decline high streets are the difficulties of accessibility and parking in the town centres, the increasing mobility of consumers, the lack of pedestrian safety in terms of vehicle traffic, the insufficiencies in the diversity of uses (for example, leisure activities) that attract different age groups etc… To regain the vitality to these districts, most of the local municipalities in Turkey have developed piecemeal interventions. Although the mission of all of these interventions is to develop and promote commercial activity in high streets with the aim of revitalising and regenerating the district, as many of them do not be planned as part of a holistic vision which take into account the social and economic sustainability of the area in the long term. Those kinds of physical makep approaches without holistic understanding can cause social and economical decline which treathens the viability of these streets. Therefore, performance indicators are required for evaluating the success of the implementations on the High Streets. However, some of the European governments have their own town center policies and key performance indicators, Turkey does not have neither policies in regard to sustainability of town centers nor key performance indicators for evaluating the success of revitalization projects [10]. Despite these deficiencies, many of the High Streets in Turkish cities have still sustained their vitality and viability. Bursa is one of them which is the fourth biggest city in Turkey in terms of population and economy. Bursa has preserved its local economic and social character for centuries. Bursa is located in northwest of Turkey, approximately 150 km southwest of Istanbul (the biggest city of Turkey) and 380 km west of Ankara(capital of Turkey), between Sea of Marmara and Mount Uludag. During the last decade Bursa town center also has faced with obsolescence problem. As a response to this problem incremental solutions has been

developed by local governments. However, lack of key performance indicators makes difficult to measure the success of the interventions.The main purpose of this study is to find out the factors behind the sustainability of the high street in Bursa and also threats to Bursa town center that endanger its sustainability. In this study, the key indicators that are explained above that play a major part in UK town center management, will be used to measure high streets performance of Bursa. First reason of using the indicators is lack of special parameters for health check of town centers in Turkey. Second reason is that UK has in-depth policies for revival of town centers and the indicators fit well with Turkish towns. Our manuscript creates a discussion for the future studies about developing local strategies and performance indicators which aims to guide High Streets in developing countries. Bursa City Center consists of four high streets. These High Streets are (west to east) Altiparmak Street, Cemal Nadir Street, Ataturk Street and Inonu Street. The key indicators, diversity of use, competitiveness, shopping rents, proportion of vacant street level property, accessibilityand Commercial yields on non-domestic property are assessed in this area to measure the performance of town center.

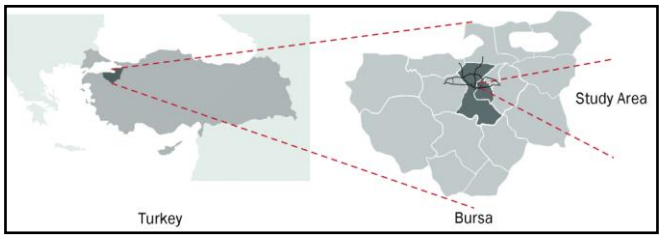

Figure 1: Study Area

Figure 2: A view from Altiparmak Street (Authors' Archive, 2015)

Figure 3: A view from Ataturk Street (Authors' Archive, 2015)

Figure 4: A view from Inonu Street (Authors ' Archive, 2015)

3.1 Diversity of Use

According to the collected data there is still a good variety of national and independent retail services in the city center of Bursa. Historical religious buildings and accommodation areas are another alternatives for using. In addition a number of governmental and cultural facilities (such as Tayyare Cultural Center, Ahmet Vefik Pasha Theatre and Governor's House) are located on Ataturk Street. There is also a shopping mall called Zafer Plaza on Cemal Nadir Street.

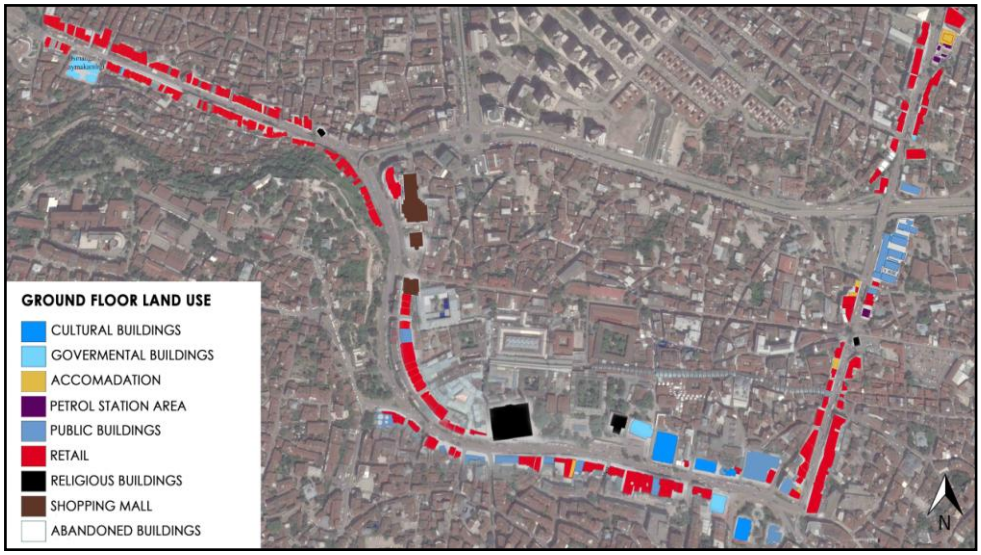

Figure 5. Land Use Analysis of Bursa City Center

3.2 Competitiveness

The clothing store sector is the highest proportion of retail services, followed by cafes and restaurants in the city center of Bursa. There is also financial and business services units, including national and independent banks. (Such as Ziraat Bank, Turkiye Is Bankasi etc.)

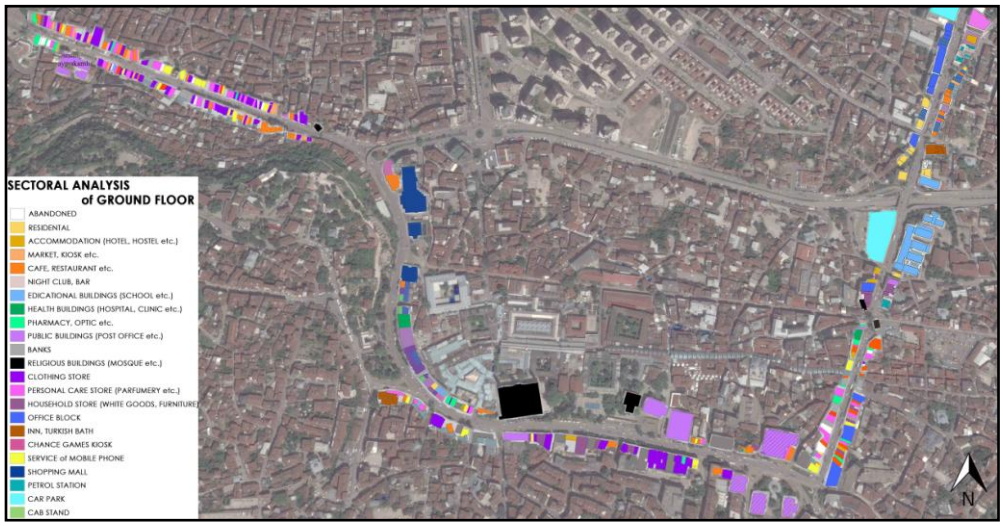

Figure 6. Sectoral Analysis of Bursa City Center

3.3 Accessibility

The accessibility of a city center is designated with different type public transportation system and having quality access facilities for pedestrians, cyclists and disabled people..The primary access route to Bursa city center is via Altiparmak Street, Cemal Nadir Street, Ataturk Street and Inonu Street. The vehicular traffic in Altiparmak Street is two-way, while the traffic on Cemal Nadir, Ataturk and Inonu Street is one-way. Access from the main arrival points to the main attractions (Zafer Plaza, Historical Grand Bazaar) is as pedestrian easy in Bursa city center.

Figure 7. Accessibility Analysis of Bursa City Center

3.4 Proportion of Vacant Street Level Property

During the study only several vacant units are identified in the city center of Bursa. The minimum number of the vacant units is located on Ataturk Street, while the maximum number of the vacant units is located on Altiparmak Street. It is difficult to find vacant units on ground floor of buildings in the city center due to active commercial facilities.

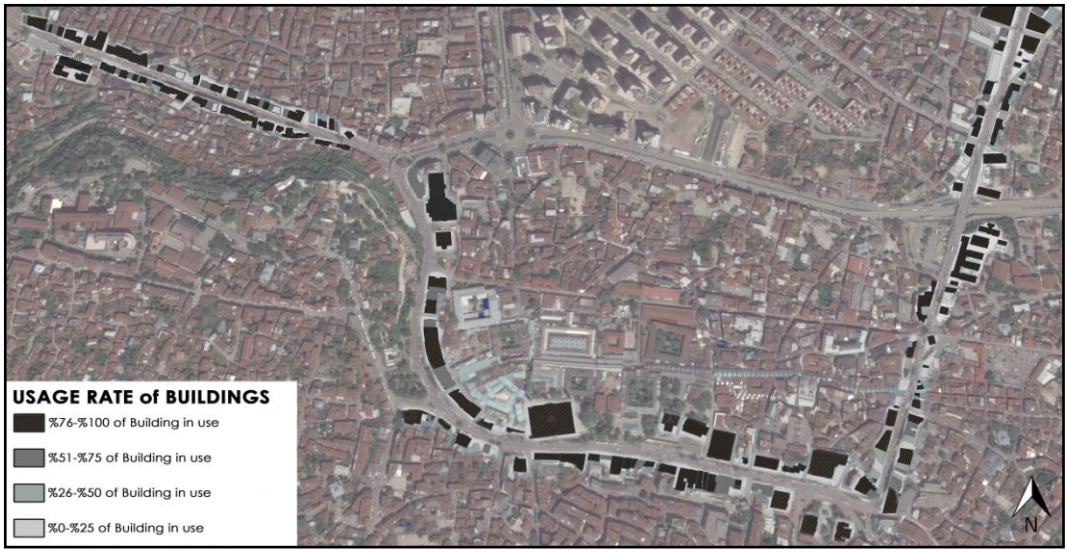

Figure 8. Usage Rate of Buildings

3.5 Shopping Rents

Generally the number of empty shops on Ataturk High Street is less than other high streets in the center of Bursa. The rental price of shops on Ataturk Street is higher than other high streets in the center of Bursa. On the other hand the number of empty shops on Altiparmak High Street is more than other high streets in the center of Bursa. So the rental price of shops on Altiparmak High Street is lower than other high streets in the center of Bursa.Shopping rental prices per square meter on Altiparmak High Street varies 8$ to 30$ for a month. Shopping rental price per square meter on Cemal Nadir High Street is nearly 20$ for a month.Shopping rental prices per square meter on Ataturk High Street varies 30$ to 60$ for a month. Shopping rental price per square on Inonu High Street is nearly 12$ for a month.

3.6 Pedestrian Flows

The analysis of pedestrian flow is an indicator of the vitality of the area. Especially the pedestrian route along Ataturk High Street has the highest level of movement. There are also pedestrian routes parallel to Ataturk Street such as Cumhuriyet Street, Grand Bazaar route, Nalbantoglu Street. The presence of retail services on high streets of Bursa increases levels of footfall during daytime and the evening.

Figure 9. Pedestrian Flows in the Town Center of Bursa

3.7 Commercial Yields on Non-Domestic Property

There are some short term and long term investments in the study area. All of these projects are important for showing the confidence of investor in Bursa town center.

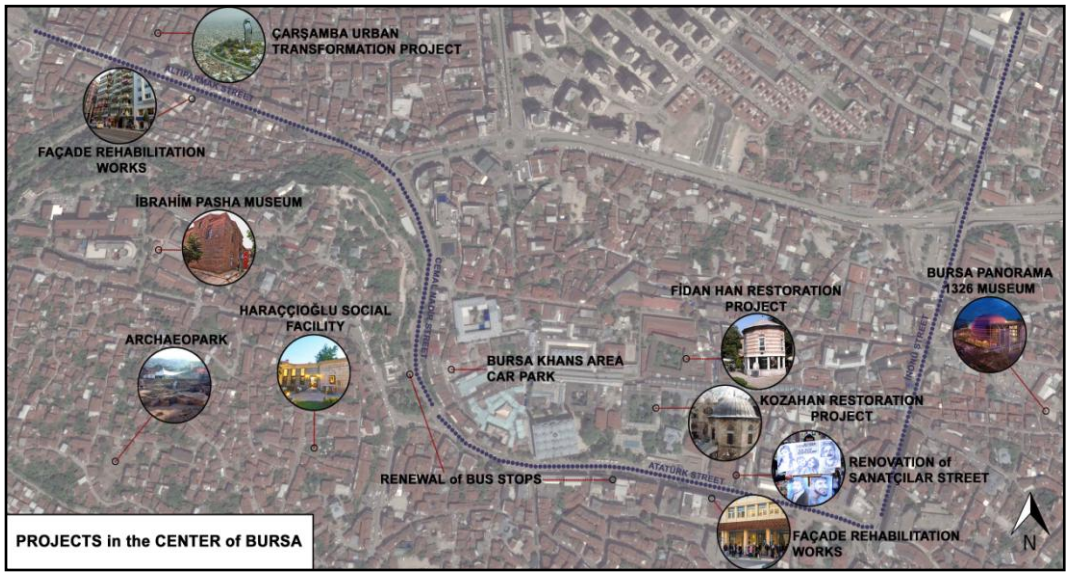

Figure 10. Investments in the Town Center of Bursa

Rehabilitation Projects

- Historical Building Rehabilitations (Fidan Han Restoration, Kozahan Restoration, Ibrahim Pasha Museum, Haraccioglu Social Facility)
- Environmental Rehabilitations
- Facade Rehabilitations Works
- Renovation of Sanatcilar Street
- Renewal of Bus Stops
- New Attraction Points (Bursa Panorama 1326 Museum, Archaeopark in Fortress, Carsamba Urban Transformation Project, Bursa Khans District Car Park)

4. CONCLUSIONS

In scope of the study, the high street performance in Bursa town center was measured via some of the selected key performance indicators. Generally the town center of Bursa still has preserved its vitality. The number of historic buildings and existing of a shopping mall attracts additional visitors to the town center. However, there is also potential threats to high streets of Bursa due to development of alternative retail facilities out of the city. Moreover decrease of people who reside in town center, causes to safety problem at night. So some vacancies begin to occur in town center of Bursa (especially on Altiparmak Street). Consequently, this study will establish a basic ground for assessing the local responses to obsolescence of town centers and setting out specialized key indicators to Turkey.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Chinese rural development and agricultural technologyextension in Hunan province: analysis based on value chainand farmer participation perspective

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Abstract

As the Chinese rural development has made remarkable achievements in the past forty years, which is shown in agricultural productivity increase and poverty reduction, the administrative agricultural technology extension system is an important factor for those outcomes. However, in recent years, the Chinese administrative agricultural extension system is playing a weak role in the agricultural development while the initiative of agricultural demonstration centers or farms are in a rising trend. This study is focused on the current status and operation of the Chinese experiences of agricultural extension with value chain and farmer participation theories, which is based on a field investigation in the Hunan province. This study shows three influencing factors of Hunan's administrative agricultural extension system: that the current Chinese administrative agricultural extension system is not suitable for the current Chinese agricultural development, and the initiative of agricultural demonstration center will be more applicable for the Chinese agricultural development.

Key words: rural development, agricultural extension, agricultural value chain, farmer participation, poverty reduction

1. INTRODUCTION

Agriculture is the oldest industry in human history. In the past six decades, especially in the past forty years, Chinese agricultural development has made remarkable achievements, however, behind these achievements, agricultural technology extension is playing an important role. By 2007, the personnel of township enterprises reached 150 million, accounting for 19.5% of employees, an increase of 121.74 million more than in 1978, the contribution to employment growth by 33 percentage points; create added value 6.8 trillion, representing an increase of social value 27.6%, compared with an increase of 6.75 trillion in 1978, an annual growth rate of 18.5%, the contribution to economic growth by 28 percentage points; total profit of 1.7 trillion yuan with an increase of 1.69 trillion yuan more than in 1978 and the annual growth rate up to 19.6%[2]. Township enterprises' projections have optimize the industrial structure in rural areas, and promote the coordinated development of economy and overall prosperity in rural areas.Besides, agricultural science and technology has been greatly improved, as well as significantly improved agricultural irrigation and mechanization level. Science and technology are core elements in the agricultural developing value chain, with the improvement and implementation of new science and technology in the agricultural area, with the outcome of agricultural development, China has also entered the ranks of the world's agricultural scientific and technological power. During the 'Twelve Five'[3] period, the rate of science and technology contribution to Chinese agricultural development is more than 55%[4], which effectively promoted agricultural and rural economic development and rural livelihood improvement. The major implementation that Chinese government apply to the whole country's rural area is agricultural technology and science extension, which leads to the newly agricultural technology being implemented by local farmers in rural areas. The Chinese agricultural science and technology development enter to a new level. Though agricultural technology and scientific extension system has played an significant role in Chinese agricultural development in the past six decades, there are still a number of issues in Chinese agricultural extension. The mechanism of agricultural extension investment is imperfect and there is a serious shortage of financial supply. The knowledge structure of agricultural extension officers is not comprehensive, which is not suitable for agricultural industrial chain development. What's more, there is a lack of incentives mechanism for agricultural extension workers. In the past three decades, the initiative of agricultural technology demonstration center or region in whole China since 1990s is playing a more significant role than the traditional agricultural extension system. This study chose Hunan province, which is located in the central China and a major agricultural province to exam the operating status of both traditional agricultural extension system and agricultural demonstration region.

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[1] *First author and also the Corresponding author, who did an oral presentation at the International Conference of Sustainable Development 2017, Sarajevo.*

[2] *Quoted from "CPC Central Committee on rural reform and development of a number of major issues", People's Publishing House in October 2008 edition, page 35."《中共中央关于推进农村改革发展若干重大问题的决定》，人民出版社".*

[3] *Since 1953, CPC start make Five Year Development Plan, the 'Twelve Five' means the twelfth Five Year Plan, this period is from 2011 to 2015.*

[4] *Ministry of Agriculture: the end of the Twelfth Five-Year Agricultural Technology Progress Contribution rate will exceed 55%, http://www.chinanews.com/（Accessed on: 2016-2-16）.*

2. CHINESE AGRICULTURAL TECHNOLOGY EXTENSION AND AGRICULTURAL TECHNOLOGY DEMONSTRATION CENTERS

2.1 Definition And Major Contents Of Agricultural Extension

According to Agricultural Technology Extension Law of People's Republic of China (1993), agricultural technology extension means to apply scientific and technological achievements, practical technology into before-production, production, post-production processes of farming, forestry, animal husbandry, fisheries and other agricultural industries through testing, demonstration, training, and consulting services. Tian and Huang (2009) defined generalized agricultural extension is a rural social education, which take the family farms or households as center and according to the actual needs of farmers. Moreover, the ultimate goal is to improve farmers' living standard in the range of rural society. For modern agricultural extension, they defined it is a dynamic process that deliver useful information to people and help these people to acquire the necessary knowledge, skills and correct perspectives use the information properly.On the goals and functions of agricultural extension, many scholars or researchers have their own point of views. Van den Ban and Hawkins (1996) demonstrated that the agricultural extension aims are delivering and transferring useful information of global knowledge base or local researches to farmers, in order to help them achieve their own goals and improve agricultural development. Wang (2003) illustrated that diffusion of innovation is a core element and issue of agricultural extension. Anderson and Feder (2004) pointed out that agricultural extension has significant functions in development but there are many elements that negatively affect the positive part of agricultural extension, for instance, lack of funds and administrative limitation. Swanson (2006) thought that agricultural extension role should change some concentration on food security to income rising in globalization era; in addition, agricultural extension need to focus more on the value chains construction, which can help small-scale farmers to get connected with markets. Hence in this study, the definition of agricultural extension is being described as a method that through transferring and delivering useful information to farmers of newly agricultural science and technology, therefore, to achieve the goals of value-added value chain construction, farmers' income increasing and agriculture developing.

2.2 Chinese Administrative Agricultural Extension System

Based on the definition, the major contents, aims and functions of agricultural extension mentioned in the last part, the Chinese agricultural administrative extension system will be introduced and tested by these contents. Firstly, what is the definition of administrative agricultural extension system and Chinese agricultural extension system's major contents? Mi (2004) defined agricultural administrative extension system as an organization system of state government that implementing agricultural technology and science work to farmers, also has the feature of organization structure and management strategies of agricultural extension institutes. Gao (2010) proposed that there are five most popular types of organizations of Chinese agricultural extension: government-leading, education-oriented, research-leading, enterprises-run and self-service types. Secondly, in the Chinese agricultural extension system, what elements influence the operation of the system? Wang (2003) pointed out that the major influencing factors in agricultural extension system are: the efficiency of the extension service system; the receiving efficiency of the target groups; and the external objective environment of the extension work. Gao (2010) demonstrated that in order to build an agricultural extension organization system, their aspects should be focusedon: the internal structural optimization of different types of extension organizations; interaction and coordination between the various organizations; the relationship between the organization and its environment. Then, in the Chinese agricultural extension system, what are the major extension organizations and who have the quality to be their workers? From table 1, there are mainly seven types of agricultural extension organizations in China, and in each type of organization, there are four levels of organizations, namely state-level, provincial-level, county-level, town and village-level (Mi, 2004). From this point, China has already constructed with farming technology, animal husbandry technology,aquaculture technology and other different kinds of agricultural extension organizations from four levels, and they are the main contents in the Chinese agricultural extension system.

Table 1 Types and numbers of Chinese administrative agricultural extension organizations and number of workers

Type of extension organization	Number of the organizations in China	Number of workers in this type of organization in China
Farming technology extension organization	59,000	0.384 million and 1 million farmer technology extension officers[5]
Animal husbandry technology extension organization	56,000	0.93 million
Aquaculture technology extension organization	17,600	43,000and 13,000 farmer technology extension officers
Agricultural mechanization technology extension organization	50,000	0.972 million
Forestry technology extension organization	37,000	No exact numbers
Water technology extension organization	48,000	0.87 million
Agricultural economy and management technology extension organization	90,000	0.3 million

(Data summarized from: Lv, Di, 2008)

On the other side, with the implementation of the Chinese agricultural extension system, are there any issues? First, the investment mechanism of Chinese agricultural extension system is not perfect, there is a serious shortage of supplement (Wang, 2003); this is because the financial resource of agricultural extension is from the government, and the beneficiaries are beneficial with no or low cost of agricultural extension, and beneficiaries are include agribusiness firms, the whole Chinese society, farmers , therefore, with the single channel of investment and multiple beneficiaries, the issue is prominent. The second problem is that although there are a large number of extension workers in China, their professional quality is not high and they are also lack of training opportunities, this is lead to uncomprehensive knowledge basement of the extension workers. There are 25% of the total agricultural workers in the town or village level extension stations do not have professional qualifications, moreover, less than 30% have a college education background (Lv, Di, 2008). Therefore, Gao (2010) indicated that it is necessary to strengthen the role of education in extension of agricultural technology, especially highlight the role of universities and research institutions in Chinese agricultural extension system. Third, as the institutions are being set in different government department and are relatively independent, it is hard to form a real system and maximize the benefits of the system (Mi, 2004).This is especially embodies in the allocation of funds for various of departments for agricultural extension, it is hard to offer enough financial support for all functional departments in the system in different levels. Forth, the equipment of agricultural extension is not good and small-scale farming is negative to the efficiency of technology extension. Many equipment of agricultural extension stations in town or village levels were purchased in 1960s or 1970s, even for those county level stations that being built in the 1980s, the aging problems of the facilities is common (Lv, Di, 2008). Yu (2012) points out that small-scale farming has negative influence on agricultural extension work, because large-scale farming has higher needs for agricultural technology and the extension work is more easy and efficient.Therefore, the different levels consist of the Chinese agricultural system and with the achievements of the operation of the system, there are still many issues need urgent solutions for both of the agricultural development and the development of agricultural extension system.

2.3 The Major Function Of Agricultural Extension In Chinese Agricultural Development

In the early times of the funded of People's Republic of China, the main function of agricultural extension was to improve agricultural production. As the needs of farmers and society developed since the 1980s, Chinese agricultural extension include agricultural development, education, counseling of farm life, the development and utilization of natural resources, etc. Zhao (2013) demonstrated that agricultural extension and rural development are tightly connected; moreover, agricultural extension is a core element in the rural development process and have a positive role in rural education area.In agricultural extension work, the most important factor is to lead farmers to believe that they can share with the achievements in rural development and then they

[5]*Farmer technology extension officers is local farmers who has got their technologies and experiences in their own farming work and they are being picked out to be technology demonstration households.*

will have passion in accepting the agricultural new technologies, which will give local farmers new opportunities to obtain techniques or knowledge to development achievements.On one hand, Chinese agricultural extension system has built a relatively comprehensive mechanism for new agricultural technology and knowledge transferring from scientific labs to fields, and lead to agricultural production improvements. On the other hand, agricultural extension is a major content of Chinese rural development, which also helps the social development of rural areas.

2.4 Agricultural technology demonstration centers in China

Agricultural technology demonstration center or region is a new development model for modern agriculture in China since the 1990s, which is concentrated on the implementation of agricultural science and technology. In 2000, the Central Rural Work Conference of CPC affirmed the achievements of the practice of agricultural science and technology parks in varies areas, and then clearly pointed out that all levels of government should step up the construction of agricultural science parks and develop supportive policies[6]. Then, in 2001, the National Conference of Agricultural Science and Technology have put the constructions of agricultural science and technology centers or regions as one of the major scientific and technological action, this conference also formally put the construction work incorporated into the 'Outline for the Development of Agricultural Science and Technology (2001-2010)'[7].Hence, these centers or regions is designed to be a connection between farmers and markets, a radiation source of modern agriculture, a base for professional personnel training and technical training. The most important role of these centers is to improve their surrounding areas' agricultural industrial upgrading and rural economic development.

2.4.1 Three Phases Of The Development Process Of Chinese Agricultural Technology Demonstration Centers

From 2001 to 2007, this is a stage that pilot construction of national agricultural technology parks implemented. During this phase, the Ministry of Science and Technology, Ministry of Agriculture, Ministry of Water Resources, the State Forestry Administration, Chinese Academy of Sciences, the Agricultural Bank of China and other departments established both inter-ministerial coordination National Agricultural Technology Park Steering Group and joint office of the National Agricultural Science & Technology Center. These two administrative agencies issued Agricultural Science and Technology Park Guide and management (trial)[8]. In 2001 and 2003 respectively set up the first and second batches of national agricultural technology parks' construction. Altogether, there are 36 national agricultural demonstration centers built within this period.

From 2008 to 2011, this is a comprehensive promoting stage of national agricultural parks. The national agricultural parks have made great achievements in the assembly of agricultural technology integration, scientific and technological achievements transformation, modern agricultural production and new industries' cultivation. In 2010 and 2011, the third and the fourth batches of national agricultural demonstration centers started to construction, and this marking the work on national agricultural technology park has been shifted from the pilot construction stage to the comprehensively promoting phase.

From 2012 until now, the development of national agricultural demonstration zones had entered an innovation and development stage. There are 46 national agricultural technology centers have been approved. According to the National Agricultural Science and Technology Park 'Twelfth Five Year Plan', the Ministry of Science and Technology proposed 'one city, two zones and a hundred parks project'(also referred as 'one-two-one project'), which means the launch of the construction of the Beijing National Modern Agricultural Science and Technology City, Yangling national agricultural high-tech demonstration zone, Yellow River Delta national modern Agricultural Science and Technology demonstration zone, around 120 national agricultural technology demonstration parks or centers in the whole country. This means a new development stage has started in the development process of Chinese agricultural demonstration centers.

2.4.2 Category Of AgriculturalDemonstration Centers

The agricultural demonstration centers have been put into different categories because of their differences in major functions or administrative characteristics. The discussions on the classification of agricultural demonstration centers differ. Xu (2000) demonstrated that there are six major varieties of Chinese agricultural demonstration centers: national agricultural science and technology zone (invest by both national and provincial government, operate by Ministry of Agriculture and agricultural departments of local governments), agricultural industrialization development zone (operate by China Science and Technology Commission), sustainable and efficient agricultural technology demonstration zone (operate by Ministry of Science and Technology), urban modern agriculture demonstration center (operate major by local governments), local government-sponsored municipal agricultural science and technology park, privately-owned agricultural science and technology park. Indeed, this classification can be measured as a perplexing work. Chen, Liu, Qu, etc. (2002) clarified agricultural technology centers by four criterion. Firstly, according to investment subjects, they divided all the demonstration centers into government-built centers, research institutes-built centers, enterprises built-centers. Secondly, because of the differences in industrial characteristics of demonstration centers, they classified the demonstration centers to international-market-leading centers, national-city-market-leading centers, deep-processing centers, featured industrial centers, comprehensive-development-type centers. Thirdly, according to the construction area and administrative level, they made all the demonstration centers into national level centers, provincial level centers, municipal level centers, county level centers. Fourthly, based on the technology content and technology-driven

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[6] *Fenghuang News, Development of National Agricultural Science and Technology Park,http://finance.ifeng.com/a/20131226/11343501_0.shtml, (Accessed on: 2016-4-21).*

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capacity, they sorted the demonstration centers into high-tech centers, technology development centers, science achievements incubator type centers, technology extension centers. This classification is a more organized and logical work.In this study, the classification on the demonstration centers is mainly based on the construction area and administrative levels, namely national level centers, provincial level centers, municipal level centers, county level centers. Moreover, the concentration is mainly on the national level of demonstration centers in China, therefore, the Changsha county agricultural demonstration center in the field investigation in Hunan province belongs to the national level.

3. THEORETICAL BASE: VALUE CHAIN AND FARMER PARTICIPATION

3.1 Definition Of Agricultural Value Chain

In 1985, Porter first put the concept of value chain to the world in his book Competitive Advantage: Creating and Sustaining Superior Performance. He defined the value chain as all the activities carried out for competition in specific industries. Jeffrey F. Rayport and John J. Sviokla (1995) put out the virtual value chain concept; they think there are two worlds in any business: a world that men can touch and see the resources, which is called the physical world; another world that is filled with information, which is named the virtual world. They believe through the information collection, organization, choice, synthesis and distribution, enterprise can create value. As it developed, Brown (1995) then gives a concise explanation: the value chain is a kind of instrument that can be used in a business to disaggregate it into strategically relevant movements. Zhong (2005) defined value chain to a series of interrelated value-added activities including product design, production, sales, service and others, which includes some sub-sectors, such as research and development, creative design, the improvement and technical training of production and processing technology, and so on.Later on, the value chain approach has been introduced in the agricultural development area; pro-poor value chain approach has been put forward. Riisgaard and Ponte (2011) give their own answers to the question 'what is a pro-poor value chain approach?'An approach to development which puts at the center the interrelatedness of actors in the value chain who-separated by time and space-gradually add value to products and services as they pass from one link in the chain to the next. Pro-poor value chain initiatives often try to overcome entry barriers for poor agricultural producers and providers of inputs and services.Haggblade and Therault (2012) think that value chains not only offer good understandings of the input suppliers, processors, dealers and consumers by a valuable visual framework to the small farmers, but also provide analytical instruments to recognize profitable income-earning chances in the rural developing area for the people that living under the poverty line. From their ideas, we can find out that value chains can provide good chances for the poor households to poverty reduction if it is being good analyze in the small farmers' productive activities.Therefore, the agricultural value chain could be defined as a chain that consists of agricultural production, processing, packaging, transportation, marketing and the ultimate goal in analyzing a value chain is to reach consumers' demands, so as to maximize the value. In a specific agricultural project, the value chain should include all the stakeholders' opinions and needs, which could help add value.

3.2 Farmer Participation And Rural Development Research

Farmer participation is used as a concept that with the goal to make the research more objective, which is being used widely in rural development research since 1980s. In 1980s, United Nations Research Institute for Social Development put participatory research as one of the two important themes (Pearse and Stiefel, 1979).Farrington and Martin (1988) conclude three main purposes of participation: involvements of community in social research, action for development in community, community education for development. Lin (1998) indicates that participation approach is widely used in the field of rural development, especially in rural development project, which include confirmation of projects, designing process, planning process, implementation, monitoring and evaluation. Therefore, farmer participation is a significant approach in the field of rural development.The reasons for the implementation of farmer participation have been put forward by a number of scholars. Vermillion and Sagardoy (1999) think that participation should focus on the question 'Who is best suited to implement which management functions?' Witcombe, etc. (1996) demonstrate that farmer participation can identify the requirements of farmers in crop improvements; this could lead the governments or donors to help farmers in crop improvement more effective. Wang, Xu, Huang (2006) point out in the Chinese irrigation system construction, participation of farmers can involve all facts of irrigation. Hence, as it develops, the implementation of farmer participation approach can be normally seen in rural development projects.

4. CASE STUDY IN HUNAN PROVINCE

4.1 Why Choosing The Hunan Case?

Hunan province, located in the central-southern region of China, in the middle reaches of the Yangtze River. The capital city is Changsha. The land area of Hunan is 211,800 square kilometers, accounting for 2.2% of China's whole territory. Hunan has a continental monsoon humid subtropical climate rich in light, heat and water resources. The average annual rainfall is between 1200-1700 mm, Hunan is one of the provinces that rich in rainfall of China. By the end of 2014, the resident population of Hunan is 67.372 million, the urban population is 33.201 million, and the rate of urbanization is 49.28%[9]. Hunan is one of the major agricultural provinces in China. The total output of food crop is 30.013 million tons in Hunan. The main agricultural products in Hunan occupies an important position in China, the total grain production in Hunan rank No. seven in China in 2014, the total rice production of Hunan rank No. one in China in 2014, the gross ramie production in Hunan in 2014 rank No. one in China, the tea production and Chinese citrus production rank No. two and No. three in 2014 of the whole country respectively. The real

[9] *Introduction of Hunan Province, www.baidu.com (Accessed on: 2016-4-15).*

disposable incomes of rural residents are increasing from 4,910 yuan in 2009 to 10,060 yuan in 2014[10]. Hunan province is in the central part of China and the economic development level is medium, not like eastern China has a high economic development level, nor western China that has a low economic development level. Therefore, Hunan province's development level is more likely to present an average level of the whole China, this is the first reason to choose Hunan province in this study. Second, Hunan is a major agriculture province, the first industry has an important role in its development, and to search for the role of technology extension in Hunan's agriculture is significant for the future development of the whole province, even the whole China.As a result, the agricultural development process in Hunan province is an important case in the whole Chinese agricultural development process, namely by analyzing the Hunan case; it can be a significant reflection of the analysis of the entire Chinese development in agricultural area. In the field investigation in Hunan province, both qualitative and quantitative methods are being used in data collection.

4.1.1 Methodology And Data Resources

Both qualitative and quantitative approach will be used in this study. Qualitative approach is mainly embodied in semi-structured interviews and their analysis; second-hand data collection and their analysis. Quantitative approach is reflected in questionnaires and their analysis. The case study in Hunan province is based on a field investigation in Changsha county and Loudi Region. And the research sites are mainly focused on Changsha county agricultural demonstration center, moreover, this study also focuses on the agricultural extension system's implementation in Loudi region. As a result of the fieldwork, there are 107 valid questionnaires from four villages' residences; 50 interviews that made with villagers, village leaders, agricultural department officers, employees and chiefs from several local agricultural companies, etc.

4.2 Analysis On The Agricultural Extension System Of Hunan Province

Since the implementation of Household Contract Responsibility System in 1978, Hunan province set up an administrative system for agricultural technology extension. The system consists of five different levels of organizations. Namely, Provincial agricultural technology extension station, Municipal agricultural extension station, County agricultural technology extension station, Township agricultural extension station, Village agricultural technical services team, Technology demonstration households.Loudi area is consists of five counties[11] and the highest level of agricultural extension agency is the Loudimunicipal agricultural extension station, which belongs to the agricultural department of Loudi municipal government. Based on the interviews with Deputy of the agricultural department of Loudi municipal government Mr. Liu Shiqi; Mr. Zeng Yang, the head of the Loudimunicipal agricultural extension station, this part mainly concentrate on the administrative mechanism involvements of Hunan agricultural extension and Hunan agricultural extension policies.

4.2.1 The Administrative Mechanism Involvements Of Hunan Agricultural Extension—The LoudiRegion Case

In the whole province's agricultural extension system, this includes four major fields: farming, animal husbandry, fisheries, agricultural machinery. There are 16 provincial extension agencies, 140 municipal extension agencies, 524 county-level extension agencies, 7461 township level extension organizations, 42,323 village level of extension teams and 0.5 million of technology demonstration households, introduced by Mr. Liu Shiqi.The financial resource of Hunan's agricultural extension system mainly consists of two parts: government funds and own revenues. In 2013, the Chinese central government allocated 500 million yuan for the agricultural technology extension work in Hunan province and another seven provinces. The own revenues financial way was to hold 10% of the whole Hunan's agricultural extension finance in 2013 by cooperatives and agribusiness , according to Mr. Zeng Yang. Mr. Zeng also said that by the end 2011, there are about 39,000 agricultural extension workers in Hunan province; more than 50% of the workers are belonging to township level extension agencies.Then, when it comes to Loudi region, based on the interview with Mr. Zeng Yang, there are three levels of agricultural extension governmental agencies (Figure 1). The municipal agricultural extension station is a section of agricultural department of Loudi municipal government; the county level of agricultural extension stations all belong to agricultural department of county government; The village agricultural technical services team and technology demonstration households are parts of township level agricultural extension station while township level agricultural extension stations are a section of township government. Mr. Zeng Yang said that because of the knowledge of experts in the township agricultural extension stations is limited, normally, township agricultural extension stations are playing an updated assigned role between villages to county level agencies. In most of the time, the experts in the villages are coming from county agricultural extension stations or municipal agricultural extension stations.

[10] *2014 National Economic and Social Development Statistical Communique of Hunan Province, http://www.hntj.gov.cn/tjqb/hntjqb/201503/t20150320_115537.htm (Accessed on: 2016-4-16).*

[11] *The five counties are: Louxing Region, Shuangfeng County, Lianyuan County, Lengshuijiang County, Xinhua County.*

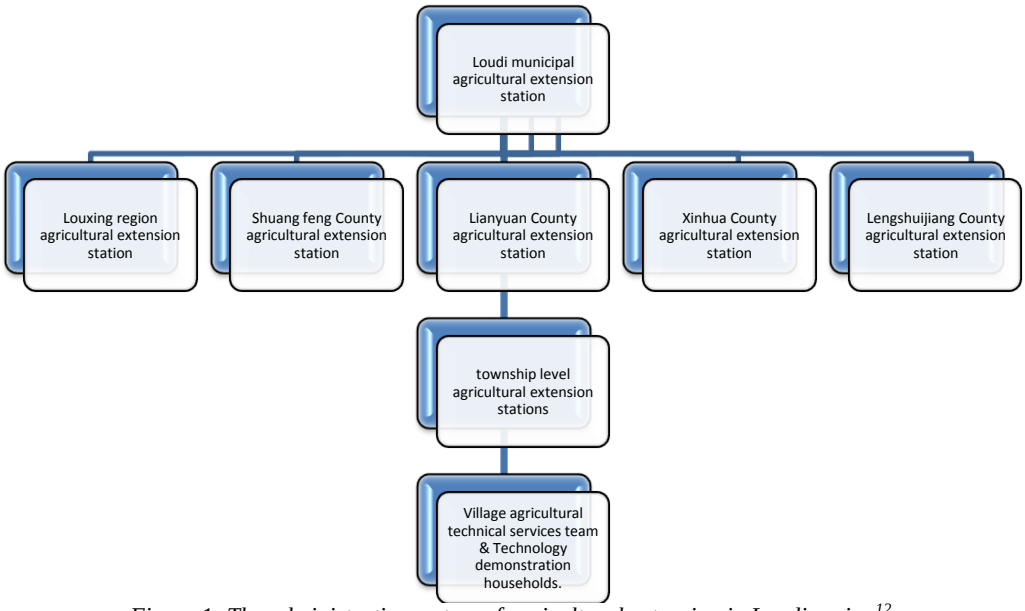

Figure 1: The administrative system of agricultural extension in Loudi region[12]

4.2.2 Analysis On Hunan Agricultural Extension Policies

According to Mr. Zeng Yang, Hunan's agricultural extension policies are being made in accordance with the national related policies and laws. The basic and key policy that should be following is the Agriculture Law of People's Republic of China[13]. In chapter seven of Agriculture Law of People's Republic of China (2013), is focused on agricultural science & technology and agricultural education. Agricultural technology extension is a core element that mentioned in this law chapter. Especially according to Article 51, 'national agricultural extension agencies should depend on the agricultural technology experimental demonstration bases, and also agricultural extension agencies should responsible for the extension and demonstration of key technologies', therefore, Mr. Zeng Yang also mentioned that this is the legal basis for the construction of different levels of agricultural demonstration centers not only in Hunan province but also in whole China. Another policy that plays an important part in Chinese agricultural extension is The State Council of PRC announced Proposal on deepen and strengthen the construction of basic levels' agricultural technology extension system[14] (2006). In this policy document, the main policy goal is in all China, all relevant governmental departments should focus on the development needs of agricultural economy and agricultural development, by reforms in making clarification of functions of different governmental departments, rationalizing related systems and innovating mechanisms, then, gradually build up a vibrant and diverse basic level of agricultural technology extension system. Within the new system, the national agricultural extension agencies should hold the leading positions, which based on agricultural cooperative economic units and have a broad participation of agricultural research and educational institutions, agricultural enterprises. Since then, this policy is an instructor of the operation of county and township levels' agricultural extension agencies. Mr. Liu Shiqi and Mr. Zeng Yang both mentioned in their interviews that these two policies are the most basic and important in Hunan agricultural extension system. Based on these two documents, Hunan provincial government has put forward a number of related policies in accordance with the actual situation of Hunan. The two most important policies that announced and implemented by Hunan provincial government are Opinions on deepen and strengthen the construction of basic levels' agricultural technology extension system [15](2007) and Notice on the reform and improvement of the township agricultural extension services agencies [16](2010). The document Opinions on deepen and strengthen the construction of basic levels' agricultural technology extension system (2007) is an understanding and interpretation of The State Council of PRC announced Proposal on deepen and strengthen the construction of basic levels' agricultural technology extension system[17] (2006) on the basis of the real situation in Hunan agricultural extension work. The gist of this policy is includes six major points: make reform on

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[12] *Data resource: the figure was formed within the field investigation in Hunan.*

[13] *The Agriculture Law of PRC was first announced in 2 July, 1993; Then, it has been revised on 28 December 2002; The current Agriculture Law of PRC was revised on 28 December, 2012, and implemented on 1 January, 2013.*

[14] *Basic levels' agricultural technology extension system is set up in the county level and township level to provide farmers with farming, animal husbandry, fisheries, forestry, agriculture machinery, water conservancy and other scientific research and practical technology services.*

[15] *Announced by Hunan provincial government on 13 July, 2007.*

[16] *Announced by Provincial Department of Agriculture, Provincial Commission Office, Provincial Department of Finance, Provincial Human Resources and Social Security Department on 30 December, 2010.*

[17] *Basic levels' agricultural technology extension system is set up in the county level and township level to provide farmers with farming, animal husbandry, fisheries, forestry, agriculture machinery, water conservancy and other scientific research and practical technology services.*

Hunan's root level agricultural extension system ; make optimization of Hunan's root level agricultural technology extension team; make innovation on the operation mechanism of Hunan's agricultural technology extension; give increasing efforts on the guarantee of the technology needs of farmers; promoting the development of agricultural technology social service organizations; strengthening the leading and organizing work on basic level agricultural extension system.The document Notice on the reform and improvement of the township agricultural extension services agencies (2010) is issued for accelerating institutional reform of township agricultural extension services agencies, further enhancing the capacity of governmental public services, promoting the development of modern agriculture and new socialist countryside construction. In this policy, according to Mr. Zeng Yang, the most important content is the public service functions of township agricultural extension agencies are clarified as agricultural technology and machinery extension services, animal husbandry and fisheries technology extension services, agricultural products' quality control services. With the interview with Mr. Zeng Yang, he pointed out that because of the implementation work of these policy files, their work is following the requirements of these documents. However, he also indicated that even though the policy files are issued significantly, there are still some problems need to solve while in the real implementation of these policies. For instance, he said that though the working and living standard of the workers in root level agricultural extension stations are enhancing, compare to other departments, they are still in a relatively lower position; another issue is the agricultural science and technology extension teams cannot satisfy the requirements of local farmers, and this is because the extension teams are facing a serious aging issue and lack of adequate backup personnel to participate the teams.

4.2.3 The Operation Factors Of Hunan's Local Level Agricultural Extension Stations

With the discussion on the three levels of Hunan administrative agricultural extension system above, the most important agencies are the extension stations of all three levels. Are these stations effectively offered technology and science to local farmers? Local level agricultural extension stations' operation is playing a core role in the whole agricultural extension system. Therefore, the fieldwork in Gaoguang village, Dongyuan village, Jinxing village, Shilong village, Loudi region are mainly focused on township level extension stations' functions in local villages. As a result, there are many aspects that exist in the operation of the agricultural extension system in Hunan. In the four villages, there are all together 107 valid questionnairesbeing conducted, the sample distribution in these four villages can be seen in Table 2.

Table 2: Sample Distribution in four villages[18]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Gaoguang village	27	25,2	25,2	25,2
	Jinxing village	25	23,4	23,4	48,6
	Shilong village	33	30,8	30,8	79,4
	Dongyuan village	22	20,6	20,6	100,0
	Total	107	100,0	100,0	

When it comes to the main source of income for the family, as in Figure 2, 42 households are getting the main source of income for their families by growing food, and it is holding 39% of the 107 samples; then, 35 households put income of migrant workers as their main source of income for families, this is holding 33% of the whole 107 samples; other sources (open store in village, garbage collection in the village, etc.) of family major income households have 17, which share the portion of 16% of the whole 107 households; 11 households are holding animal husbandry as their main family income source, which occupied 12% of the 107 households. From these data, in these four villages, even though in a major agricultural province, in rural areas, there are about half of the population are earning their family income without agricultural production.

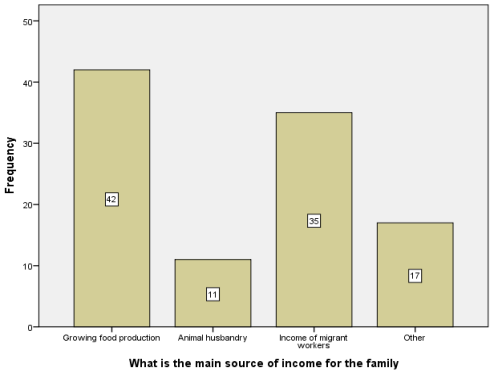

Figure 2: Main source of income for the family of farmers[19]

[18] *Data resource: questionnaires in Hunan field investigation*

[19] *Data resource: questionnaires in Hunan field investigation.*

Within all the 107 questionnaires, the question on 'What do you think is the most important element in agricultural production', the answers are as showed in Figure 3. The answer 'implementation of agricultural science and technology' is the most popular one being chosen, which has 66 selectors; then, the options of 'the quality of seeds' and 'government subsidies' almost have the same amount of choosers, which have the amount of 17 and 15 respectively; also, there are three people chose the answer 'I don't know'. Therefore, the most important element in agricultural production in the four villagers' views is agricultural science and technology.

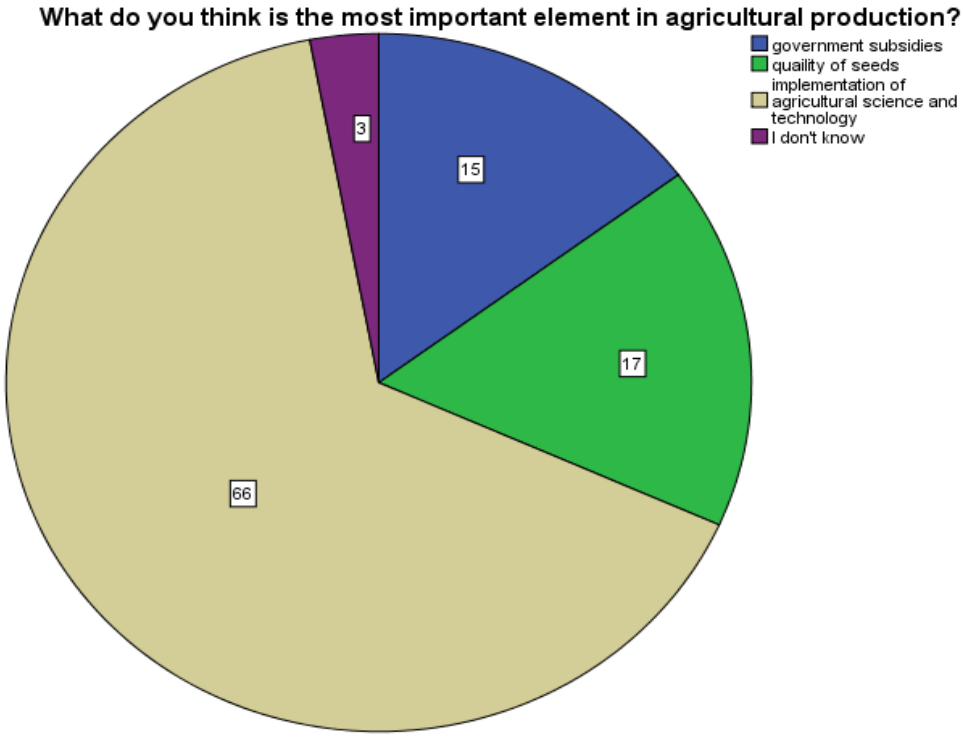

Figure 3: Answers on the most important element in agricultural production[20]

Then, it comes to the question of 'do you know that there is an agricultural technology extension office or station in town'? About 54.6% villagers do know about the existence of the agricultural extension station in township level, about 45.4% of the villagers do not know about there is a township level of extension station. Based on this outcome, it seems like the township level of agricultural extension station or office does not have a comprehensive recognition in these villages.Therefore, if connected the main income source data outcome and this question together, it can be observed that the major farming households have around 51% (together with growing food production households and animal husbandry households) in the village, and 54.6% of the villagers do know about the existence of township agricultural extension stations. From this comparison, there can be seen that the percentage of rural residents who mainly depend on agricultural production for a living do concern about the agricultural science and technology's extension and implementation.Later on, within the 54.6% of whom known about the extension stations were requested to answer four other questions of 'how do you get to know about the agricultural extension station or office', 'what kind of technologies do you ever got from the extension station', 'in what ways do the workers of the extension stations deliver the agricultural technology or science', 'are you satisfied with the work that the workers of agricultural extension station have done'. On the first question, 'how do you get to know about the agricultural extension station or office', 24.7% answer 'heard from other villagers', 32.5% answer 'heard from villager leaders', 24.7% answer 'the agricultural extension officers often come to our village and that's why I know them', 5.2% answer 'heard from local TV channels or local newspapers', 13% answer 'I have no idea why I know about the extension station'.On the second question, 'what kind of technologies do you ever got from the extension station', 32.2% respond with 'planting technologies', 8.1% respond with 'animal husbandry technologies', 19.5% respond with 'both planting and animal husbandry technologies', 2.3% respond with 'other technologies (marketing, processing, etc.)', 37.9% respond with 'I have not got technologies from agricultural extension stations'.On the third question, 'in what ways do the workers of the extension stations deliver the agricultural technology or science', the percentage of replies on 'they giving local farmers training courses' is 25.3%, 39.8 % of replies are 'they give out newspapers or brochures on agricultural technologies and sciences', 7.2% of replies are 'when local residents have agricultural producing problems, the workers of agricultural extension stations will come to help them solving problems', 1.2% of replies are 'other ways', 26.5% replies are 'I don't know'.On the

[20] *Data resource: questionnaires in Hunan field investigation*

fourth question, 'Are you satisfied with the work that the workers of the agricultural extension station have done'. Answers on 'very satisfied' have the percentage of 8.1%, choosers for 'satisfied' take the percentage of 47.7%, 24.4% of responses are 'I cannot tell', 14% chose the answer 'unsatisfied' and 5.8% answers are 'very unsatisfied'. According to these four questions and their results, there are several points can be put forward. First of all, within the 54.6% of the local residents that know about the agricultural extension stations, 55.8% of them are satisfied or very satisfied with the extension station workers' work, about half of these residents are not satisfied with the local extension officers' work or do not want to judge their work. In the second place, only 24.7% of the residents get to know about the extension stations because the extension officers often come to their villages and most of the residents get to know about the extension office of the reasons that heard from village leaders or other villagers. From this, it is not hard to observe that the extension station officers do not have a common audience in local villages. In the third place, the majority kinds of technology or knowledge the extension stations offer to local residents are on agricultural producing process, almost nothing offered in other areas like marketing or processing knowledge of agriculture development. Another factor that can be noticed from the results above is that there are varieties of ways that the extension stations that used to deliver agricultural knowledge.

4.3 Analysis On The National Agricultural Demonstration Centers Of Hunan Province

4.3.1 National Agricultural Demonstration Centers In Hunan

Within the three batches that have been approved by Ministry of Agriculture, Hunan province has 15 national agricultural demonstration centers by now, among these 15 centers, two of them are approved in the first batch, four of them are belong to the second batch, nine of the centers are from the third batch. The Changsha county modern agricultural demonstration center is from the first batch.Based on the interview with the head of Changsha County modern agricultural innovation demonstration center management committee Mr. Tu Yapeng, the current status of the Changsha national demonstration centers are as follows.

4.3.2 Changsha County Modern Agricultural Demonstration Center[21]

There are 1,752 square kilometers of land in Changsha County and 0.853 million mu[22] of arable land. In October 2008, Changsha County was approved by the Hunan provincial government as a provincial modern innovation agricultural demonstration area or center; then, in August 2010, Changsha County was accounted as one of the first batch of national modern agricultural demonstration center by Ministry of Agriculture.Until August 2015, the Changsha County agricultural demonstration center has 1.02 million mu of rice area, 92,700 mu of tea base area, 0.109 million mu of vegetables (edible mushrooms) planting area, 0.103 million mu of seasonal fruits planting area. Moreover, there are 254 large-scale agricultural enterprises, among which, there are one national leading enterprise[23] and 15 provincial leading enterprises[24]. There are more than 1,300 cooperatives, 200 family farms, 3300 large farming households in varies area in Changsha County. Additionally, there are about 0.426 million mu lands transferred, which contain 0.299 million mu of cultivated land transferred. There are 0.44 million mu of agricultural base that have pollution-free certification, 37774 mu agricultural base that have green product certification[25]. Case one: Liuji Ornamental Fish Industry Park (Liuji Modern Agriculture Science and Technology Co., Ltd)-Based on an interview with Mr. Liu Guojun, legal representative of the company. Liuji Modern Agriculture Science and Technology Co., Ltd was founded on 14 October 2011, its major scope of business is selling ornamental fish, and its supplemental business scope is included sell fodder of ornamental fish, aquarium equipment, pond landscape design, and construction, customer service. The company's base is Liuji Ornamental Fish Industry Park, which has a 310 mu total planned land and planned to finish the whole project with three phases in Changfeng village, Huanghua Township, Changsha County. With the accomplishment of the first phase at the end of 2012, currently, the industry park has land 211 mu being operated. The planning map is as in Figure 4, there are seven major zones in the whole Liuji Ornamental Fish Industry Park: Commercial center and reception, leisure and health resort zone, ornamental fish creative industry zone, ecological ingredients planting area, folk customs experience zone, stereoscopic breeding base. According to Mr. Liu, the ornamental fish creative industry zone is a base of the whole park; other six zones are supplemental industrial zones. The output value in 2014 of the company is more than six million yuan. When it comes to profit point, Mr. Liu mentioned that the low-grade categories' fishes have a profit point of 18%, the middle-grade categories' fishes have a profit point of 40%, the high-grade categories' fishes have a profit point of 200%. Currently, the low-grade and middle-grade fishes are holding a major position in marketing.

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[21] *The introduction and current status of the demonstration center is according to the interview with Mr. Long Miaoan.*

[22] *Mu, the Chinese system of weights and measures, one mu equals 6.6666667 are.*

[23] *National agriculture leading enterprises are being elected by the Ministry of Agriculture according to the applications of different enterprises that based on their production, processing, distribution scale, annual agricultural products wholesale market in transaction size, product competitiveness, driving ability of the company, etc.*

[24] *Hunan provincial agricultural leading enterprises are being selected by the provincial government according to the indicators mentioned in footnote No. 7.*

[25] *Both pollution-free certification and green product certification are authorized by Ministry of Agriculture.*

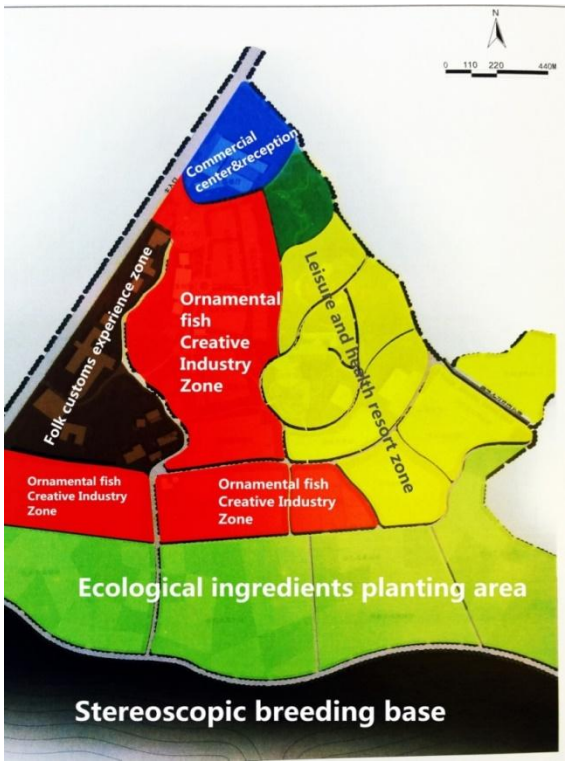

Figure 4 Planning map of the Liuji Ornamental Fish Industry Park[26]

Mr. Liu introduced that the fish business started fifteen years ago and just based on his interests in breeding ornamental fishes. In the beginning period, he learned the technologies to raise ornamental fishes all by himself and sold the fishes to local city area market, by this means, he makes his family-operated business a success. Later on, his breeding ornamental fishes base was named as Healthy aquaculture demonstration farm (Ministry of Agriculture), Provincial aquatic breeding farm (Hunan Provincial Animal Husbandry and Fishery Bureau), Science and technology demonstration household (Hunan Science and Technology Association), Three Star leisure agriculture manor (Hunan Science and Technology Association), Changsha municipal characteristic industrial demonstration base (Changsha Municipal Science and Technology Association). What's more, now the fish park is an educational base for Hunan Agricultural University.The Liuji Ornamental Fish Industry Park is playing an important role in the Changfeng village. First is about the land of this industry park. At present, the 211 mu land of the industry park is collected by land using rights transferred from local farmers. The current contracts with these local farmers are lasting until 2026, the price for the arable land [27]is 900 yuan per year and the price for the mountain land is 500 yuan per year; every five years the rent price will increase 10%. Because the Chinese rural land transferring policy is still under construction and perfection, Mr. Liu indicated that he is not sure whether the policy will allow him to rent the land after 2026, but he is quite optimistic about it. Another important function that the Liuji industry park has is the establishment of ornamental fish breeding cooperative in Changfeng village. This cooperative is initiated by Mr. Liu Guojun, there are about 40 local farmers have participated in this cooperative so far. In Figure 5, it embodies the running process of the cooperative. In the first place, Liuji Industry Park will offer free fries, fodder and professional training courses for the farmers who join the cooperative. Then, the involved farmers will breed the fries in their own household ponds. Later, after the fries growing up to fishes that can be sell, the Liuji Industry Park will buy the fish from the farmers and give the farmers money for their raising the fishes. In this model, the local farmers do not have risk since they only offer their ponds to grow the fries. In addition, Liuji Industry Park also gives local farmers job opportunities. The park hired 23 fixed employees from local farmers to work in the park currently. And other unfixed jobs that offered for local farmers are around 15. In 2014, Mr. Liu claimed that they have used 1.3 million yuan on workers' salaries. Therefore, from all these functions that Liuji Park implemented in the village, its role in increasing local residents' income is obvious.

[26] *Data resource: translated from the original map of Liuji Ornamental Fish Industry plan brochure with the interview with Mr. Liu and showed by him.*

[27] *These arable lands are mainly dry lands that are not being able to cultivate food production.*

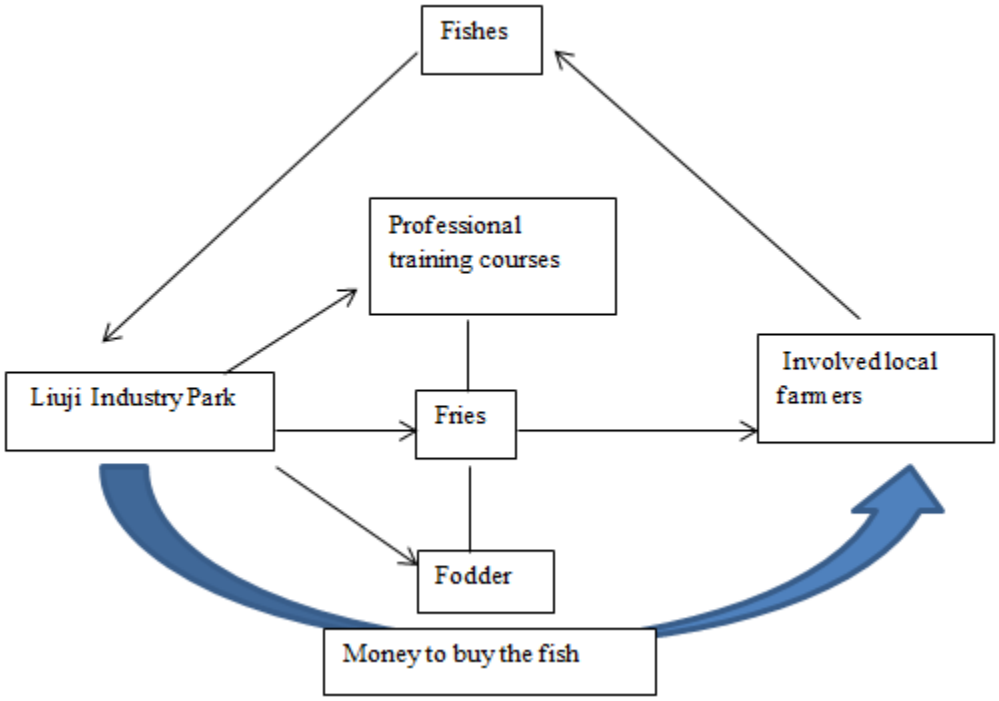

Figure 5 the operating process of the ornamental fish breeding cooperative[28]

Nevertheless, there are several issues that are upsetting Mr. Liu on the future development of the industrial park. Firstly, the financial issue for enlarge the park, as the scale of the park's planning is growing in the future years, there is an urgent need for financial support for the company. Secondly, about the land using rights, because the current contracts with the local farmers are until 2026, there is some confusion in the future policy on land transferring. Thirdly, as the company and the park are developing fast, there is an urgent need for different varieties of personnel to work in the company and the park, but the location is in a rural area, this makes it a bit harder to absorb talented people. Therefore, in the future five years, Mr. Liu indicated that he will concentrate on solving those problems, and the whole construction of the industrial park will be finished by the year 2020.

5. ANALYSIS BASED ON VALUE CHAIN AND FARMER PARTICIPATION PERSPECTIVE

5.1 The Influencing Factors Of Hunan's Administrative Agricultural Extension System

In the administrative agricultural extension system of Hunan, there are several influencing factors that are playing significant roles in the whole operation process. Based on the illustration and analysis above, this study concludes three core elements that have impacts on the administrative agricultural extension system of Hunan.First, the most important influencing factor is all governmental level policies on agricultural extension and administrative agencies. The policies can be divided into national level—laws and policies; provincial level—administrative policies or regulation files issued by provincial related government departments; municipal and county level—local policies or regulations based on national and provincial level files. These policies have direct influences on the administrative extension system of Hunan because they are the basic rules for the extension agencies to follow during operation. Second, fewer farmers working in the farmlands has affected the operation of agricultural administrative extension system. Currently, because of the increasing out-going city workers from rural areas, in accordance with the field investigation in Hunan, there is a correlation between influencing force of extension agencies with local residents. This is due to the fact that the young city workers they do not have the need for agricultural technologies and do not care about what do the local extension agencies' work are, therefore, during the field investigation, many young rural residents do not know about the existence of extension officers; moreover, although some young people know about these agencies, they just think because they do not need these technologies and think these agencies does not do a good job in the local area.Third, the limitation of knowledge and technology of the workers in local extension agencies, this apply negative impacts on the local farmers who really want to acquire agricultural technologies and sciences. This is an issue that both agricultural department officers and local farmers hold a consensus on. What's more, based on the interviews in the field, this is a tough issue that can be solved in current circumstances, which is relatively low salary and poor working conditions in local extension agencies are not able to attract high level personnel to work at there since they can find more prospective career in the cities.

[28] *Framed by the author after the field investigation.*

5.2 The Role Of Agricultural Demonstration Center In Hunan's Agricultural Extension Affairs

Beside the administrative system of agricultural technology extension, the various agricultural demonstration centers are playing a more promising role in both agricultural technology extension and agricultural development, especially the national level ones. As the operations of Changsha county national agricultural demonstration center has delivered positive influences on local agriculture at least in the following two aspects.On one hand, because these national demonstration centers are consisting with many large-scale agribusinesses, these enterprises are mostly originated developed by local farmers and thanks to their operation and management, the local agricultural economy is growing; also because these companies need to hire employees to work in them, rural residents in the local area are the first beneficiaries ofthis job hunting activities. On the other hand, the majority agribusinesses of these demonstration centers are in the mode of 'enterprise + base + farmers', within this mode, numerous of agricultural cooperatives are being set up, and an increasing number of rural residents participate in these cooperatives, the newly agricultural sciences and technologies are implied to the production of these agribusinesses and cooperatives. From these cases, it can be seen that agricultural demonstration centers are playing a more effective way for agricultural technology extension than traditional administrative extension agencies; additionally, with the profitable mode both for local residents and agribusiness, the new technologies are more popular and effective in agricultural development.

5.3 Value Chain And Farmer Participation Perspective Analysis On Agricultural Extension Affairs And Development In Hunan

(1) Value chain and agricultural extension affairs and development. In 1985, Porter first put the concept of value chain to the world in his book *Competitive Advantage: Creating and Sustaining Superior Performance*. He defined the value chain as all the activities carried out for competition in specific industries. As it develops, Haggblade and Therault (2012) think that value chains not only offer good understandings of the input suppliers, processors, dealers and consumers by a valuable visual framework to the small farmers but also provide analytical instruments to recognize profitable income-earning chances in the rural developing area for the people that living under the poverty line. Agricultural value chain in this study is defined as a chain that consists of agricultural production, processing, packaging, transportation, marketing and the ultimate goal in analyzing a value chain is to reach consumers' demands, so as to maximize the value. In a specific agricultural project, the value chain must include all the stakeholders' opinions and needs, but the needs of the farmers should be put in the first place.The main goal of agricultural extension is to help farmers to add values in agricultural production; the main content that consists of the agricultural extension system is technology and sciences, which are also a key factor of agricultural production, processing, packaging, transportation and even in marketing and analyzing customers' needs. Therefore, from Figure 6, it can be seen that in the agricultural value chain, almost all the phases are in need of technologies and sciences. However, the current administrative agricultural extension system only offering basic technologies and knowledge for local farmers in the producing phase of the whole agricultural value chain, the lack of knowledge in other parts of the value chain lead to the ineffectiveness of the traditional administrative extension system in agricultural development.

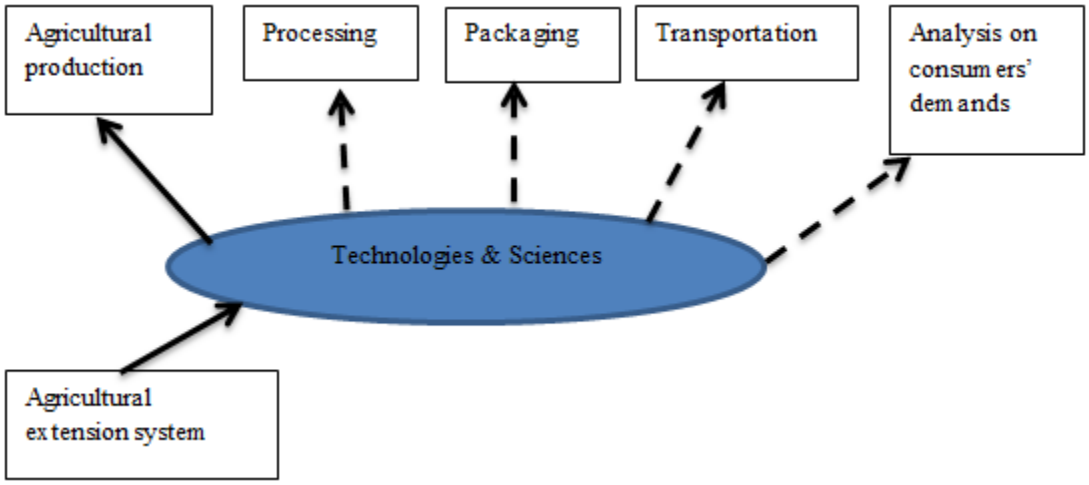

Figure 6: Agricultural value chain and agricultural extension system[29]

On the other side, the cooperatives in the demonstration centers are operated by large scale of agricultural enterprises; these enterprises not only involved with agricultural primary producing, but also put much effort in processing and marketing parts in the value chain, which are the most profitable phases in agricultural value chain. Local farmers can absorb all kinds of knowledge while participate in the cooperatives, and they can also be able to earn more money with these cooperatives, therefore, it is not hard to observe that the demonstration centers are more likely to deliver better options for local farmers than administrative

[29] *Framed within the concept given by this study on agricultural value chian*

extension agencies. (2) Farmer participation and agricultural extension affairs and development. Agricultural extension is a major content in rural development, especially connected with rural social development, which embodies in leading farmers to get to know that they can share with the achievements in rural development and then they will have enthusiasm in accepting the agricultural new technologies and sciences. In addition, what technologies and sciences are in demand of farmers can only be obtained by requiring or consulting with them.Vermillion and Sagardoy (1999) think that participation focuses on the question 'Who is best suited to implement which management functions?' Based on the field investigation in Hunan, the comparative operations of traditional administrative extension system and agricultural demonstration centers can be an analysis based on farmer participation theory.In the traditional administrative extension system, because of the limited knowledge of workers in the local level agencies, it is hard for farmers to actual participated in the operation of the system especially because even they participate in the system, they still cannot get the technologies they really need and make a profit out of it. In the demonstration centers, the enterprises and cooperatives are willing to absorb the needs and inspiration of local farmers, therefore, farmers fully participate in the agricultural development activities of the demonstration centers; what's more important, farmers can earn much more money than the producing period not joining the cooperatives, this offers enthusiasm for local farmers to participation.

6. CONCLUSION

Consequently, with the discussion based on both the value chain and farmer participation perspectives, the traditional administrative extension system is not implemented well in the current period compared to national demonstration centers. With the barely-solved issues existing in the administrative extension system while demonstration centers seem to have more proper solutions in Hunan, agricultural demonstration centers are a better option in agricultural technology and science extension. Therefore, based on the value chain theory and farmer participation theory in analyzing the Hunan case, the conclusion of this study is that the effectiveness of the agricultural administrative extension system is declining, and demonstration centers are rising for Chinese agricultural development and agricultural extension affairs.Additionally, with the influencing factors of the Hunan administrative agricultural extension system, the role of the agricultural demonstration centers in Hunan's case can be more related to a newly developed complementary way to traditional administrative agricultural extension system. In a future trend view, the demonstration centers' mode may even take the place of the current extension system because technology extension is one major function that already covered by the demonstration operative system, which are positive effectively influence the agricultural economy.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Ceramic Wastes Usage as Alternative Aggregate in Mortar and Concrete

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Abstract

In the ceramic industry, huge amounts of wastes are generated during manufacturing and transportation processes. In order to decrease the need for landfill areas and increase environmentally harmful effects of such wastes, this industry is under pressure to finding effective ways for recycling its wastes and by-products. In addition, the construction industry requires new sources of aggregates due to running out of conventional virgin aggregates, saving energy, and protecting the environment. Therefore, recently, ceramic wastes are often used as coarse and/or fine aggregate both in mortar and concrete. In the present study, effects of using ceramic wastes as coarse and/or fine aggregate on the engineering properties of mortar and concrete are evaluated. These engineering properties are listed and compared according to their mechanical and durability properties. Reviewing of previous studies related with this subject in literature and discussion all results of the studies are conducted as the methodology of this study. Consequently, it was found out that the use of waste ceramic in the conventional concrete or mortar mix as fine/coarse aggregate is suitable as it can improve mechanical and durability properties of the concrete/mortar.

Keywords: Aggregate, Ceramic Waste, Concrete, Durability Properties, Mechanical Properties.

1. INTRODUCTION

Recycling and reutilization of industrial waste and byproducts is a subject of great importance today in cement and concrete technology [1]. Especially ceramic wastes, which are durable, hard and highly resistant to biological, chemical and physical degradation forces, cannot be recycled by any existing process. The use of inorganic industrial residual products in the production of concrete will lead to sustainable ceramic industry ranges from 3% to 7% of daily production [2]. Therefore, construction industry can be the end user of all ceramic wastes and in this way can contribute to solve this environmental problem. The nature of construction industry, especially the concrete industry, is such that ceramic wastes can be used safely with no need for dramatic change in production and application process. On the other hand, the cost of deposition of ceramic waste in landfill will be saved and, on the other, raw materials and natural resources will be replaced, thus saving energy and protecting the environment [3].In the present study, the effects of ceramic wastes used as fine/coarse aggregates on the properties of concrete were investigated by an in-depth literature review. Thus, the effect of these ceramic wastes on the durability and mechanical properties of concrete and mortar were presented in a detailed manner. Consequently, the use of ceramic wastes and their effects as fine/coarse aggregates in a sustainable concrete and mortar were examined.

2. ETHODOLOGY

In this study, considering the previous studies, mechanical and durability properties of concrete produced by waste ceramic addition into mortar and concrete investigated in detailed manner. Throughout the literature review, it was observed that ceramic waste was used as fine/coarse aggregate in sand/gravel in producing mortar/concrete mix. In these studies, effects of waste ceramic on the some mechanical and durability properties of concrete were investigated. In this study, mechanical properties grouped into compressive, flexural and tensile strength, elastic modulus and finally shrinkage of concrete. In addition to, durability properties grouped into water absorbtion, ultrasonic pulse velocity, chloride penetration, abrasion resistance and finally freeze-thaw resistance. Consequently, effects of waste ceramic on these properties of concrete were evaluated in a detailed manner and reasons of results were established.

3. RESULTS AND DISCUSSION

3.1 Mechanical Properties

Mechanical properties of results were summarized in Table 1. Considering the results, waste ceramic was used as fine or/and coarse aggregate in concrete/mortar mixing. When ceramic waste was used as fine or/and coarse aggregate in concrete or mortar mixing, strength properties of concrete were increased compared with control concrete/mortar in generally. This improved incorporation of waste ceramic aggregate in the paste can be due to the more irregular shape it presents, resulting in a superior specific surface area than natural aggregate (gravel), which is rounded and thus lacks edges. Moreover, this irregular shape

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provides the higher bond between recycled ceramic aggregate and the paste. Furthermore, the ceramic aggregate could presented little puzzolanic activity in the surface part due to its chemical composition and grain size, this was nevertheless sufficient to react with the porltandite present in the periphery of the aggregate, giving rise to hydrated products such as calcium silicate hydrates (CSH) and calcium aluminate hydrates which present a less porous, more compact structure, forming a more stable aggregate/paste transition zone [4]. In contrast to all these studies, a few studies consisted of low strength properties compared to conventional concrete/mortar detected [5]-[6]. In these studies, the reason of strength loss was explained as ceramic aggregate having lower density and strength compared to conventional aggregate [6].

3.2 Durability Properties

Durability properties of results were summarized in Table 2. According to results of studies, chloride penetration, capillarity water absorbtion, abrasion resistance, freeze-thaw resistance, high temperature resistance, gas permeability and finally, ultrasonic pulse velocity properties were investigated in previous studies. Especially, capillary water absorbtion, oxygen and gas permeability of concrete produced waste ceramic as fine/coarse aggregate were improved or similar compared to conventional concrete. But, these properties were determined as worse compared to control specimen [7]-[8]. This decrease can be due to both the higher water absorption coefficient in waste ceramic aggregate and the effect of this waste ceramic aggregate on the pore system [9]. In generally, freeze-thaw durability and high temperature resistance, chloride penetration and abrasion resistance performance of concrete produced by waste ceramic were better than conventional concrete due to the high mechanical and the puzolonic properties of the ceramic aggregate [4]

Table 8. Comparison of some results for mechanical properties.

		Mixing Ratio of Concrete						
Type of Product	**Using of Waste Ceramic In The Concrete**	**Waste Ceramic Type**	**Waste Ceramic Ratio**	**Comparison Criteria**	**Experiments**	**Curing Day**	**Mechanical Property Findings**	**Ref.**
Normal Mortar Mixing	As Fine Aggregate in Sand	Earthenware ceramic waste (CWA)	(10-20-30-40-50-100)%	Mortar mix produced by %100 natural sand	-Compressive Strength	7, 14 and 28	All mortar mixes containing CWA gave higher compressive strength than that of the control mortar (42.2 MPa at 28 days), and that the compressive strength increased with increasing use of CWA up to 50% by weight (50.2 MPa at 28 days).	[10]
Normal Mortar Mixing	As Fine Aggregate in Sand	Porcelain insulator waste (CWA)	100%	Mortar mix produced by %100 typical river sand (RS)	-Compressive Strength	7, 28, 91	The compressive strength of the CWA mortars in which the CWA was used as received from the recycle plant was relatively similar to that of the corresponding RS mortars.	[11]
Conventional Concrete	As Fine Aggregate in Sand	Earthenware ceramic waste (CWA)	(50-100)%	Concrete mix produced by %100 natural sand	-Compressive Strength	7 and 28	The compressive strength at 28 days of (CWA) concrete increased with the use of CWA at 50% by weight, where it reached optimum strength (40 MPa). This was an increase of 7.5% compared to the control concrete. Thereafter a decline in compressive strength was observed, with a slightly lower value (38.5 MPa) at 100% CWA.	[10]
Conventional Concrete	As Fine Aggregate in Sand	White ceramic powder	(10-20-30-40-50)%	Concrete mix produced by %100 natural sand	-Compressive Strength -Tensile (Brazilian) Test -Flexi-traction Test	7, 14, 28	The use of white ceramic powder to substitute part of the sand does not reduce compressive strength but rather gives an appreciable increase in strength. Regarding traction resistance, the introduction of white ceramic powder does not give any appreciable difference compared with the control concrete.	[12]
Conventional Concrete	As Fine Aggregate in Sand	Crushed ceramic waste (CC)	(40- 50-60)%	Concrete mix produced by %100 conventional crushed fine aggregates	-Compressive Strength	7, 28, 90, 365	It can be seen that the compressive strength of CC concrete mixes with 40%, 50% and 60% fine aggregate replacement with CC were higher than the control specimen at all ages .However, the rate of increase of strength decreases with the increase in CC content.	[13]
Conventional Concrete	As Fine Aggregate in CEN Reference Sand	Sanitary ceramic waste	(10, 15 and 20)%	Concrete mix produced by %100 natural sand	-Compressive Strength -Flexural Strength	2, 7, 14, 28 and 56	Incorporation of ceramic waste aggregates led to a systematic improvement of the mechanical properties, the benefits increasing with the addition rate.	[14]
Conventional Concrete	As Fine and coarse aggregate in sand and gravel	Brick, blocks and roof tiles - wall, floor tiles and sanitary ware	100% (for both fine and coarse)	Concrete mix produced by %100 natural fine and coarse aggregate	-Compressive Strength	7, 14, 28, 56 and 90	The results obtained indicate that the strength is higher for concrete with both replacements coarse ceramic aggregate and ceramic sand than control concrete with traditional aggregates.	[15]
Conventional Concrete	As Fine and coarse aggregate in sand and gravel	Sanitary ceramic ware waste	100% (for both fine and coarse)	Concrete mix produced by %100 natural fine and coarse aggregate	-Compressive Strength -Tensile Strength	28	Compressive strength of such concrete was higher of 12% and tensile strength of 30% in comparison to concrete with sand and gravel aggregate.	[16]

Table 9. Comparison of some results for mechanical properties (cont.).

		Mixing Ratio of Concrete						
Type of Product	**Using of Waste Ceramic In The Concrete**	**Waste Ceramic Type**	**Waste Ceramic Ratio**	**Comparison Criteria**	**Experiments**	**Curing Day**	**Mechanical Property Findings**	**Ref.**
High-Performance Concrete	As Fine and coarse aggregate in sand and gravel	Earthenware ceramic waste	15-30% of natural sand and 20-50-100% of coarse mixed aggregates.	Concrete mix produced by %100 natural river sand mixes and dolomitic gravel	-Compressive Strength -Flexural Strength -Split Tensile Strength -Elastic Modulus	1, 7, 28 and 180	Concrete made with fine ceramic aggregate achieved a higher compressive, flexural, splitting tensile strength and elastic modulus strength in comparison to that of control concrete. But, the concrete made with more than 20% of coarse ceramic aggregates achieved a lower compressive, flexural, splitting tensile strength and elastic modulus to that of control concrete.	[8]
Conventional Concrete	As Coarse Aggregate	Sanitary ceramic waste	(15, 20 and 25)%	Concrete mix produced by %100 natural coarse aggregate.	-Compressive Strength -Split Tensile Strength	7, 28 and 90	The mechanical behavior, both in terms of compression and splitting tensile strength, was better for the recycled concretes than for the reference concrete.	[4]
Conventional Concrete	As Coarse Aggregate	Ceramic Waste	100%	Concrete mix produced by %100 conventional coarse aggregate	-Compressive Strength	28	The concrete mixes containing recycled ceramic waste aggregates achieve strength levels between 80 to 95% compared to the conventional concrete.	[17]
Conventional Concrete	As Coarse Aggregate	Ceramic electrical insulator wastes	100%	Concrete mix produced by %100 conventional crushed stone coarse aggregate	-Compressive Strength -Flexural Strength -Split Tensile Strength -Elastic Modulus	28	The compressive, splitting tensile and flexural strengths of ceramic waste coarse aggregate concrete are lower by 3.8, 18.2 and 6% respectively when compared to conventional concrete, but ceramic waste coarse aggregate concrete possesses lower tensile to compressive strength ratio.	[18]
Conventional Concrete	As Coarse Aggregate	Crushed tiles	(50-100)%	Concrete mix produced by %100 conventional crushed stone coarse aggregate	-Compressive Strength -Flexural Strength -Split Tensile Strength	7, 28	In general, concretes made with crushed tile as coarse aggregate showed higher compressive, tensile, and flexural strengths than control concrete.	[19]
Non-Structural Concrete	As Coarse Aggregate	Ceramic hollow bricks	(33, 66 and 100)%	Concrete mix produced by %100 coarse limestone aggregate	-Compressive Strength -Flexural Strength	28	The compressive and flexural strength, decreased with the percentage of replacement of limestone aggregates with ceramic aggregates increase. The decrease in compressive strength is higher than that in the flexural strength.	[6]
Portland Blast Furnace Cement Type B Concretes	As Coarse Aggregate	Porous ceramic waste aggregate (PCA)	(10 and 20)%	Concrete mix produced by %100 crushed gravel aggregate	-Compressive Strength -Shrinkage	3, 7 and 28 (internal curing)	A 10% replacement of coarse aggregate by PCA was more effective in improving compressive strength than a 20% replacement by PCA at the early ages of 3 and 7 days, independent of exposure conditions. Internal curing using PCA to replace part of the coarse aggregate was not effective in reducing autogenous shrinkage.	[20]

Table 2. Comparison of some results for durability properties.

		Mixing Ratio of Concrete					
Type of Product	**Using of Waste Ceramic In The Concrete**	**Waste Ceramic Type**	**Waste Ceramic Ratio**	**Comparison Criteria**	**Experiments**	**Durability Results**	**Ref.**
Normal Mortar Mixing	As Fine Aggregate in Sand	Porcelain insulator waste (CWA)	100%	Mortar mix produced by %100 typical river sand (RS)	-Chloride Penetration	It quantitatively indicated that the CWA mortars had lower apparent chloride diffusion coefficient than the RS mortars	[11]
Conventional Concrete	As Fine Aggregate in Sand	Crushed ceramic waste (CC)	(40- 50-60)%	Concrete mix produced by %100 conventional crushed fine aggregates	-Abrasion Resistance -Chloride Penetration	Abrasion resistance of concrete was strongly influenced by its compressive strength and crushed ceramic. Measurement of chloride penetration depths correlated well with the differences between additive type and replacement percentage of the mixtures. Crushed ceramic 60% specimens were considerably more resistant to chloride ingress than those of other specimens.	[13]
Conventional Concrete	As Fine Aggregate in CEN Reference Sand	Sanitary ceramic waste	(10, 15 and 20)%	Concrete mix produced by %100 natural sand	-Freeze-Thaw Resistance	The freeze-thaw resistance results were concluding that ground ceramic waste addition did not have any influence on compressive strength up to 25 cycles, the observed behavior being similar for all tested mortars. Conversely, freeze-thaw was found to affect negatively the flexural strength of all tested mortars, the reduction increasing with the ceramic waste content.	[14]
Conventional Concrete	As Fine and coarse aggregate in sand and gravel	Sanitary ceramic ware waste	100% (for both fine and coarse)	Concrete mix produced by %100 natural fine and coarse aggregate	-High Temp. Resist. -Abrasion Resistance	Abrasion resistance of concrete with ceramic sanitary ware aggregate is higher by about 20% than abrasion resistance of gravel concrete. Compressive strength of concrete with ceramic aggregate decreased immediately after heating by 46%, in comparison to strength of unheated concrete, whereas tensile strength decreased by 54%; strength loss was similar to other types of concrete, however high initial strength made the strength of this concrete still high after heating.	[16]
Conventional Concrete	As Fine and coarse aggregate in sand and gravel	Brick, blocks and roof tiles - wall, floor tiles and sanitary ware	100% (for both fine and coarse)	Concrete mix produced by %100 natural fine and coarse aggregate	-Capillary Water Absorb. -Oxygen Permeability -Chloride Penetration	As for capillarity water absorption coefficients the differences are rather important since capillary water absorption for control concrete (with traditional aggregates) almost doubles the capillarity water absorption coefficient of ceramic aggregates based concrete. The oxygen permeability results confirm the good performance of the concrete mixtures with ceramic aggregates. As for the chloride diffusion it once more confirms the good performance of ceramic sand and coarse ceramic aggregate based concrete.	[15]
High-Performance Concrete	As Fine and coarse aggregate in sand and gravel	Earthenware ceramic waste	15-30% of natural sand and 20-50-100% of coarse mixed aggregates.	Concrete mix produced by %100 natural river sand mixes and dolomitic gravel	-Ultrasonic Pulse Veloc. -Capillary Water Absorb. -Chloride Penetration	Although the capillary absorption coefficient and ultrasonic pulse velocity values were worse than those of conventional concrete, the chloride ion penetration, after 180 days, was lower in concretes made with ceramic fine aggregates.	[8]

Table 2.Comparison of some results for durability properties (cont.).

		Mixing Ratio of Concrete					
Type of Product	**Using of Waste Ceramic In The Concrete**	**Waste Ceramic Type**	**Waste Ceramic Ratio**	**Comparison Criteria**	**Experiments**	**Durability Results**	**Ref.**
Non-Structural Concrete	As Coarse Aggregate	Ceramic hollow bricks	(33, 66 and 100)%	Concrete mix produced by %100 coarse limestone aggregate	-Capillary Water Absorb. -Immersion Water Absorb -Abrasion Resistance	The durability of this type of concrete may turn out to be its major insufficiency, since water absorption either by immersion or capillarity increases very regularly and significantly with the proportion of ceramic aggregates on the concrete mix. Abrasion resistance is precisely the one in which the concrete produced with recycled ceramic aggregates shows an excellent performance, even better than the reference concrete.	[21]
Conventional Concrete	As Coarse Aggregate	Sanitary ceramic waste	(20 and 25)%	Concrete mix produced by %100 natural coarse aggregate.	-Gas Permeability	According to test results, micro-porosity and gas permeability, O_2 and CO_2 permeability were similar in the reference concrete and the concretes containing recycled sanitary ware as a partial replacement for conventional aggregate.	[7]
Conventional Concrete	As Coarse Aggregate	Sanitary ceramic waste	(20 and 25)%	Concrete mix produced by %100 natural coarse aggregate.	-Freeze-Thaw Resistance	Sanitary ware industry aggregate is more resistant to temperature change than natural coarse aggregate. The new concrete is more freeze-thaw resistant than conventional concrete. The scaling rate is lower and the cracks are narrower in recycled concrete. Both effects are accentuated with rising replacement ratios.	[9]
Conventional Concrete	As Coarse Aggregate	Sanitary ceramic waste	(20 and 25)%	Concrete mix produced by %100 natural coarse aggregate.	-Water Resistance -Porosity -Sorptivity	The maximum depth of water penetration is no greater in recycled aggregate than natural aggregate concretes, and although the average value is somewhat higher in the former, it never exceeds 30 mm. The inclusion of ceramic sanitary ware aggregate raises total porosity slightly and modifies pore size distribution, with an increase in the volume of capillary pores at the expense of macro pores. The concretes with recycled ceramic aggregate have greater sorptivity than conventional concretes, since the values are consistently under 3 $mm/h^{0.5}$, these may consequently be regarded as durable materials.	[4]
Conventional Concrete	As Coarse Aggregate	Ceramic electrical insulator wastes	100%	Concrete mix produced by %100 conventional crushed stone coarse aggregate	-Capillary Water Absorb. -Sorptivity -Chloride Penetration	The basic trend of permeation characteristics of the ceramic electrical insulator waste coarse aggregate concrete is similar to those of the conventional concrete. The permeation characteristic values increase with increase in water–cement ratio for both the ceramic electrical insulator waste coarse aggregate concrete and the conventional concrete.	[18]

4. CONCLUSIONS

In this study, effects of waste ceramic on some mechanical and durability properties of conventional concrete were investigated. Considering all of the results and the findings in the literature, it was found that, using of waste ceramic in the conventional concrete as fine/coarse aggregate was positively affected on these mechanical and durability properties of concrete. Consequently, the green and sustainable concretes would be obtained by partial substitution of waste ceramic aggregates from different ceramics industry can be used for structural purposes.

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BIOGRAPHY

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ICSD INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Cultural Heritage Management: A Model Proposal for Yesemek Archeological Sites

M.Serhat Yenice[1], Esra Islamoglu[1]

Abstract

The aim of this study is to build a model for the management and institutional organization to conserve and improve the Yesemek archaeological site in Gaziantep-Turkey. Within the scope of the study; a model that is based on extensive participation and collaboration, that runs governance, socio-economic, cultural and financial programs in coordination, is being defined. This model is addressed in detail as a five-stage methodology. The first stage is the Cultural Heritage Governance Program that defines the participation groups intended for the common will in the process of planning, implementation, controlling and monitoring of the preservation and improvement programs. The second one is the Spatial Conservation-Development Program, which defines the spatial planning program for the conservation and development of the Yesemek archaeological site's unique cultural heritage values. The third stage is the Socio-Economic Restoration Program, which presents the current life and socio-economic implications of cultural heritage values. The fourth stage is the Informatics Program, which constitutes the cultural memory of Yesemek and will provide the introduction and promotion of cultural memory values existing or lost in the historical development process to future generations. The fifth one is an Economic Sourcing and Investment Incentive-Support Program that will provide alternatives for providing financial resources and support to policies and strategies for the sustainable protection and development of cultural heritage values. As a result of the research, a model of cultural heritage management consisting of governance, spatial, socio-economic, cultural and financial programs for sustainable protection and improvement in the case of Yesemek archaeological site is defined.

Keywords: archaeological sites, cultural sustainability, management, Yesemek, Gaziantep.

1. INTRODUCTION

Cultural heritage and conservation have become important themes in current discussions on place, cultural and urban identity, and the preservation of the past. Archaeological sites constitute an important form of cultural heritage. Besides, archaeological sites have long been a part of cultural heritage and its display, certainly before the use of the term heritage and the formal study of tourism ([1], [2]).Archaeological sites are regarded as the common memory of history in contracts, statutes, recommendations or principles issued by global platforms like UNESCO (United Nations Educational, Scientific and Cultural Organization), HABITAT (United Nation Centre for Human Settlements), ICOMOS (International Monuments and Sites Council) [3]. This framework emphasizes the necessity of preserving archaeological sites in the context of interdisciplinary history and scientific studies and transferring them to future generations.Archaeology offers a perspective to the distant past that enhances our understanding of human, social, and technological development. For professionals, academics, and the public at large, archaeological sites provide valued information and experiences that most of us hope to keep available to future generations as well. Thus, there is increasing and well-warranted concern about the long-term preservation of archaeological sites and about the intergenerational responsibility conservation professionals and decision makers have to ensure that preservation is meaningful in the present and sustainable in the long term. So, it is important that archaeological sites are reserved, accessible, protected, and authentic. In recent decades, the need for a planning methodology for the conservation and management of archaeological sites has arisen in response to the rapidly changing world. The extent and pace of change-whether manifest in the physical destruction of sites, in the varied uses of sites, or in our ways of thinking about and valuing the past—pose an enormous challenge for those involved in preserving and interpreting the archaeological record ([1], [2], [4]).The aim of this study is to build a model for the management and institutional organization to conserve and improve the Yesemek archaeological site in Gaziantep-Turkey. It is believed that the research will contribute to the search for methodology and organization model for the definition of scope, content and institutional infrastructure on the basis of cultural sustainability, especially on the level of field management debates, focusing on the cultural heritage of Turkey.

2. SCOPE AND METHODS

The scope of this research is the Yesemek archaeological site, which is known as the Yesemek Stone Quarry and Sculpture Workshop. The site is located about 22 km southeast of Islahiye district of Gaziantep province and in the Karasu Rift, which has been seismically active from ancient times onwards (Figure 1). The main area that was chosen as a workshop and quarry at

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Yesemek is situated on the western slope of the Karatepe Hill, which is a volcanic basalt formation according to the excavators of the site and one of the main reasons for choosing this spot is the presence of fine-grained basalt [2].

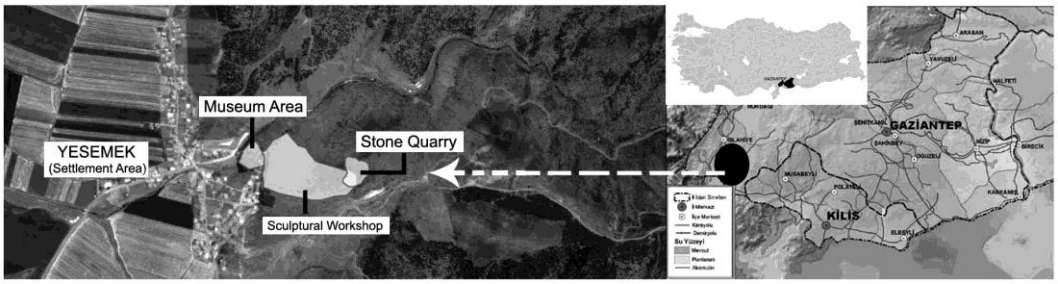

Figure 1. Location of The Yesemek Stone Quarry and Sculpture Workshop in region and country

Within the scope of the study; a model that is based on extensive participation and collaboration, that runs governance, socio-economic, cultural and financial programs in coordination, is being defined. This model is addressed in detail as a five-stage methodology. The first stage is the Cultural Heritage Governance Program that defines the participation groups intended for the common will in the process of planning, implementation, controlling and monitoring of the preservation and improvement programs. The second one is the Spatial Conservation-Development Program, which defines the spatial planning program for the conservation and development of the Yesemek archaeological site's unique cultural heritage values. The third stage is the Social & Cultural and Economic Rehabilitation Program, which presents the current life and socio-economic implications of cultural heritage values. The fourth stage is the Informatics Program, which constitutes the cultural memory of Yesemek and will provide the introduction and promotion of cultural memory values existing or lost in the historical development process to future generations. The fifth one is an Economic Sourcing and Investment Incentive-Support Program that will provide alternatives for providing financial resources and support to policies and strategies for the sustainable protection and development of cultural heritage values. As a result of the research, a model of cultural heritage management consisting of governance, spatial, socio-economic, cultural and financial programs for sustainable protection and improvement in the case of Yesemek archaeological site is defined. In this research; it is considered to be important and necessary to address the current spatial and socio-economic infrastructure problems of the Yesemek archaeological site within the situation analysis, in order to identify the original spatial characteristics and functional identity values, and establish the primary objectives of future protection and development strategies within the problematic of protection.

2.1 Historical Background

Yesemek is the first outdoor sculpture workshop known in history. The Site was discovered by Felix Von Luschan in 1890 while he was conducting an archaeological excavation in Zincirli, Sam'al. In his first excavation report of Zincirli "Ausgrabungen in Sendschirli" he mentioned Yesemek, but no further research was done at the site. In 1955, a team under the directorship of U. Bahadir Alkim began scientific explorations of Yesemek. Studies at the site and surveys in the vicinity took place between 1957 and 1961 [6]. During this time, the studies were mainly focused on the western side of the hill where over 250 individual sculptures were found in different sculpturing stages at the quarry itself and around the vicinity. The second excavation campaign was conducted between 1989 and 1991. The primary objective of the campaigns was to find new sculpted blocks, and to re-erect the ones that were found in the previous years by Bahadir Alkim in order to arrange the site as an open-air museum for the exhibition of the sculptures [7,8].

Figure 2. The Yesemek Archeological Site and Crude Sculpture Samples

Being the largest sculpture workshop that has been identified to date in the Antique Front Asian World, the Yesemek Sculpture Workshop is a very interesting and unique archaeological centre. The site covers a 300 x 400 meters area on the hill [9]. Although it has a very outstanding place in the Anatolian Cultural Assets Inventory, Yesemek has not been well promoted and got the attention that it deserves. It has not been able to enter the Cultural Tourism program due to various reasons for nearly 30 years after the first scientific excavation period. After 1989, the museum came back to the agenda and between 1989 and 1991, the Gaziantep Museum Directorate made excavations and landscaping work in Yesemek and turned it into an open-air museum [9]. Today, architectural pieces such as sphinxes, door lions, winged lions, sitting lions, mountain Gods reliefs (representing the Amanos Mountains), war scene reliefs and plinths are exhibited in their natural environment (Figure 2). In 2012, Yesemek Open Air Museum and Sculpture Workshop was selected by the United Nations Educational, Scientific and Cultural Organization (UNESCO) for the World Heritage Tentative List.

3. CULTURAL HERITAGE MANAGEMENT MODEL

Cultural heritage management model is addressed in five programs that include "site-specific" governance, spatial, social and economic aspects. These programs are named as follows: "Governance Program", "Spatial Conservation-Development Program", "Social & Cultural and Economic Rehabilitation Program", "Informatics Program" and "Economic Sourcing and Investment Incentive-Support Program.

3.1 Governance Program

Governance program refers to a model of institutional organization that functions as a decision-making mechanism for the protection and development of cultural heritage values on the basis of sustainability principle. This model is based on broad participation, transparency and cooperation-solidarity principles at every stage of the process of determining spatial and functional-sectoral development strategies. The protection and development management partnership is defined in the model in coordination with the metropolitan municipality. This partnership takes place in six groups of participants.

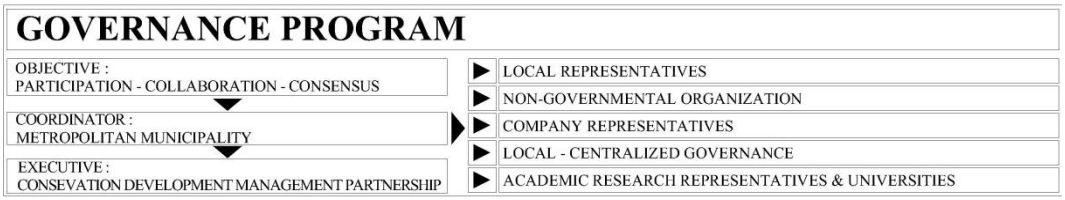

Figure 3. Governance Program

The first group is the property owners-users and the public representatives of the tradesmen, craftsmen and farmers in the local dynamics. The second group is non-governmental organizations that consist of the representatives of the local cooperatives and unions, foundations and trade associations. The third is capital representatives composed of private enterprise and investment groups. The fourth is the central-local government representatives, the Ministry of Culture and Tourism, the Ministry of Environment and Urban Planning, the Ministry of Forestry and Water Management, the regional conservation councils and local authorities related to local-provincial organizations. The academic representatives of universities and institutes, who are experts in the related fields, in different characteristics of the integrated conservation areas consisting of natural, archaeological and urban conservation areas, form the fifth group.

3.2 Spatial Conservation-Development Program

Integrated Spatial Conservation-Development Program describes the planning methodology for design, planning, implementation and control-monitoring processes (Figure 5). This program was developed based on a strategic spatial planning approach. It is based on spatial conservation and development strategies generated in the context of scenario design, whichfocuses on raising the national and international awareness of spatial and functional "site-spesific" identity values of Yesemek archaeological site and ensuring socio-economic development and sustainability.

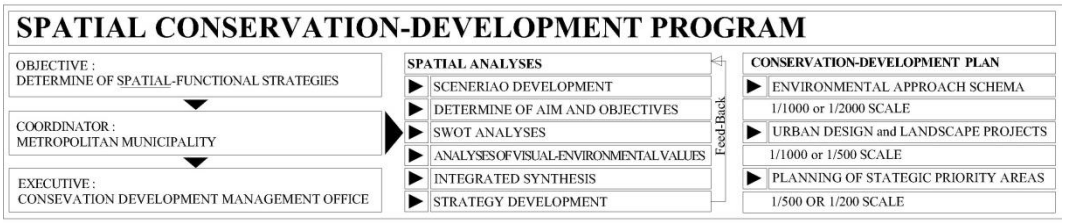

Figure 4: Spatial Conservation- Development Program

The Spatial Conservation-Development Program is based on a two-stage sequential process of analysis (analytical research) and conservation-improvement planning: the spatial analysis process; field detection-observation and demand analysis findings. This process includes spatial-functional identity solutions for planning-implementation processes such as SWOT analyses, Environmental-Visual Values Analysis, Integrated Synthesis and strategical planning. The Conservation-Improvement Plan consists of planning, design and implementation level work such as the Environmental Approach Scheme (1/1.000 or 1/2.000 scale plans) and Protection and Development Areas (Special Interest Locations) Urban Design and Landscape Projects (1/500 or 1/200 scaled application-level work).

3.3 Social&Cultural and Economic Rehabilitation Program

Social & Cultural and Economic Rehabilitation Program is based on the establishment of socio-spatial infrastructure and consciousness of unity and solidarity in accordance with the preservation process, by setting the priority intervention issues to solve the current social problems related to the area. This shall be according to the situation analysis findings and creating awareness in preserving the cultural heritage values by educational and vocational programs to make sustainable preservation possible. In this respect, the elimination of urban deprivation and poverty through the integration of cultural heritage values in the context of spatial and functional transformations, increasing the quality of spatial living and creating employment opportunities on the spot has been identified as the primary goal of the social rehabilitation program (Figure 5).

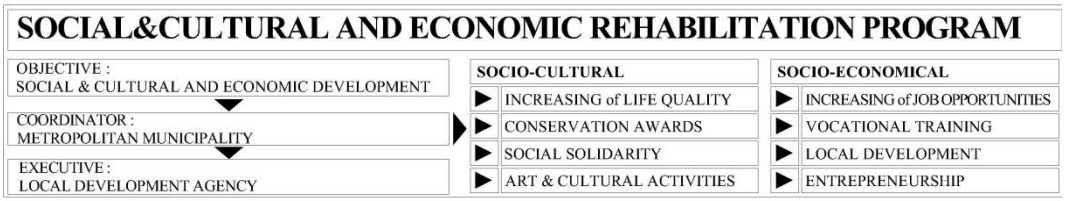

Figure 5: Social-Cultural and Economic Rehabilitation Program

3.4 Informatics Program

Informatics Program is the establishment of the knowledge infrastructure by reviving the values of written, verbal and visual cultural memory existing or lost in the historical development process of Yesemek, to make those values sustainable for the future generations. This program consists of "Archive" and "Inventory-Tracking" programs supported by Geographic Information Systems (GIS) (Figure 6).The archive is programmed to function as a written and visual resource brought to life by academic-scientific researches, conferences and symposiums and workshops, and transmitted to future generations, with its intangible cultural values defined as ethnographic, folkloric, archaeological, architectural and verbal memory of the Yesemek Sit area and its immediate surroundings. This function is a source of information in terms of functional-sectoral strategies that will be produced in order to protect cultural memory values and integrate them with current social-economic city life.

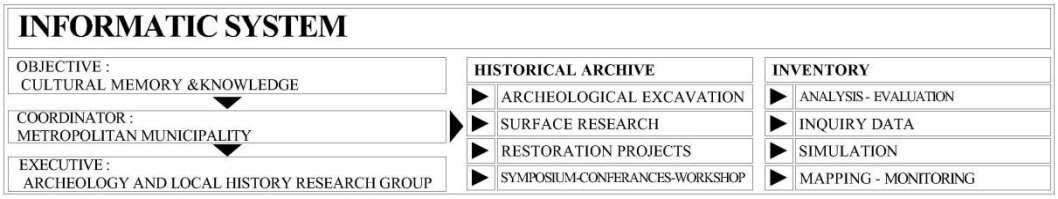

Figure 6. Informatics system

Inventory-monitoring program is the establishment of a scientific and technological infrastructure or an information system to examine the expectations, trends and demands of local people about their spatial and functional uses, and also to monitor and store the data that may be used in the planning and implementation process. This system refers to a Cultural Heritage Information System based on the Geographical Information System in which spatial and feature data are stored, processed, interrogated, analysed, visualized and modelled (Figure 7). Therefore, the establishment of information technology-supported Cultural Heritage Information System is foreseen as the main priority in terms of the effective operation of the inventory-monitoring program.

3.5 Financial Resources and Investment Incentive-Support Program

Financial Resources and Investment Incentive-Support Program is a road map and financial program that includes the search for alternatives to raise awareness of cultural heritage values at national and international level and make conservation-renovation work sustainable. In this aspect, it is a financial resource research guide for creating tourism-oriented alternative "site-specific" development areas for local employment opportunities and providing scientific and technical infrastructure support both at national and international level to the preservation and development projects to be produced at any scale. (Figure 8).

Figure 7. Financial resources and Incentives Program

The function of this program is to present information about the conditions and possibilities of national and international programs by providing technical assistance, projecting, grants and support-incentives to the projects to be developed for the preservation of cultural heritage values. Another function of this program is to provide alternatives to financing models such as build-operate-hand over or long-and medium-term lease, co-share or risk-sharing public-private partnerships or sponsorship institutions.

4. RESULTS

This research, which focuses on defining the administrative-institutional organization scheme for the preservation-development of the unique spatial characteristics and cultural identity of the Yesemek archaeological site, has made it possible to present some suggestions in the context of analytical research process and situation analysis findings consisting of field detection, observation and demand analysis. Within this scope; a "Protection and Development Management Partnership" functioning as a decision-making mechanism based on the principle of effective participation and transparency at every stage of the planning-implementation and control-monitoring processes of "specific" protection-development programs, is being suggested."Preservation and Development Areas Planning Office" should be established to guide the design, planning, implementation and control-monitoring processes of the spatial strategies defined in the spatial protection-development program. This office's function is the monitoring of the processes related to planning, design and implementation works for preservation and development on any scale to be produced for the site area and its immediate surroundings, and the identification and updating of future spatial and functional development strategies. To promote social and economic development policies and strategies such as creating social and spatial infrastructure and employment opportunities and sectoral investment areas in order to improve the socio-spatial infrastructure foreseen under the social-economic sanitation program and to encourage conservation consciousness by artistic, cultural and vocational training activities, the Local Development Office should be established.

Figure 8: Cultural Heritage Management Model for Yesemek Archaeological Site

Thirdly, the Local History and Archeology Research Group should be established to provide scientific and technical support to carry out scientific researches of any scale and in various disciplines to make it possible to document, archive and present the cultural memory within the informatics program. The main function of this institute is to raise national and international awareness of local identity values and promote recognition through organizing national and international participated congresses, symposiums and panels and workshops by means of scientific-academic researches.Fourthly, as part of Financial Resources and Investment Incentive-Support Program, an Investment Incentive-Support and Research Projection Fund should be established to investigate the investment areas that will encourage private sector groups with alternative sources and incentive-support opportunities at national and international level, focusing on tourism-oriented sectoral projects aimed at preserving and developing the original identity values of Yesemek. It is believed that this study will contribute to pass cultural heritage values on future generations within the protection-use balance by defining a roadmap to be followed in the development of the preservation of the Yesemek Open Air Museum and Sculpture Workshop.

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19 - 23 April 2017, Sarajevo

Smart Legal Mechanisms for Sustainable Cities

Tiago de Melo Cartaxo[1], Miguel de Castro Neto[2], Vânia Vassalo[3]

Abstract

The reality of "smart cities" is being spread all over the world as an obvious acquis, once populations are more and more gathering in urban areas. According to most recent reports from the United Nations, the largest part of the world's population lives within the territories of cities and, by 2050, these numbers may reach more than 70% of the inhabitants on the surface of Earth. The aggregation of people in small territories, such as megacities, represents a greater problem for present and future generations, once there are questions of health, pollution, safety or welfare that must be dealt with more effectiveness. Therefore, environmental and spatial planning laws and policies are a concern for political and judiciary powers. Public officers are, obviously, concerned with people's well-being, balance between various factors and resources in the nature, efficient use of those resources, cohesion and territorial sustainability, the future of the world we live in and the guarantee of meeting the needs of future generations. Consequently, the mechanisms used for fostering the development of "smart cities" (which are to be sustainable, inclusive and resilient territories), such as the use of new technologies, open data, monitoring and public participation, must be adopted by legal systems in urban areas. Adaptive legal mechanisms will play the catalysing role of articulating the wide range of the traditionally idiosyncratic elements of cities. Adaptive, flexible, participated, perceptive legal instruments are the most innovative secret for enhancing the future of people's lives in smarter and more sustainable cities.

Keywords: Smart Cities, Adaptive Law, Sustainable Urbanism, Well-being

1. INTRODUCTION

For millennia, large numbers of human beings have tried to gather themselves in local communities, which would be later developed into urban communities, until the current most widely spread and common reality of towns and cities.Recently, the United Nations Human Settlements Programme (UN-Habitat), while preparing the Quito Conference "Habitat III", published the *World Cities Report 2016 - Urbanization and Development: Emerging Futures*, which characterizes cities as a "gathering force" in the world, once the trend of a global urban growth "is not new, but relentless and has been marked by a remarkable increase in the absolute numbers of urban dwellers—from a yearly average of 57 million between 1990-2000 to 77 million between 2010-2015. In 1990, 43 per cent (2.3 billion) of the world's population lived in urban areas; by 2015, this had grown to 54 per cent (4 billion)" [1]. And, in fact, UN projections indicate that by 2050, 66 per cent of the world's population will be living in urban areas. [2]. Facing all these new realities regarding cities, it should be also emphasized that, according to some other recent indicators, almost 75 per cent of the world's cities have higher levels of income inequalities than twenty years ago [3]. This has been indubitably caused by the increasing population around the world and, simultaneously, the gathering in larger and larger cities (megacities when with more than 10 million inhabitants). Because each year more human beings choose to live in cities, being forced to adapt their lives to new challenges, new realities and continuous change. In fact, on this issue, Robert Park noted that "man's most successful attempt to remake the world he lives in more after his heart's desire. But, if the city is the world which man created, it is the world in which he is henceforth condemned to live. Thus, indirectly, and without any clear sense of the nature of his task, in making the city man has remade himself" [4].From water to sanitation, decent housing, infrastructures, electricity, health, schools, waste, police services, fire departments, traffic, social action or environmental protection, in smaller or larger urban spaces, there is a myriad of rights, services or goods that are or should be assured and provided to citizens by public authorities. And local elected officials have been trying to use "smart city technologies" to decrease crime rates, improve air quality, manage and control road traffic, foster new businesses and start-ups through opening data, develop municipal infrastructures, or even to develop new city planning models for present and future generations.One of the first examples of predictive crime analytics was the IBM Predictive Software, used by Memphis Police Department [5], and in what regards open data the Lisbon City Council, in Portugal, launched an open data portal, named*Lisboa Aberta* (Open Lisbon) [6].At this point, one of the most relevant questions of analysing the reality of the cities of the future is to know if legal and governance systems in cities are able to provide every inhabitant and citizen the adequate services and protection (from rights to public amenities or goods), while fostering, at the same time, sustainable development and well-being within the territories of cities, which are more and more populated, especially in these times of climate, social and economic change, that challenge the everyday efforts of public officials, legislators, judges, companies, associations and (primarily) citizens.

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2. LAW AND CITIES

Remembering the Latin maxim *ubi societas ibi jus* (where there is society, there is law), it is nowadays widely accepted that any social organization needs law to persist in time. And cities can be no exception to such principle.Regarding this issue, English jurist Gerald Fitzmaurice, who was member of the International Court of Justice and of the European Court of Human Rights, considered that: "The view that seems to be closest both to the realities of the matter and to the historical facts is the 'social' view, or in other words the idea embodied in the maxim *ubi societas ibi jus*. This maxim is more than a statement of mere fact (…). It is not simply that where society is found, law is found, but that it must be so found – that law is a necessary condition of any systematized form of inter-relationships" [7].Depending on the constitutional law of each state, urban realities may be regulated by national (at federal or state level), regional or local law, being also possible that all these layers may share jurisdiction on the same reality, though in different areas. And even international or supranational law (such as European law) may affect, in some cases, cities.In addition to that, and once most of the world's population is gathered in cities, it is extremely likely that most of legal issues, statutes and litigation are related to facts and realities that occur in urban areas. Therefore, law and cities will always be indubitably inseparable.From the assurance of human and fundamental rights [8, 9], through the application of international instruments, such as the Universal Declaration of Human Rights, or national constitutions, to national or local norms that authorities, companies and citizens must comply with, cities are, in fact, very often in the centre of the application (and also the adjudication) of law.In what respects securing rights of inhabitants in the cities, especially regarding environmental issues, reference must be made to a more recent right of the public to participate in decision-making processes, under the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which was adopted on 25 June 1998 in the Danish city of Aarhus.The Aarhus Convention entered into force on 30 October 2001, establishing a number of rights of the public (individuals and their associations) with regard to the environment. States which are parties to the Convention are required to make the necessary provisions so that public authorities (at national, regional or local level) will contribute to these rights to become effective. The Convention provides for the right of everyone to receive environmental information that is held by public authorities ("access to environmental information"); the right to participate in environmental decision-making; and the right to review procedures to challenge public decisions that have been made without respecting the two aforementioned rights or environmental law in general ("access to justice").It is, in fact, a form of increasing the ties between law- or decision-making and the people, once "the public sphere can best be described as a network for communicating information and points of view (i.e., opinions expressing affirmative or negative attitudes)" [10].Following the words of Anne Barron, who certainly would agree with this viewpoint, clearly demonstrating the connection between law and the world around, it is essential to emphasize that:"[S]ince law also speaks the language of the system, it can function as a bridge between lifeworld and system, and a vehicle for the former's defence and reinvigoration. In particular, law can serve as the 'transformer' that converts the 'communicative power' generated by discursive processes in the lifeworld into the 'administrative power' of the state" [11]. Within the so-called autopoietic theories, various authors such as Niklas Luhmann and Gunther Teubner [12], consider that there is an idea of legal "closure", in which law operates autonomously from other disciplines and practices, reproducing and validating itself. As Cotterell would explain:"To adopt an idea of legal closure is to claim that law is self-standing and irreducible or has an independent integrity which is normally unproblematic, natural or self-generated, not dependent on contingent links with an extralegal environment of knowledge or practice" [13]. However, after trying to test autopoietic processes to the reality of cities, from an environmental perspective, Philippopoulos-Mihalopoulos correctly concludes that "autopoiesis does not attempt to change anything, only describe" [14].Consequently, the connection between legal systems and the lifeworld, and in this specific case the urban reality, in its various elements, such as social, ecological or technological, must be absolutely emphasized, once law may certainly play a paramount catalyst role for solving the most varied problems within urban areas.One particular example of the importance that law and governance may represent in city life is the famous Portuguese judicial case *RLx 1-Fev.-1957*, in which the Lisbon Court of Appeal confirmed the judicial order, on a provisional procedure, to suspend the public works of the Lisbon underground train (*Metropolitano de Lisboa*) in an important avenue of the Portuguese capital (Avenida Columbano Bordalo Pinheiro), between midnight and 7 a.m. The reason of that suspension was the continuous working of the machines, which affected the inhabitants' sleep and their "right of existence" (foreseen in the Civil Code and the Constitution of that time) [15]. In 1960, that decision was followed by a similar one, regarding the construction of tunnels for the underground, in which the Lisbon Court of Appel reaffirmed the recognition of the above-mentioned right to existence [16]. Other interesting occurrences of this connection between law and the city in other countries of the world may be referred, such as the *Mazibuko v. City of Johannesburg* case [17], in which the High Court and subsequently the Supreme Court supported the claim and declared as unlawful, discriminatory and unfair the city policy of implementing prepayment water meters. Nevertheless, the Constitutional Court reviewed the previous decisions of the lower courts [18], legitimising the enactment of that policy, namely the application of prepaid meters to poor communities.The same theme was discussed in the United Kingdom, though with a happier ending, once the Water Industry Act 1999, s. 1, definitely prohibited the disconnection for non-payment and the use of prepayment metering devices, after an application for judicial review by six urban councils against the Director-General of Water Services [19].

3. GOVERNANCE AND CITIES

From the area of law to the fields of governance, it is essential at this point to highlight the role that local public officials (namely those who are elected) play in order to comply with those principles and norms that law sets out for them to govern urban territories [20]. How city mayors and representatives are selected, which powers and competences they are entitled to, which services and rights local governments provide and secure (transport, water, electricity, waste collection, etc.), are only some of the

characteristics that may differ from one city to another and that, as matter of fact, depend on historical, cultural or social factors [21]. And administrative procedures, commercial, industrial or environmental licensing, planning and land use are examples of what mayors and their officials must deal with, while having to, simultaneously, be subject to public scrutiny. And each time this referred scrutiny is more and more stringent.Nowadays, with the advancing ICTs, populations have more and more access to information and different realities from other countries and other cities. Consequently, it is easier to compare and benchmark governance models and economic, well-being or sustainability indexes.Therefore, the literature sets out a large number of criteria to evaluate governance structures in urban and metropolitan areas. From economic efficiency to fiscal capacity, regional coordination, land use planning or access and accountability [22, 23, 24]. However, the truth is that in recent times the fields of access and accountability turned to be considered as more and more essential in what regards the relation between public officials and citizens.That is why open data policies [25] have been gaining so much followers in some groups of mayors and their communities. And this new stream in city governance only stops when faced with difficulties caused by privacy and data protection. In what respects privacy and data protection, it should be highlighted that the EU institutions have recently approved a new General Data Protection Regulation (GDPR), through the Regulation (EU) 2016/679, which intends to strengthen and unify data protection for individuals within the EU. As a matter of fact, national and local governments, largely in North American and Europe, have been experimenting sharing their data, what has generated the spread of a vast number of civic-based applications, the forging of new partnerships between civic organizations, and also an increased involvement in civics by the technology community.In effect, open data has been allowing national and local governments to generate city infrastructure outside formal governmental structures, creating new possibilities for innovation and increasing information sharing, which fosters the generation of new partnerships, more innovation, more start-ups, and civic action [26]. At the same time, open data, public participation and engagement represent instruments of enhancing transparency and accountability, which, while following the recommendations of the Aarhus Convention, also close the relation between public officials or representatives and citizens, giving these latter more opportunities of asserting their rights and claiming for a better provision of governmental services.

4. SMART, FAIR AND SUSTAINABLE CITIES

4.1 Defining "smart cities"

The term "Smart Cities" is widely considered as broadly inclusive. In fact, it encompasses "almost any form of technology-based innovation in the planning, development, and operation of cities" [27, 28]. Within the European Union (EU) the term "smart city" almost has an official status, with the European Parliament having issued a study ranking cities based on their performance in governance, human flourishing, liveability, mobility, economy, and environment, assuming that:"the idea of Smart Cities is rooted in the creation and connection of human capital, social capital and information and Communication technology (ICT) infrastructure in order to generate greater and more sustainable economic development and a better quality of life" [29]. According to the referred study, the European Parliament adopted the following working definition for "smart city": "a city seeking to address public issues via ICT-based solutions on the basis of a multistakeholder, municipally based partnership."Nonetheless, other suggestions have been presented, such as the idea that a city is smart when the use of information and communications technology (ICT) makes:"the critical infrastructure components and services of a city – which include city administration, education, healthcare, public safety, real estate, transportation, and utilities – more intelligent, interconnected, and efficient" [30], as well as the approach "that cities are systems of systems, and that there are emerging opportunities to introduce digital nervous systems, intelligent responsiveness, and optimization at every level of system integration" [31]. Other interesting definition is based on the idea that a city may be called "smart" when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure are used to "fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance" [32, 33]. As a matter of fact, according to the possible definitions presented above, the inclusion of urban fairness or inclusiveness [34], public participation and sustainability is absolutely accepted to be included in the term of "smart city", if the so-called intelligence that is present in the city (from ICT to open data) is used for improving those indicators, through innovative, open and analytical solutions, which are available for all.

4.2 Application to practical realities

As a matter of fact, in order to promote a more general movement of building smarter, but also fairer and more sustainable cities, there have been approved and released several instruments, reports and agendas regarding urban policies for more sustainable communities and consequently improved well-being of urban populations. One of the first relevant documents of the new millennium in this area was the *Bristol Accord* (December 2005), which was approved by the Ministerial Informal Meeting on Sustainable Communities in Europe, under the British presidency, and consisted of eight characteristics of a sustainable community, and a commitment to share good practice case studies. The mentioned characteristics were the following: (1) Active, Inclusive and Safe – fair, tolerant and cohesive with a strong local culture and other shared community activities; (2) Well Run – with effective and inclusive participation, representation and leadership; (3) Well Connected – with good transport services and communication linking people to jobs, schools, health and other services; (4) Well Served – with public, private, community and voluntary services that are appropriate to people's needs and accessible to all; (5) Environmentally Sensitive – providing places for people to live that are considerate of the environment; (6) Thriving – with a flourishing, diverse and innovative local economy; (7) Well Designed and Built – featuring quality built and natural environment; (8) Fair for Everyone – including those in other

communities, now and in the future.The *Bristol Accord* was followed by the *Leipzig Charter on European Sustainable Cities*, under the German presidency of the EU in 2007, where ministers recommended to: (1) Making greater use of integrated urban development policy approaches, through (i) Creating and ensuring high-quality public spaces, (ii) Modernizing infrastructure networks and improving energy efficiency, (iii) Proactive innovation and educational policies; and (2) That special attention is paid to deprived neighbourhoods within the context of the city as a whole, through (i) Pursuing strategies for upgrading the physical environment, (ii) Strengthening the local economy and local labour market policy, (iii) Proactive education and training policies for children and young people, (iv) Promotion of efficient and affordable urban transport [35]. In 2010, the *Toledo Declaration* was approved, under the Spanish presidency of the EU, with the following principles: (1) on addressing the current urban challenges and implementing the Europe 2020 strategy by achieving a smarter, more sustainable and socially inclusive urban development; (2) on supporting the continuation of the Marseille process and the implementation of the European Reference Framework for Sustainable Cities (RFSC); and (3) on the need to consolidate a European urban agenda in the future. In addition, the ministers of the EU also Reference Document on integrated urban regeneration and its strategic potential for a smarter, more sustainable and socially inclusive urban development in Europe.Following these initiatives, the European Commission (EC) released in 2011 a report named *Cities of tomorrow - Challenges, visions, ways forward*, which tried to assess the state of the art of European cities, as well as contribute with solutions in the following themes: (1) Towards a European vision of the city of tomorrow; (2) A European urban development model under threat; (3) The main challenges for the Cities of tomorrow; and (4) Governance – how to respond to the challenges. Among its conclusions, it should be emphasised that a coherent approach to smart, inclusive and green growth strategies must be adopted, and once social exclusion and increasing spatial segregation will affect a growing number of regions and cities, governments (particularly local ones) should pay special attention to deprived neighbourhoods in order to foster more equality. The relevance of urban policies is, therefore, demonstrated through the choice of introducing in the Strategy Europe 2020 the theme of sustainable urban development as a priority intervention domain.Although the EU has developed a large array of "soft-law" solutions for fostering sustainable and inclusive urban development, the World Bank has also released relevant documents in this area, such *Cities and Climate Change: An Urgent Agenda*, in 2010. Moreover, the World Economic Forum created the Global Agenda Council Future of Cities Progress (2014 – 2015), which released the *Top Ten Urban Innovations*: (1) (Digitally) Re-Programmable Space; (2) Waternet: An Internet of Pipes; (3) Adopt a Tree through Your Social Network; (4) Augmented Humans: The Next Generation of Mobility; (5) Co-Co-Co: Co-generating, Co-heating, Co-cooling; (6) The Sharing City: Unleashing Spare Capacity; (7) Mobility-on-Demand; (8) Medellin Revisited: Infrastructure for Social Integration; (9) Smart Array: Intelligent Street Poles as a Platform for Urban Sensing; (10) Urban Farming: Vertical Vegetables. At the same time, the UN-Habitat's Cities and Climate Change Initiative (CCCI) continues seeking to enhance the preparedness and mitigation activities of cities in developing countries, in order to foster well-being and equality in urban territories, which continues to be a real challenge these days. As a matter of fact, the already referred UN-Habitat's *World Cities Report 2016* and the launching of the "City Prosperity Initiative" – which aims to promote innovative approaches to urban governance and management to assist metropolitan leaders in guiding their cities towards economically, socially, politically and environmentally prosperous urban futures – are examples of the work developed by this UN programme.

5. CONNECTING ALL THE ELEMENTS

However, even domestically countries are implementing strategies for fostering urban sustainable development.A recent comprehensive effort of connecting law, governance and cities was the Portuguese Strategy for Sustainable Cities 2020, which was approved by the Resolution of the Council of Ministers no. 61/2015, of 16 July [36]. Based on the previously released international and European legal and policy instruments, the referred strategy recommends the appliance by national and local governments of solutions to inform and integrate citizens in the design and implementation of sustainability measures and urban efficiency, making cities able to be more sustainable, more resilient and greener, where governance and citizenship reach high levels of excellence, and following similar lines as the recent norms *ISO 37120:2014* – Sustainable development of communities Indicators for city services and quality of life, and *ISO 37101:2016* – Sustainable development in communities – Management system for sustainable development – Requirements with guidance for use, which represent an important step forward in measuring sustainability indicators in urban communities.This strategy presents cities as extremely complex systems, gathering in the same space a multiplicity of actors, goods and activities, which interact with each other in a profusion of fluxes and interchanges. Consequently, capturing the way cities operate is an increasingly fundamental issue to improve the performance of urban systems and to mitigate the effects of the urban footprint on the environment and on people's lives. In this sense, the mentioned Strategy suggests: more prosperity; more resilience; more health; more justice; more connection; and more cognition in the cities.In effect, exactly basing their ideas on the challenging theme of resilience, some authors from different latitudes, such as Craig Anthony Arnold [37] or Jonas Ebbesson [38], have been trying to suggest solutions and methodologies, at legal and governance levels, in order to enhance the so-called social-ecological resilience, which could be briefly defined as the capacity of a system to withstand a disturbance and maintain the same basic processes and structures, dealing with change and continuing to develop [39]. Consequently, from a social-ecological perspective, it should be possible to give inhabitants the chance of participating in different processes, such as planning, government decisions and law-making in the city, in order to improve well-being and social-ecological quality.At this point, once the capacity of cities to build social-ecological resilience and adaptive capacity will depend, at least in part, on the legal system and frameworks that shape and constrain cities, Arnold suggests a new paradigm, which he calls "adaptive law," to replace features of the legal system that are usually seen as rigid and ignore interrelationships among social and ecological systems, emphasize front-end prescriptive rules, and generally are ill-equipped to

adapt to rapid, unexpected change [40]. Therefore, arises the proposition of the implementation of new mechanisms of law and governance, following the same characteristics of adaptive planning, which is:"(…) an iterative and evolving process of identifying goals and making decisions for future action that are flexible, contemplate uncertainty and multiple possible scenarios, include feedback loops for frequent modification to plans and their implementation, and build planning and management capacity to adapt to change. It is planning that seeks to adapt to the complexity of systems and actors, conditions of uncertainty and unpredictability, and the dynamism of environments characterized by instability and rapid nonlinear changes" [41]. Simultaneously, Ebbesson states that, although not homogeneous in its conclusions, literature on resilience widely agree on the following factors and conditions:

"1. *Flexibility* in social systems and institutions to deal with changes.
2. *Openness* of institutions so as to provide for *broad participation*, not least in local decision-making and administration.
3. Effectiveness of *multilevel governance*.
4. Social structures that promote *learning and adaptability* without limiting the options for future development."

These flexible, adaptive and open mechanisms are, in fact, essential characteristics that law and governance must have if intending to play a relevant role in the construction of smarter cities. In effect, communities will have access to new dynamic mechanisms and to a revolutionary reality of adaptive or even (why could it not be said?) "smarter" law and governance [42].

6. CONCLUSIONS

Being adaptive is no more than being smart, perceptive or responsive. With the reality of "big data", social media and the continuous changes of a fast-moving society and an extremely uncertain environment, legislators and decision makers must be more aware than ever of what happens around them. Because people who live in smart cities want fast and precise responses to their daily questions and problems.Following the words of Benjamin Cardozo, who was an Associate Justice of the Supreme Court of the United States from 1932 to 1938:"Existing rules and principles can give us our present location, our bearings, our latitude and longitude. The inn that shelters us for the night is not the journey's end. The law, like the traveller, must be ready for the morrow. It must have a principle of growth" [43]. Therefore, legal systems and governance models of urban areas must be always prepared to grow, to evolve and to adapt to changes and uncertainty – from energy and microgrids, to *interwebs*, local service delivery and local political participation.Being smart, flexible, open, multileveled and capable to learn with the so-called feedback loops of society and nature, using new legal and decision-making mechanisms, is the secret for legislators and public officials to better respond to the needs of the population and providing them the best quality of city services and granting them the maximum level of well-being, which all human beings need and deserve.

ACKNOWLEDGMENT

The study was completed with the support of the Portuguese Foundation for Science and Technology, as well as Nova Law School and Nova Information Management School, Universidade Nova de Lisboa, Portugal.

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BIOGRAPHY

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

The New Building on Historical Fabric and Cultural Sustainability: Istanbul Courthouse Experience

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Abstract

The aim of this research is to analyze the construction process of Istanbul Courthouse on the frame of cultural sustainability and design a new building on a historical environment also the obtained experience and results with this process are discussed in the context of historical environmental conservation. The scope of the research is the Istanbul Courthouse Building. The design and construction of Istanbul Courthouse were spread to an extensive and extremely contradictive process from 1930's to 1970's. The area where the Courthouse is built has a rather complicated problem. The Courthouse is in a position overlooking Sultanahmet Square where the historic Ibrahim Pasha's Palace is and the Byzantine St. Euphemia Church remains. The locational features of the building have brought many controversies. Especially many archeologists and architects of the time worried that this structure would harm the remains of Byzantine churches and Ibrahim Pasha's Palace and voiced criticism in various platforms. The main materials of this research consist of articles and remarks that were published in the newspapers and magazines of the period, and also maps, projects and other visual materials. In this research, a method based on examining the historical sources in detail and chronologically scrutinized and analyzing comparatively was followed. In this context, old-new relationship and historical preservation understanding over the design and construction process were evaluated. The research is quite interesting in terms of the design and construction process of the building which respects the transformation and understanding of Turkey from 1930's to 1970's historical preservation, monumentality, power and modernity representation, old-new relationship. The experience and results obtained from these discussions are thought to contribute the principles and argues which are about specifying the form and types of the buildings to be construct in the historical area.

Keywords: cultural sustainability, conservation, renewal, Istanbul.

1. INTRODUCTION

Historic urban sites and traditional buildings are the most important evidence of the past life style. The protection of these cultural values in the context of conservation and revitalization of architectural heritage is in a sense the preservation of culture. This protection is the effort made by the society between its past and its future. The main goal of conservation is to enliven cultural properties by evaluating their architectural, historical, environmental, visual and aesthetic characteristics ([1]-[2]). The development of conservation principles in the second half of the 20th century has been regarded by many as the most significant achievement of conservation activities internationally. These principles or guidelines, promulgated either as charters, recommendations, resolutions, declarations or statements, were drafted and adopted mainly by international organizations, such as UNESCO and ICOMOS, with the aim to protect cultural property, which includes historical monuments, buildings, and groups of buildings, sites and towns around the globe, against various threats [3].Addition to historic settings has always been a big issue in the preservation field. There have been many discussions about the proper way to approach a historic context when it is in need of development to create more usable building for a new or expanding use. A critical issue facing decision makers and conservation professionals is accommodating change to heritage places and adding new layers to the historic urban environment in ways that recognize, interpret, and sustain their heritage values. Anatolian cities, which have been home to many different cultures and civilizations in the historical process, define a spatial system that produces many different cultures. Undoubtedly, it is necessary to emphasize the importance of the effects of natural construction such as topography, climate, and material in the formation of the spatial system in question. However, others factors that the basic principles of the construction of the spatial system are social and cultural, as well as the natural structure. The form of arrival of all these components defines the unique identity and character of the settlement [4]. One of the main themes of the conservation and cultural sustainability is desire to be transported to future generations together with the original character of historical surroundings as far as the structures are concerned. In this context, the inevitable debate for the historical cities is the design and construction of new buildings. The problem of design, which already has a multi-dimensional and complex structure, turns into an even more complex structure when it comes to historical textures and cultural heritage. As a matter of fact, the debates about the structure of this problem are going to be discussed with all its dimensions depending on the sensitivity and awareness about the historical textures and environment. The mission of the designer is to contribute to the formation of architectural identity and continuity of built environments in relation to 'traditional texture - new structure'.The results of the design and construction process of the Istanbul Courthouse, which has been quite controversial and extended for a long time, are quite remarkable. The process started with the architectural competition project in

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1935 and continued with the opening of the second congressman of the Ministry of Public Works in 1949, and extended to the 1970s. This design and construction experience of the Istanbul courthouse from the 1930s to the 1970s periodically reflects the transformation and understanding of the new surroundings in terms of conservation, monumentality, representation of power and modernity, old-new relationship in the historical environment.The aim of this research is to examine the construction process of the Istanbul Courthouse building in the context of new building design and cultural sustainability, and to discuss the experience and results obtained in the context of historical environment protection. The experience and results obtained from these discussions are thought to contribute the principles and argues which are about specifying the form and types of the buildings to be construct in the historical area.

2. MATERIALS AND METHOD

The scope of this research is the design and construction of the Istanbul Courthouse, which dates from the 1930s to the 1970s. The Courthouse Palace is located in a position overlooking Sultanahmet Square, where the historic Ibrahim Pasha Palace and the Byzantine Palace belonged to the city. There are Euphemia Church remains (Figure 1). The positional property of the courthouse has brought many controversies. In particular, many archaeologists and architects of the period were concerned that this building would harm the remains of the Byzantine church and the palace of Ibrahim Pasha, and they were criticized on many platforms.

Figure 1.The location of the Istanbul courthouse [5]

The basic materials of the research consist of Istanbul Courthouse Palace and other visual materials such as the maps and the project published in the newspapers and magazines of the period of this construction. In the research, a method based on the analysis of the historical sources in chronological detail and the comparative analysis was carried out. In this framework, the old-new relationship and approach of historical conservation are evaluated through the design and construction process of the building. In this research, a method based on examining the historical sources in detail and chronologically scrutinized and analyzing comparatively was followed. In this context, old-new relationship and historical preservation understanding over the design and construction process were evaluated.

3. FINDINGS

3.1 Legal and Institutional Background

The beginning of the idea of conservation in Turkey is dated to the last century of Ottoman Empire. Initially, this approach only involved movable cultural assets. Later this approach was developed to include monumental structures. The idea of urban planning, which was led by the understanding of 'beautiful city', started to come into being in the 1910s with the approach of Haussmannization, which aims to open the circles of the monuments and reveal them with all their glory.The approach that left the monuments in the middle of the newly opened squares distorted both the traditional urban texture and the destruction of some secondary monuments ([6]-[8]). With the foundation of the Republic, the process of emergence of new and contemporary principles of protection has begun. In the first years of the Republic; the preservation of the historical architectural monuments in the monumental quality is gaining importance. Monumental buildings are preserved in the city development plans and the buildings around them are demolished [9].In 1951, the Law No. 5805 on "The Formation and the Deputies of the Antique Real Estate and Monuments High Council" entered into force. This law defines the principles to be followed in the protection, maintenance, repair and restoration works of the monuments and other immovable monuments which have architectural and historical features that should be protected in Turkey. Monitoring and supervising the implementation of the programs; (GEEAYK) which is obliged to present scientific opinion on all kinds of issues and disputes to be informed by monuments and immovable old artefacts and to be informed by private investigations and board members. The most important event for protection in Turkey is the 1961 Constitution. According to the Constitution, the State is obliged to protect monuments and monuments which are historical and cultural values. The Venice Charter, which was created in 1964, was accepted by Turkey in 1967. It was reorganized by the Law on Antiquities, numbered 5510 and numbered 1710, which was adopted in 1973. Turkey also embraced the Amsterdam Declaration conservation principles, which were announced as the result of the 1975 European Architectural Heritage campaign ([9], [10]).

3.2 First Competition Experience - Project Area Chaos

The need and debates on the construction of the new Courthouse in Istanbul has started with the burning of the present Courthouse (Darulfunun Building) of those days in December 1933. An architectural competition opened for the construction of a

new building in 1935. The chosen project area was Tomruk Area where the State Council (Surayi devlet) Building is located (Figure 3). Within the area which is approximately 18.344 m^2, land and buildings with private property are also included.The project, which was prepared by Architect Asim Komurcuoglu, was chosen as the winner of the competition (Figure 2). Although a protocol was made between Komurcuoglu and the related Ministry regarding the project, the construction of the building could not be started. The smallness of the selected area for the project, the possibility of a more proper location and high expropriation costs were effective in this decision [11]. For this reason, in 1939, it was decided to change the area of the courthouse.

Figure 2. Asim Komurcuoglu's Winner Courthouse Project In The 1st Competition [12]

The new designated area for the courthouse is in front of Sultanahmet Square. It is striking that the historic Ibrahim Pasha's Palace in the area is shown as a free construction area (Figure 4). However, it was later suggested by the Istanbul Zoning Directorate and the Ministry of Public Works that this place is not suitable for the Courtouse due to the necessity of the Ibrahim Pasha's Palace to be kept and the narrowness of street facade.

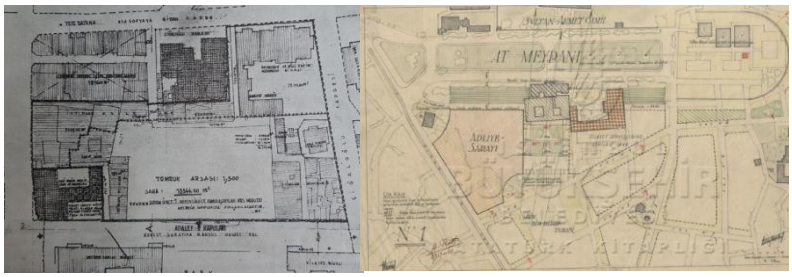

Figure 3.Tomruk Site Project Area [11]

Figure 4.The Second Designated Area For The Courthouse [20]

In 1946, a report with the approval of Justice and Public Works Ministry was published as a result of an examination by a commision consists of seven authorities like Emin Onat, Sedad Hakki Eldem and Henri Prost This report evaluates the location of the Courthouse basically under three main titles which are the cost of expropriation, archaeological remains and symbolic value.First one among these is to be the far above of estimates of the expropriation cost, which is shown as the reason for the cancellation of the first area. The archaeological remains are shown as the second main title. It is striking that the place where the Old Courthouse is located (2nd proposed area) has been abandoned for this reason. It is important to be stated the value of the location as well as reasons such as the lowness of the cost of expropriation compared to other areas, which is shown reason on the acceptance of the last determined area (old prison near in Sultanahmet Square) [11]. Thus, the need to organize a project competition for the 2nd time in the last designated area for the Courthouse has emerged. In this report, it is stated that the most suitable area for the Courthouse is the old prison surroundings in Sultanahmet (Figure 5). This time, historic Ibrahim Pasha's Palace was not shown as a free construction area.

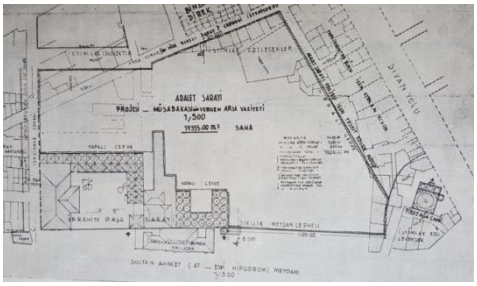

Figure 5. The Designated Project Area For The Second Competition Of Courthouse [11]

3.3 Second Competition Experience - Modernity Emphasis

In 1949 the Second Architectural Project competition for the Courthouse was opened and brought many debates. The archaeological remains of the area from the date on which the project place was declared and the possibility of the collapse of the

Ibrahim Pasha's Palace have been heated debates. One of those debates is the idea that the remains of the Byzantine church identified by the archaeologists A. M. Schneider and R. Naumann, who excavated a few years before the contest date in the region, were important and the project would destroy them. Even suggestions in the frame of these debates were made to build the building to protect such historic remains [13]. However, in 1950, when excavations were started for construction, becoming visible of these remains concretely made the debate flared up. So much so that archaeologists made explanations that they wanted to stop construction. It is also noticed that the expressions used in the periodicals and magazine articles were hardened ([14],[15]). This and similar publications are indicative of a knowledge and sensitivity to archeological remains in the 1950s. However, it is not possible to say that this sensitivity is the same for the administrative power of the period.The second competition for the Courthouse was opened in 1949 by the Ministry of Public Works. There were nine local and foreign officials in the jury such as Paul Bonatz on behalf of the Ministry of National Education, Henri Prost on behalf of the Istanbul Municipality. The final result of the competition was announced in August 1949, together with the jury report. 37 projects participated in the competition. The explanations of the jury reports of the projects that are seen as unsuccessful shed light on the expectations and perspective of the jury. When it is looked at the commentaries on the jury report, the evaluation criteria can generally be summarized under the titles that are suitability of plan solutions, the characteristics of "exterior architecture", the received light sufficiency, the harmony with the near environment (Firuzaga Mosque and Ibrahim Pasha's Palace) and the height of the building. One of the most remarkable points of the report is the emphasis on "exterior architecture". The reason of the failure of many projects is the fact that the facades are "boring" or "old imitation". Projects showing conventional features on the facade seem to have always been eliminated. In other words, a "modern" building, which cuts off the relationship with the old as much as possible was desired. Another important emphasis is the relationship with the nearby environment. The relationship with the immediate surroundings - the emphasizing of facade overlooking the Sultanahmet Square and the "harmony" between the projects and Ibrahim Pasa Palace and Firuzaga Mosque were the criterias which was overstressed. At this point, it should be stated that since the preparation of the project specifications, there is an awareness and sensitivity about the symbolic importance of Sultanahmet Square. However, no criterion or sensitivity to the Byzantine remains in the area is present in the reports nor in the projects participating in the competition.The winner of the competition is Sedad Hakki Eldem and Emin Onat. (Figure 6). The project has been admired in many ways, such as "modesty" of architecture, "a very nice harmony" with surroundings, and sufficient light get into the building [16]. The Courthouse, proposed by Eldem and Onat, is a reinforced concrete carcass structure and is designed in a style close to the international style.

Figure 6. Eldem's and Onat's Winner Project Of The Second Competition [16]

By Eldem's own statement "glasses are used in the maximum but traditional proportions". The building's some features such as its "modern" style which is desired in the period, columnar, a front facade which is a strong emphasis, and simplicity which does not contain any decoration details are important qualities. Also, the admiration of the concrete in the period was a factor in the appreciation of the building by some circles made up of many architects and administrators [17].When the second competition project and assessment principles are evaluated in the framework of historical environmental preservation, it can be said that the relation with the "historical" works in the immediate vicinity of the building and the character of the facade are very important. As a matter of fact, project works that emulate the old in these facade characteristics are regarded as imitations. That the winner project of the competition has the facade character defined as modern is considered as a reflection of the political and ideological approach of the period and the tendency to reject the old.

3.4 A Building With "Unbuilt Head And Body"

In 1951, the foundations of the Courthouse were laid down in company with all these discussions. In the periodicals, information about the building process of courthouse is found. In 1955, due to the objections made to the historical remains, merely the construction of the court parts have finished and the courthouse began to be used. The building has contructed as with Architect Eldem's own words "unbuilt head and body" [18]. The courthouse has built a total of six floors with two floors underground and has 4000 m2 construction area [19]. Until 1961, when Emin Onat passed away, no further construction was undertaken.After 1961, Eldem made new drawings that preserved the remains like a dome (Figure 7). Despite the fact that the project was passed from the Supreme Council of Antiquities and Monuments, these new drawings and the rest of the project have never been implemented.

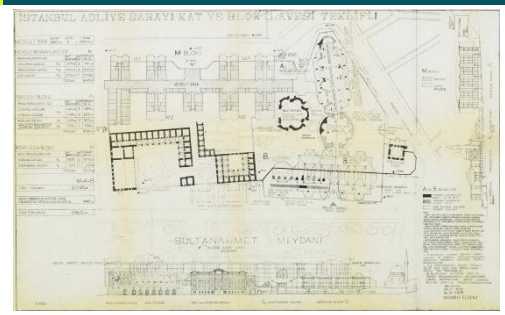

Figure 7. One of Eldem's Revision Project After 1961 [21]

In the 1960s and 70s, the need to expand the palace was repeatedly at the top of the agenda. But it was also opposed to expanding for various reasons. Again, it is the most important reason for the opposition to claim that historical ruins will be damaged. But, there is another important point here. It is noteworthy that the construction of a building which harms the historical remains and the archaeological site would be a proof of international underdevelopment In other words, the insensitivity towards this historical heritage of the Byzantine period is a concern that the republic, which has adopted the ideology of modernism and westernization, will shake its reputation against western countries.

4. RESULTS

The culture of preservation of movable relics, which began in the middle of 19th century in Turkey, seems to be evolve towards the conservation and uncovering of monumental structures together with the 20th century. In the Republican period, it can be said that the ideology of westernization adopted in parallel with the developed western countries of conservation approach. The change experienced in this process can be examined from the example of Istanbul courthouse which is examined within the scope of the research.The debates about the design and construction of the Istanbul Courthouse have turned into the field of ideological conflict between the modern understanding of management and the academic environment that advocates the conservation of the historical environment. As a matter of fact, with the declaration of the Republic, the success of the new regime were tried to be shown in public buildings and public spaces. In this framework, there is a desire to create a new and effective identity in the location decision on the construction of a new public building. In other words, the effect of the new construction is much more than the historical environmental protection. However, the various professionals of the period, unlike the administrators, are discussing and calling on the preservation and awareness of the constant historical environment on various platforms such as meetings, articles, newspaper news. Such criticisms have influenced and altered the design and construction process of the building. In Turkey, the legal structures for the preservation of the historical structure and the environment towards the 1950s were added to agenda. However, in this period, the importance of the public structures and areas for central and local governments is more important according to the concept of environmental conservation. At this stage it is possible to read through the designated place for the construction of the Istanbul Courthouse. Hence, the courthouse is also based on historical texture and archaeological remains. However, in this period, as in the previous period, criticism has continued in academic and professional platforms. With the 1960's, historical buildings, monuments and sites were taken under the responsibility of the State together with the constitution. However, with the adoption of the Venice statute, a new process was beginning. It has been accepted that it should be preserved together with the historical buildings. In the process, only a part of the courthouse was completed and the usage was opened. The rest of the building has never been able to finish.

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Urban Conservation and Development Strategies for Sustainability of Historical Texture in Tarakli, Turkey

Selma Celikyay[1], *Havva Kan*[2]

Abstract

Historical settlements and historical urban fabrics are special areas that reflect urban memory. Historic towns and historic buildings are important witnesses of the past cultures and civilizations. Therefore, in historical environments that have changed and transformed, urban conservation is of great importance from the sustainability of physical and social structure aspects. Urban design studies in the context of conservation are major tools for sustainability these historical heritages. With this approach, traditional timber framed houses of Tarakli in Sakarya were chosen as the case study, on account of being one of the significant historical towns in our country where the texture together with historical buildings is still conserved. Tarakli is an important city center being cultural center of Byzantine and Ottoman civilizations and transmitting historical traces with traditional architecture samples from the past to these days. In this paper, by means of data related to research area, existing urban fabric and problems have been determined and suggestions to realize harmony of traditional fabric and to improve socio-cultural life in the region have been presented.

Keywords: ***Development, historical environment, urban conservation, sustainability, Tarakli.***

1. INTRODUCTION

Historical settlements together with their all components are cultural and historical heritages. They reflect urban memory and life styles in the past.Holistic conservation of historical environments with all components is an important issue adopted all around the world [1]. Although cultural sustainability should be essential approach for conservation programs, modern life has ignored some characteristics of traditional culture [2]. Technological developments have caused cultural changes and thus, conservation efforts have growth difficult. Consciousness on history and living in environment in which historical indicators have can provide wtih the participation of community to conservation process [3].As an open museum, historical settlements exhibit their all components. They demonstrate life style, traditional architecture, building art and building workship in their ages. Historical environments have living value and also reflect urban memory from the past up today.In conservation and renovation of historical environments it should be aimed to protect traditional settlement form, to renovate it in direcion of contemporary life conditions of community, to support historical and cultural sustainability. Therefore, from physical and cultural sustainability aspects in historical environment, in which changes and tranformations are experienced, studies to aim conservation are of great significance. Conservation provides to control of these changes and to prevent them to damage historical environment [4].In historical environments, environmental and cultural values have to be protected in order to create livable and sustainable settlements [1].urban conservation and urban design are two main categories and processes of the studies as important tools aiming conservation and sustainability. conservation plans, urban design projects and design guides can provide sustainable historical environment.It is necessary that historical environments with all physical and cultural values should be integrated with daily life's conditions in the context of protection-reanimation- development. This major aim can be realized by urban design and landscape design process to create urban spaces suitable for both local conditions and historical characteristics of the places [5].

2. MATERIAL AND METHOD

2.1 Material

In the context of this study, historical texture in Tarakli consisting of traditional architecture samples, which is one of the historical settlements in Turkey and which preserved their original structures up today, was selected case area.

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Figure 1.Satellite map of Tarakli (Google Earth, 2016).

Following document have been consisted in material of the study:

- Satellite maps
- Photos
- Current survey
- Scientific knowledge from printed or online resources.

2.2 Method

Methodology of this research was consisted of three topics;

- Collection of data
- Spatial analysis of traditional texture and buildings
- Evaluation and proposals

At the result of the analysis of data regarding to selected case areaactual texture and problems were determined. Urban design and urban landscape design recommendations on creation of harmonic traditional texture and development of socio-cultural life were proposed.

3. SPATIAL ANALYSIS OF TARAKLI

3.1 Traditional Texture

Tarakli is an important historical town which was cultural center of Byzantine and Ottoman civilizations.With monuments and samples of traditional architecture it transmitted all cultural traces from the past to recent days. Tarakli is a first degree urban site area and has 97 certified traditional houses some of which were included first, second and third degree groups to be protected [6].

Figure 2. Historical texture in Tarakli (Google Earth, 2016).

Tarakli is located on a rugged terrain and Goynuk River goes through. The town has a compact historical texture. It was not changed a lot, thanks to its far-field location and the community living there having a small income. Therefore, the buildings in historical texture have preserved their characteristics up to day.Almost all people made a living by making wooden spoon and comb. Hence, the town was named after wooden spoon and comb *(tarak)* made by hand workmanship in the past.

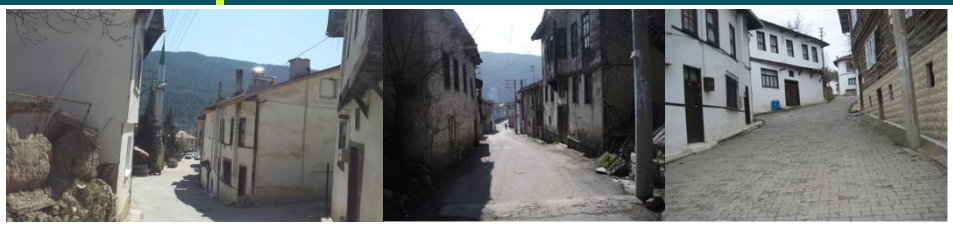

Figure 3. Street structure and narrow streets in Tarakli [7]

Figure 4. Squares in Tarakli [7]

Figure 5. Squares in Tarakli [7]

Figure 6. Streets in commercial district in Tarakli [7]

Recently, streets have been covered with stone block pavement (Figure 3) and squares have been emphasized by cyclical figures on the pavement pattern (Figure 4, 5).Historical texture in Tarakli contains mosques, a bath, five khans and fountains built in Republic Peirod and Ottoman Period, besides of traditional houses. But recently, new buildings have been added to historical fabric of the town.Streets, which are consequent with topography, are quite narrow (Figure 3). Contrary to introversion of some Turkish cities, Tarakli is a settlement facing urban space. This characteristic is observed spatial organization in Tarakli.

3.2 Spatial Relation between Street and House

It was determined that the spatial relation between street and house in Tarakli was constituted in different forms. When some houses with back gardens are directly opened to the street, some houses having front garden are indirectly opened to the street (Figure 7).

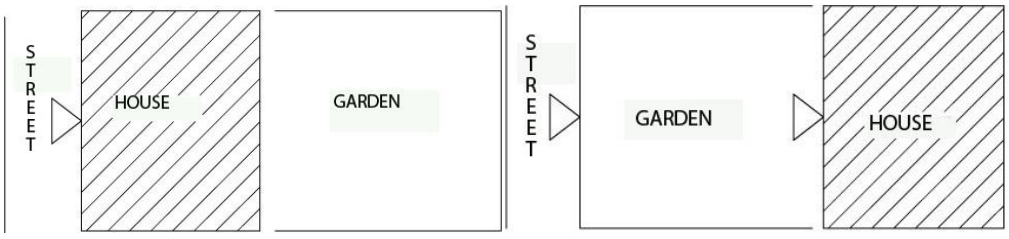

Figure 7. (a) Houses with back garden *(b) Houses with front garden*

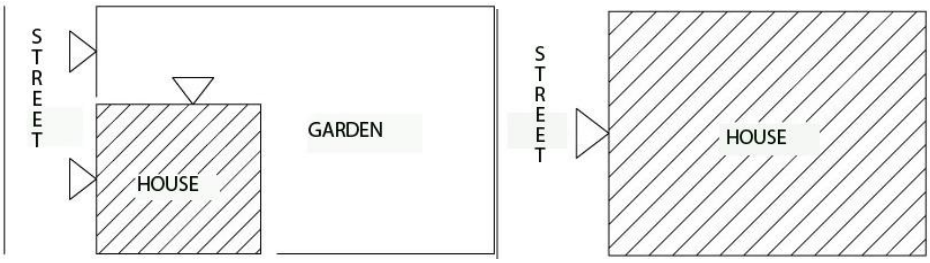

Figure 8. (a) Houses with back and side garden *(b) Houses without garden*

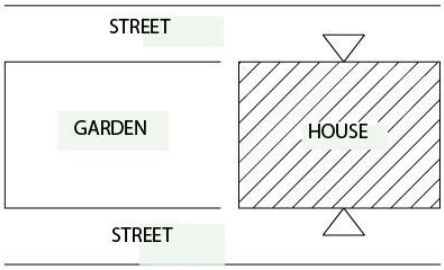

Figure 9. Houses accesible from two streets

In spatial organization in Tarakli houses, direct accessibility to the streets is of importance. When some houses have both back and side garden, it is possible to enter both house and garden from the street. Therefore, as shown in Figure 8 (a), houses have two entrance doors, one of them is street-door and the other is garden entrance door. In some cases, while houses have no garden and directly open to the street (Figure 8b), different cases show that houses between two streets have a side garden and two street-doors (Figure 9).

3.3 Traditional Architecture Samples

Traditional houses in Tarakli are most elementary samples of domestic architecture in 19th century [6]. Rainy climate, large family structure and cultural richness had a great effect on forming traditional architecture in Tarakli. Tarakli houses demonstrate all characteristics of Turkish house type in West Anatolia.

Figure 10. Traditional architecture in Tarakli [7]

Two or three-storey traditional houses were made by wood frame construction techicques. Adobe was used as filling material among frame. Most of them have a central hall. Rectangular shaped windows have timber frames.There are pavilions or balconies on the middle of the facades. These exedras were boosted with pillars or timber columns. Facades were plastered or timber covered (Figure 10). Pitched roofs of traditional houses were covered with pantiles in red color.Pavilions, balconies and several motives on the facades display effective workmanship of ancient ethnic builders lived in Tarakli (Figure 11).

Figure 11. Architectural details on facades [6]

It was observed that new buildings are not harmonic with traditional houses. They have not characteristics of traditional

architecture and unfortunately cannot enable to sustain cultural identity. Owners of the houses have changed, this change causes that spatial organizations of the houses have been changed. As a result of these changes, traditional characteristics of the houses have been damaged.

- Window dimensions have been changed
- Interiors of the houses have been divided to minor units
- Original facade covers have been changed
- Spatial uses have been changed
- New windows or doors have been added to facades

Nevertheless, recently some traditional houses have been restorated by local governance. Although these are promising studies, not enough for conservation of the whole historical settlement. Yet the most house owners are low-income family, there is a need for financial support to house owners, so that they are motivated on conservation and they can success to preserve their traditional houses.

4. SUGGESTIONS

At the result of observation and investigation on historical urban fabric, it was concluded that most of the traditional houses in Tarakli need maintenance or renovation. Firstly, there is an urgent need for determination of conservation zones in Tarakli. Conservation and development strategies should be decided in accordance with the priority of conservation zones. Therefore, conservation planning and renovation projects for historical fabric in Tarakli are important studies to provide holistic conservation of the settlement.In tarakli which consisted of three districts, the district called Yusuf Bey contains most of the traditional houses and buildings which preserved their original characteristics. This unit can be selected pilot zone for application of conservation planning strategies.Yet the streets in Tarakli are narrow for vehicular traffic, it is recommended to give priority pedestrians in historical city center, instead of vehicular traffic so that they keep on their original characteristics.Outdoor spaces should be considered as public space. As an urban space, streets are used for social space by households in which neighbours come together because of that the gardens are located back side of the houses. Therefore, traditional urban furnitures are necessary to be placed in the street. Urban design and landscape design principles should be considered to develop open and public spaces from both visual and spatial quality aspects.Finally, as protection and sustainability principles, following main topics to be adopted have been proposed and accordingly this proposal guide an action plan aiming protection should be prepared.

- Sustainability of historical and cultural identity
- Preparation of historical and cultural heritage inventory
- Determination of typologies regarding traditional architecture
- Determination of unique details in architecture
- Consideration of architectural dimension in facades
- Giving new function to some traditional houses
- Cultural representation of the whole settlement

As a case area for urban design study to take into account above topics, Mimar Sinan Street was selected. It is an important center line in Tarakli. The houses both sides of the street were analysed and some suggestions were developed for providing both conservation and sustainability.

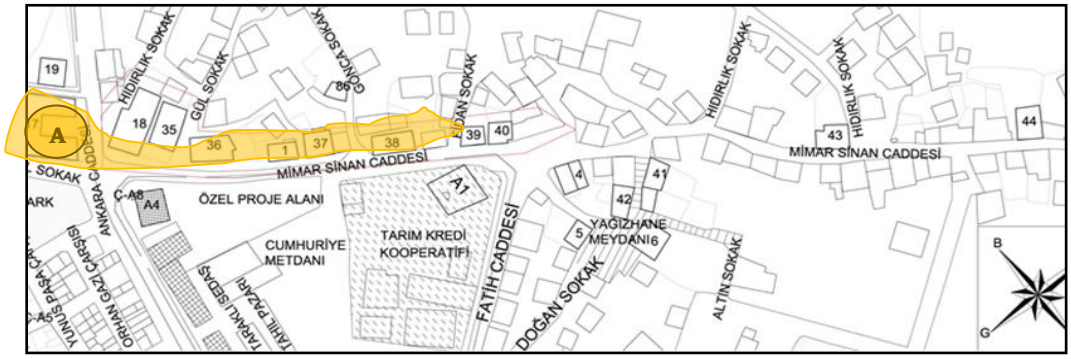

Figure 12. (A) zone on Mimar Sinan Street

Figure 13. Actual and proposal facades in (A) zone on Mimar Sinan Street.

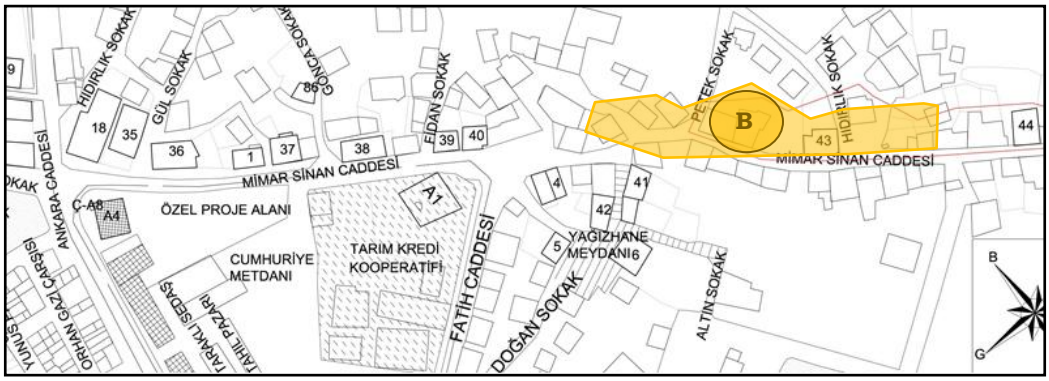

Figure 14. (B) zone on Mimar Sinan Street

Figure 15. Actual and proposal facades in (B) zone on Mimar Sinan Street.

In the context of proposal facades, following constructural or partial interventions in traditional houses have been recommended:

- To make all buildings on the street harmonic with traditional architecture
- To consider window proportions on the facades
- To maintain facades
- To replace old materials with the new original ones
- To restore facade elements in accordance with the original characteristics
- To give new function to traditional houses for tourism uses

Facade analysis and developed recommendations mentioned above is a short summary and a small part of the overall thesis which is the basis of this paper.

5. CONCLUSIONS

With the aim of conservation and development of historical settlements, firstly it should be determined targets, strategies and action plans consisted in holistic conservation program to provide sustainability.Sustainability and transferring of historical and cultural heritage to the next generations require continuous maintenance and repair interventions which should be compatible with their original construction techniques, details and materials. In order to define proper interventions to a historic building, it is necessary to understand how and by which materials it is built. Therefore, traditional construction materials, detailings and techniques should be well understood prior to any kind of intervention to a historic building. From tools to provide conservation and sustainability, priority should be given to that all actors from local administrators to community and households have conscious awareness on historical environment and cultural heritage.As a summary, from protection and sustainability aspects highlights are following issues to guide all process from beginning to end;

- As an action: conservation
- Consciousness on conservation
- Financial support
- Development of tourism potential
- Cultural representation

Tourism is an important tool and a potential to be developed for sustainability. It is recommended that tourism strategies for this aim should be developed. Cultural representation of a historical place is of great importance as much as protection. Conservation is not an action to be realized by not only local administrators and other actors but also local community should has consciousness on conservation. They must aware of their own cultural values and it is necessarry that they have willingness to action process for conservation and sustainability.

ACKNOWLEDGEMENT

This paper is based on the master thesis of the second author conducted with academic consultancy of the first author, in 2009. In addition to the context of the thesis, current information and present conditions of historical environment in Tarakli have been mentioned and some actual photographs have been added to this paper.

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BIOGRAPHY

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19 - 23 April 2017, Sarajevo

Green Bonds As A Finance Instrument For Environmental Projects: The World And Turkey Applications

Gamze Sekeroglu[1], Melek Acar[1], Fatih Guzel[1]

Abstract

Nowadays, the various effects of climate changes are seen on the human life and if no precautions are taken, it is mentioned by the experts that it will be encountered with worse scenarios in the future. So there are variety ways to meet the financing needs that will come from dealing with the problem of climate change on a very global scale, which is closely related to all the countries of the world.The newest of these ways are green or sustainable bonds, which have begun to be issued in recent years and are used only to finance green projects.In this study, the advantages, disadvantages and principles of green bonds, which are more understood day by day, are explained and the applications of the world and Turkey are examined. Finally, the situation of the green bond market is assessed and information about the future potential in Turkey is give.

Keywords: Climate change, climate financing, green bonds, green projects

1. INTRODUCTION

There are many different risks that arise from climate changes on Earth. Global warming is at the top of these risks and it is mostly voiced. Inthisissue, which is meticulously stood on almos tevery sector, the finance sector continues to its activities under the title of "green economy". Because of public awareness and consumer's preference to further eco-friendly products and services, both public and private institutions have increased their financing needs in this issue.The financing of projects to mitigate the effects of climate change is carried out in various ways under the name of climate financing. Mechanisms of climate financing are climate funding, carbon markets and green bonds. The history of climate funding is based on the end of the 1900s. These funds are categorized under various subtitles and it is determined separately which funds will be used for financing of which projects. In 2000s, the system called carbon trade was established. According to this system, a certain amount of green house gas emissions is determined for each country, and countries exceeding this amount are either reducing it or buying emissions from other countries that have not reached the specified upper level. Thus, the amount of green house gas emission determined for the world's generals is not exceeded. In 2007, gren bond was presented to the market as an alternative resource for the financing of green projects. The aim of this study is to contribute to the literature by discussing the current situation in the World and Turkey of green bonds which are one of the methods used to finance of green projects aiming at reduce the effects of climate change and to discuss the future status for green bond market in Turkey and also to make suggestions. In this paper, it is mentioned about climate change, climate economy financing, green bonds and its applications in the World and in Turkey.

2. CLIMATE CHANGE

Climate changes, one of the potential effects of global warming, are often seen as a consequence of there lease of greenhouse gases, especially carbondioxide, into the atmosphere. According to the definition in the United Nations Framework Convention on Climate Change (UNFCCC), climatechange is a change in the climate resulting from human activities that directly or indirectly disrupts the composition of the global atmosphere, in addition to the natural climate change observed in comparable time periods. It is clear from the definition that there has been a great deal of climate change from the World history of thousands years to now, but these changes have been seen to take place more rapidly from the beginning of human history. Especially after the 1950s, there has been a significant increase of human activities affecting the climate.The impact of climate change on the global environment is huge. Therefore, in the fight against it, the whole World needs to be in a common activity and agreement. Because the attempts of enterprises, cities or nations on this issue alone will not be enough, so climate change requires a joint action[1]. As regards international climate change, Swedish scientist S. Arrhenius in the Climate Change and Risks Report in 1896, for the first time noted that the accumulation of carbondioxide in the atmosphere was likely to change climates. However, after almost a century passed, the first international serious step could be taken in 1979 and the 1st World Climate Conference was held [2]. In the following years, various agreements have been signed to reduce the possible effects of climate change.The issue that development of a number of alternative strategies to be followed in response to climate changes was adopted at meetings in

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Austria in 1985 and 1987 and in Canada in 1988. In 1990 in Switzerland (2nd World Climate Conference), 1992 in Brazil (United Nations Environment and Development Conference - adoption of the UN Framework Convention on ClimateChange), 1997 in Japan (Kyoto Protocol) and several conferences held in many different countries in the following years have shown that this issue is being discussed globally in all countries of the world[2].In addition to climate change being a global problem, many countries are struggling to anticipate the effects of climate change. Therefore the climate change effort has a cost to both the world economy and the country's economy [3]. Here, in order to finance these costs, it is utilized from various sources under the roof of the climate economy or the green economy.An easy way to comply with the symposium paper formatting requirements is to use this document as a template and simply type your text into it.

3. CLIMATE ECONOMY FINANCING

In addition to struggle with climate change is a common goal for all countries of the world, the sources of financing that the countries with different levels of development can distinguish for this purpose are vary. Accordingly, the climate funding set for climate financing, carbon financing and green / sustainable bonds were mechanisms for climate financing.

- Climate Funds: In 1992, the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, the issue of the financing of climate change was brought up. The UN Framework Convention on Climate Change, which was adopted at the conference, defined the World Environment Fund as the funding mechanism. These funds provide to support for low-carbon models especially small and medium-sized countries which have cities with rapid growth potential. The French fund, another climate main fund, was set up for partial subsidies to projects in urban transport areas in developing countries. Climate strategy funds, called Climate Investment Funds for clean technologies, were established to support 15 developing countries, including Turkey, in the fight against climate change. Green funding for the climate, which was established at the Cancun climate conference in 2010 but it is currently in the construction phase, is a fund to meet the demand of developing countries[4]. In addition, the Global Environment Fund, which was established to provide financial support to mitigate the adverse effects of climate change, and the Climate Investment Fund, which was established to provide loans to developing countries to adapt to climate change and to mitigate the effects of climate change, are also included in the leading climate change financing programs [5].
- Carbon Finance: According to the definition of the World Bank, carbon finance is used to fund projects for greenhouse gas emission reduction. In other words, it is defined as an economic area that examines the costs of living in regions where carbon emission, one of the factors leading climate change, are high, In the widest sense, market solutions developed against climate change are in the scope of carbon financing [6]. For fighting climate change,the market which is called carbon markets because of carbon dioxide which hasthe highest release in greenhouse gases and the basis for the use of carbon finance which is the market-based economic solution tool, is the market where carbon credits or certificates obtained for greenhouse gas reduction are bought and sold [7]. With greenhouse gas reduction, investors are transferring money to carbon funding by purchasing "emission reduction certificates" from current emission reduction projects or by investing in new climate-friendly opportunities [8]. In terms of the countries, the amount of greenhouse gas emissions of each country is determined and if the amount of emission by the emission trading mechanism exceeds the country's requirement, this excess can be sold to other countries. In addition, countries that have carried out a greenhouse gas release over a determinated release are faced with paying damages according to the Kyoto Protocol [9].
- Green / Sustainable Bonds: Green bonds as different from other bonds are investment sources that are used only to finance green projects, assets and activities [10]. More detailed information related to green bonds, one of the alternative financing tools for green projects, is given below.

4. GREEN BONDS

An alternative option of funding need requiring to cope with the climate change problem, which is predicted to cause significant changes that will directly impact both ecological systems and human life [11], is green bonds. For this reason, green bonds, which have a very important place, have been among the topics discussed in the Conference of Parties (COP) in recent years.Green bonds designed to support green projects which are positive environmental and climatic effects, were first issued by the World Bank and the European Participation Bank in 2007. Green bonds which bond yields obtained are transferred to a different account and the investors are informed about the projects to be used for these yields, have the following features [5]:

- Do not create additional cost to the investor due to the right pricing policy,
- Not having the right to return (recourse) to the issuer,
- Having the same features and payment criteria as other bonds issued by the issuer,
- Creating additional value for the investor by making environmental contribution with the green feature.

According to World Bank reports, although the prices are almost close to each other, the main difference between the green and the normal bonds is green bondholders will be able to sell these bonds at higher prices than traditional ones. The reason for this, green bonds are rarely found in the market yet. Although it does not appear to be a "magical solution" for climate funding, it is

aimed at reaching full potential of green bonds through active government policy and continuing private initiatives in order to contribute to the decrease of climate change [12].

4.1 Green Bond Principles

The Green Bond Principles (GBP) are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the green bond market by clarifying the approach for issuance of a green bond. The Green Bond Principles have four core components [13]:

- Use of Proceeds: The cornerstone of a green bond is the utilization of the proceeds of the bond for green projects which should be appropriately described in the legal documentation for the security. The green project categories mentioned in these documents are renewable energy, energy efficiency, pollution prevention and control, sustainable management of living natural resources, terrestrial and aquatic biodiversity conservation including the protection of coastal, marine and watershed environments, clean transportation, sustainable water management, climate change adaptation, eco-efficient products, production technologies and processes, but not limited only to these.
- Process for Project Evaluation and Selection: In this phase, the issuer of a green bond should outline to determine how the projects fit within the eligible green projects categories identified above, the related eligibility criteria andthe environmental sustainability objectives. In addition, green bond investors may also take into consideration the quality of the issuer's overall profile and performance regarding environmental sustainability, so they decide whether to invest or not.
- Management of Proceeds: The net proceeds of green bonds should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner and attested to by a formal internal process linked to the issuer's lending and investment operations for green projects. So long as the green bonds are outstanding, the balance of the tracked proceeds should be periodically adjusted to match allocations to eligible green projects made during that period.
- Reporting: Issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and as necessary thereafter in the event of new developments. This should include a list of the projects to which green bond proceeds have been allocated, as well as a brief description of the projects and the amounts allocated, and their expected impact.

4.2 Advantages and Disadvantages of Green Bonds

Green bonds, which can be used to finance a broad range of environmental projects, including but not limited to categories such as renewable energy, energy efficiency, sustainable waste management, sustainable land use, biodiversity conservation, clean transportation, and clean water and/or drinking water[14], have some advantages and disadvantages in terms of investors and issuers. These advantages and disadvantages are summarized in Table 1 [10].

Table 10. Green Bond's Advantages and Disadvantages

Advantages	Disadvantages
FOR INVESTORS	
• Investors can balance risk-adjusted financial returns with environmental benefits • Satisfies Environment, Social an Governance (ESG) requirements and green investment mandates • Improved risk assessment in an otherwise opaque fixed income market through use of proceeds reporting • Potential use pure-play, Project and asset-backed securities (ABS) to actively hedge against climate policy risks in a portfolio that includes emissions intensive assets • Recognised by UNFCCC as non-stateactor "climate action"	• Small and nascent (and potentially less liquid) market, small bond sizes • Lack of unified standards can raise confusion and possibility for reputational risk if green integrity of bond questioned • Limited scope for legal enforcement of green integrity • Lack of standardisation can lead to complexities in research and a need for extra duediligence that may not always be fulfilled
FOR ISSUERS	
• Demonstrating and implementing issuer's approach to ESG issues • Strong investor demand can lead to over subscription and potential to increase issuance size • Improving diversification of bond issuer investor base, potentially reducing exposure to bond demand fluctuations • Evidence of more "buy andhold" investors for green bonds which can lead to lower bond volatility in secondary market • Reputational benefits (e.g. marketing can highlight issuer's green credentials and support for green investment) • Articulation and enhanced credibility of sustainability strategy ("Money where your mouth is") • Access to "economies of scale" as majority of issuance costs are in setting up the processes	• Upfront and ongoing transaction costs from labelling and associated administrative, certification, reporting, verification and monitoring requirements (costestimatesvary) • Reputational risk if a bond's green credentialsarechallenge

In addition to the above, a panel titled "Business Response: Green Bonds" was held on July 15, 2015, discussing the advantages and disadvantages of the green bond market.In this panel, it was emphasized that green bond issues will increase over the next five years and some innovations such as the creation of a pool of green mortgages within ABS can be made. Thus, as a result of the innovations introduced, the green bond market achieves a continuously improving market quality, which is an advantage for this market. In addition, compared to ABS, it was also among the advantages emphasized in the panelthat the discounted prices can be applied in the context of green projects such as green car loans, solar leases, and commercial energy efficiency [15].Green bonds are also considered ideal for investors who want to be sustainable. As a result, people are buying bonds with great enthusiasm that they think to provide extremely important contributions to the environment and these bond's issues are increasing day by day. The bonds issued in 2014 are worth threefold as much as those issued in 2013. Now, however, there are some questions about these bonds. These question are in the direction of whether or not there is a difference between the green bonds and the other bonds. Although some companies do not have environmental responsibility known as "greenwashing", they show themselves like that.So, by this way, they sell their bonds, which are not actually green bonds, thus they deceive society [16]. This situation creates a disadvantage for investors, and it can lead to a loss of reputation for companies issuing green bonds by this way.

4.3 Green Bond Applications in The World

Green bonds aimed at financing eco-friendly projects were first issued by the Development Banks led by the World Bank in 2007.While the amount of green bond sissued worldwide was around $ 806 million that year, the issuing trend in the following years is as shown in Figure 1 [17]-[18]:

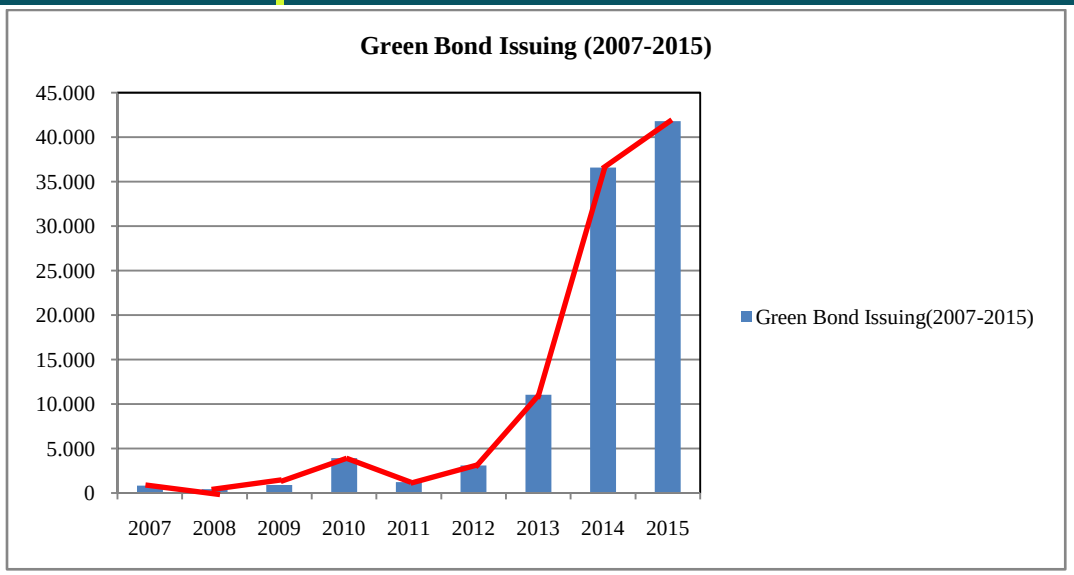

Figure 1:Green Bond Issuing Trend by Years (Million Dollars).

In 2008, with the impact of the global economic crisis, while green bond issuing decreased to $ 414.284.450, this figure was $ 909.372.500 in 2009 and in the following years are $ 3.904.688.904, $ 1.219.282.424, $ 3.101.960.463, $ 11.042.322.319, $ 36.593.334.453, $ 41,8 billion respectively. It is estimated that the bond issue occuring around $ 28 billion in the first six months of 2016 will increase to about $ 100 billion by the end of 2016 [17]. According to the growth trend in recent years, it is expected that green bonds will become more preferred in the coming periods.Green bonds were issued in 2007 when it was first issued only by development banks, but now they are also issued by governments and large companies [19]. The first corporate green bonds were issued by the French Electricity Company EDF, Bank of America and the Swedish real estate company Vasakronan and the amount of these bonds grew rapidly day by day. The green bond issued by GDF Suez, which opened Suez Canal in March 2014, reached € 2.5 billion and therefore it is the largest green bond in the corporate market. But the highest green bond issuer in 2014 is the European Participation Bank whose bonds are Climate Awareness Bonds with $ 3.53 billion value. The World Bank issued 100 green bonds in 18 different currencies with $ 8.4 billion value as of June 30, 2015. Since 2013, municipalities and local governments, especially Massachusetts State has started to issue green bonds. Massachusetts, New York and California in America, Ontario in Canada, Gothenburg in Sweden and Johannesburg in South Africa are among the local governments that issue green bonds [5].As a major consumer goods company, Unilever issued $ 416 million worth of green bonds in March 2014 and 40% of these bonds were purchased in a very short period of time. In addition, while 75% of the benchmark bonds of the African Development Bank were generally taken by Central Banks and other official institutions, more than 70% of the green bonds issued by the Bank in October 2015 were invested by asset managers, insurers and pension funds [20].In July 2016, it is reported issuance of the first green bonds of $ 3 billion by Bank of China in the Luxembourg and New York branches. According to the Bank's statement, the issue of green bonds is demanded by more than three times the amount issued in international markets and 76% of these demands come from Europe. On the other hand, the green bonds, issued by the Bank of China with a maturity of 2, 3 and 5 years Euro and Yuan denominated, are at the same time the largest issue amount in the international markets(www.uzmanpara.milliyet.com.tr).Green bonds are expected to be one of the most innovative and in demand financing sources in the coming period. It is also about the establishment of special markets for green bonds. In September 2016, the first capital market platform to deal with green bonds in Luxembourg was established [21].

4.4 Green Bond Applications in Turkey

The United Nations Framework Convention on Climate Change, the first inter-governmental agreement aimed at reducing the effects of human-induced climate change by reducing greenhouse gas emissions in the atmosphere, was opened for signature by the United Nations in 1992 at the Rio Environment and Development Conference. The agreement was signed by 191 countries and the European Union at that time came into force on March 21, 1994 and the Conference of Parties (COP) began to be held every year since 1995 in the direction of this agreement. These agreements generally aimed at regulating the general principles, action strategies and obligations of countries in the direction of reducing greenhouse gas rates in the atmosphere [22].As a result of the 21st Conference in Paris in December 2015, agreements were entered into with the signatures of about 200 countries to struggle climate change and to accelerate and increase the actions and investments needed for a sustainable low-carbon future. One of the important decisions of COP 21 is to limit the total greenhouse gas emissions and to increase the global temperature to maximum of 2 degrees, or if possible even 1.5 degrees, in addition to the actions to be taken and their binding. According to the BBC, 10 countries with the highest carbon emission per capita are shown in Figure 2. Turkey Statistical Institute announces annual 6 tons of carbon emissions per capita. Although the amount of carbon emission per capita in Turkey is low compared to

the countries in the Figure 2, even so Turkey assumed to reduce greenhouse gas emissions in 2030 to 219 million tonnes by 21% instead of 1,175 million tonnes in total at COP 21 [23].

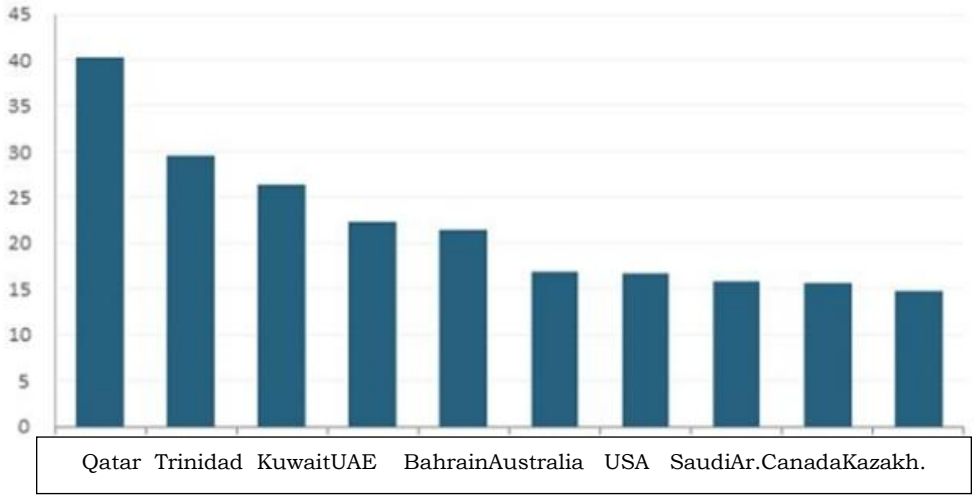

Figure 2: Ten Countries with the Annual Highest Carbon Release.

According to Ministry of Environment and Urbanization; Turkey, signing this agreement on April 22, 2016, places great importance on struggling climate change and sharing knowledge and experience related to this issue. According to the statement made by the Ministry, Turkey informed the Secretariat of the United Nations of its candidacy to host the 26th COP to be held in 2020 in Antalya.Green bonds are market that started to be implemented with the World Bank's new climate change program since 2008 and rapidly grew with the issuing of corporate green bonds to investors in 2013. In Turkey, the first application on this issue was realized by the Industrial Development Bank of Turkey (IDBT). The IDBT issued Turkey's first green bonds with $ 300 million value and five-years maturity with the aim of supporting sustainable development, in May 2016 [24]. The IDBT was deserved the "Green / Sustainable Bond Issue of the Year" award in Europe, Middle East and Africa Region within the scope of the Sustainable and Responsible Capital Markets Conference organized by Euromoney and GlobalCapital. In addition, in early 2017, the IDBT received the "Sustainable Bond of the Year Award" from the International Finance Review (IFR) magazine, so that the IDBT received two awards with this first green bonds issue [25].Furthermore, an international panel titled "The New Climate Change Regime: From Paris to Antalya" was organized by the Ministry of Environment and Urbanism in May 2016, showing Turkey's care about green bonds issued to use in financing of sustainable growth. It was also discussed the possible actions for the new climate change regime and related issues at the Panel by discussing the actions necessary for the effectively aplication of the Paris Agreement [26].

5. CONCLUSIONS AND RECOMMENDATIONS

Although the potential impacts of global climate changes have not been fully felt around the world yet, there has been significant changes that will directly affect all life on Earth as a result of global warming. Therefore, if no measures are taken to prevent these climate changes, it is the common opinion of all experts that the world will be out of a habitable area. Everyone on Earth has to be aware of the responsibilities, especially industrialised countries that have more impact on global warming. For this reason, it is inevitable that whole humanity develops different ways and methods for the same purpose in solving the problem.The financial sector is also working on the topic of green economy. Particularly in 2008, it is seen that the importance given to the green economy has increased with the steps taken by the United Nations and the efforts to provide the necessary financing for the planned investments and analyzes for the green projects have accelerated. The latest development in this area is creation of the green bond market.Initially, the purpose of the green bonds issued under the leadership of the World Bank is to use the incomes of the bonds to finance the green projects. Although the amount of green bonds issued to the market up to this time from the first issuing year has reached 10 times, more work needs be done to develop this market. Particularly in Turkey, various introductory activities should be organized by the ministries or by IDBT, which is the first green bonds issuer in Turkey, in order to increase the knowledge level and interest to green bonds of investors.A point about green bonds is that projects used to bond returns should be well distinguished. In other words, it is very important to remove the question marks about which projects are really green projects. Therefore, the various standards introduced in the green projects will make the market more attractive and useful by ensuring that the market is free of uncertainty. As a matter of fact, the green bond principles created on the purpose of transparency, openness and integrity in related investments by investment banks are critical point. However, it is still emphasized by some experts that these principles should be more developed.It is said that there has been an explosion in the international green bond market by all sectors. Although Turkey is unaware of this, it is indicated that the demand for these bonds comes from especially conscious institutional investors focusing on the field of sustainability and sold billions dollars of bonds after only few minutes of issuance. In fact, it is known that the interest shown in the works on sustainable investments in Turkey is closely

followed by some segments. Nevertheless, the important point is that every country, including Turkey, should not only demonstrate at meetings they attend, but also take the necessary steps to make investors conscious of this issue.

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19 - 23 April 2017, Sarajevo

Sovereign Wealth Funds: A Comparison Of The Turkish Sovereign Wealth Fund With The World Samples

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Abstract

Sovereign wealth funds represent unity of assets that are directly or indirectly under public control and whose investments are largely concentrated across borders. Strategic objectives of the sovereign wealth funds are accumulating income surpluses for future generations or restoring the economic order and stabilizing it over the years when volatility is intense. Turkey decided the establishment of sovereign wealth fund in 2016. In this study, firstly, information on the practices of sovereign wealth funds is given. Then, the differences between the Turkish Sovereign Wealth Fund and existing samples are revealed. As a result, criticisms have been brought about the establishment and the operation process of the Turkish Sovereign Wealth Fund. Recommendations regarding the structure of the audit system and the management organization have been presented. The Turkish Sovereign Wealth Fund is a strategic step for Turkey, if it is managed properly, transparent and reliable.

Keywords: ***Portfolio management, Strategic planning, The Turkish Sovereign Wealth fund***

1. INTRODUCTION

As a result of the structural transformations in economies after World War II and the rapid evolution of financial liberalization after the '80s, the importance of the economy has increased in politics and international relations. However, a robust economy, has become a significantly important weapon in the hands of the countries for being a center of power and balance in the international arena. Governments are constantly introducing new policies and new financial instruments to ensure stability alongside economic effectiveness. One of these instruments is the national wealth funds, which have different forms of practice in various countries. National wealth funds have been used for over 150 years, the real increase in the number of such funds has been experienced since 2000s. In addition to the quantitative increase, the expansion in economic size and the effective use of funds have led to intense debate in the perspective of the principles of budget unity and transparency in general. Despite this, more than 80 funds operate in more than 40 countries today.In this study, information about national wealth funds, their place in the country's economy and the Turkish Wealth Fund are given. In addition, the Turkish Wealth Fund is compared with wealth funds in other countries, and critics and suggestions are presented.

2. NATIONAL WEALTH FUNDS AND PURPOSES

Although sovereign wealth funds have been used in more than 150 years in economy management, they have made a major leap since the 2000s. The first example of the wealth fund was created in 1854 by the Texas State Legislature in the context of private-public service. On behalf of the benefit of education and public schools, the Texas Permanent School Fund was established with $ 2 million in grants. The sale and acquisition of land owned by the state are shown as a source of funds [3]. In the present sense, national wealth funds have been operating since the 1950s and becoming increasingly important players in the international money and financial system. [4].National wealth funds are used in different ways depending on socio-economic and cultural conditions [3]. The wealth fund is a pool of assets that are in the possession or control of the state, investing heavily in the assets of other countries [8]. Another definition is the state-controlled investment institution financed by the current surplus reserves of the country [5] . Although there are more explanations in the literature, there is no generally accepted definition. For this reason, it would be more descriptive to indicate common elements of wealth funds. Features that can be counted as common elements [29]:

- National wealth funds are state owned.
- The liabilities to the other side are very limited or none at all. This increases risk appetite.
- It is managed separately from official foreign exchange reserves. Because investment objectives and areas are different from each other.
- Most or all of the fund is invested in foreign assets.

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While some countries create more than one wealth fund for a single target, others use one fund to reach different targets [9]. Generally, the types of funds created by governments and the purposes they serve are listed as follows [14], [15]:

- ***Stabilization funds:*** Countries with rich natural resources are set up to isolate the budget and the economy from the volatility of commodity (usually oil) prices. Funds are created for years with high fiscal year revenues and prepared for years when there is a downward trend.
- ***Saving funds:*** Funds are established to transfer richness and wealth to future generations. Countries with rich natural resources are transferring savings funds obtained from non-renewable sources to an internationally diversified portfolio to transfer to future generations or to achieve other long-term goals.
- ***Reserve investment companies:*** Funds set up to reduce the negative carrying costs of assets to be held as reserves or to monitor higher return on investment policies and to increase the reserve profitability. Often, assets in this context preserve the reserve nature.
- ***Development funds:*** Funds set up to finance industrial socio-economic projects, such as infrastructure, or to support industrial policies that could increase the output growth of the country.
- ***Retirement reserve funds:*** The provisions made for non-contingent pension liabilities (from sources other than private pension contributions). These funds are the source of reserves for payments that may arise from unpredictable dates and amounts of pensions.

In summary, the main objectives of wealth funds are to assess savings effectively and in the long run, to protect the economy against crises, to reduce imbalances between economies, to provide economic prosperity to future generations and to increase the international effectiveness of the country [1], [24].
Income from balance-of-payments, official foreign exchange transactions, privatization revenues, fiscal surpluses and / or commodity issues constitute the basis for national wealth funds. [18]. In order to establish the wealth fund, there is a need for income surplus than the source selection. Depending on the nature of the surplus resource, the funds may be subject to a general classification as commodity based or non-commodity-based [32]. Commodity-based funds are based on the income generated from the exported assets. Natural gas, especially petroleum, copper and minerals are the commodities that provide resources for wealth fund. Funds that are not based on commodity are based on pension funds and foreign trade surplus, etc.

3. THE PLACE AND IMPORTANCE OF THE NATIONAL WEALTH FUNDS IN THE ECONOMY

The wealth fund will present a very high value added outcome, such as acquiring companies and managing global brands, expanding the current marketplaces, and providing competitive advantage with new information and technologies. Naturally, the return on such an investment is not limited to that. As a result of the trade made through this company, the company's customers, suppliers, and stakeholders in general terms will provide value added [26]. Another way to get a global company is to buy a company or merger. For these activities, large-scale funds are needed. One of the sources that have been actively used for economic development in the last half century is the sovereign wealth funds. Wealth funds differ because of systematic resource transfer from public savings, the ability to be a stabilization tool, and a longer-term investment horizon compared to other funds [31]. Company investments are not a goal for wealth funds, but rather a step where the fund rises above to its targets. Wealth funds aim to protect the income generated by the country's natural resources from political aspirations and conflicts and use it for the well-being of its citizens and future generations. In addition, overvaluation of the country's money due to the surplus of income and the reduction of the competitive advantage of the country (Dutch Disease) are also indirectly a reason for the establishment of wealth funds [30]. The past half-century and especially the 2000's, have been a period in which structural breakdowns for the world economy have experienced one after another and economic crises have affected long years. Governments have also established wealth funds as a stabilization tool, as well as taking a variety of measures to prevent or mitigate economic devastation. Sovereign wealth funds have been tasked with a breakwater mission, to prevent the volatility and crisis from worsening the economy. In Figure 1 [19], sovereign wealth funds are grouped according to the years they are established. After 2000, the increase in the number of funds is noteworthy. Two thirds of the sovereign wealth funds were established after this date.

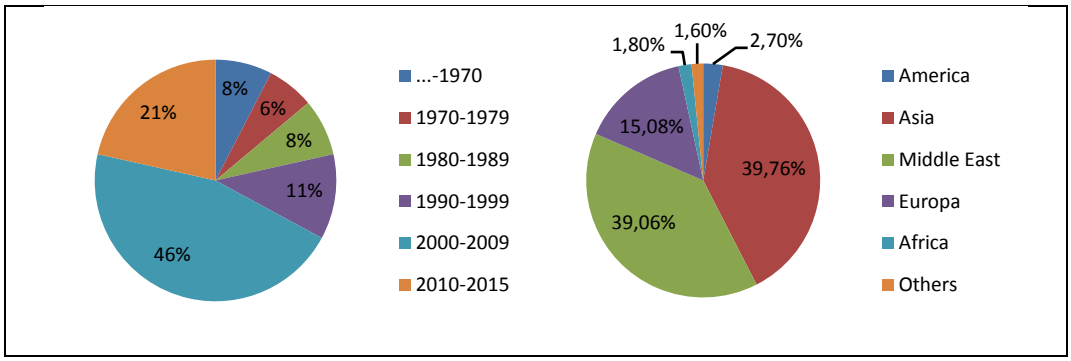

Figure 2:Sovereign Wealth Funds by Years and Region

The reason for the rapid increase in the number of sovereign wealth funds in recent years is high natural resource and commodity prices. Moreover, governments' high foreign exchange reserves and fiscal resource policies are also supporting this increase. National wealth funds are, in essence, the symbols of the latest trends in the global political economy. These funds can be expressed as a demonstration of the transfer and distribution of the economic and financial power from the US, Europe and other developed industrial countries to countries where is less, and the increasing effectiveness of governments in managing the wealth and economic power of the world today [6]. Figure 1 also shows regional distribution of wealth funds established. In general, most of the funds are in the Middle East and Asia region, which is the majority of developing countries.Sovereign Wealth Funds shows that the ownership of capital in a globalized economy is dispersed to peripheral countries. In the global financial system, countries other than Japan, USA and European countries are now playing an active role [8]. In order to measure the impact of sovereign wealth funds on global financial markets the economic magnitudes of funds should be considered [29]. Table 1 contains the top 10 funds having the largest economic size [19].

Table 11: National Wealth Funds Profile by Economic Growth (2016)

Country	Name of Wealth Fund	Assets (Billion US $)	Inception	Origin
Norway	Government Pension Fund - Global	870.81	1990	Oil
China	China Investment Corporation	813.8	2007	Non-Commodity
UAE-Abu Dhabi	Abu Dhabi Investment Authority	792	1976	Oil
Suudi Arabia	SAMA Foreign Holdings	576.3	1952	Oil
Kuwait	Kuwait Investment Authority	592	1953	Oil
China	SAFE Investment Company	474	1997	Non-Commodity
China –Hong Kong	Hong Kong Monetary Authority Investment Portfolio	456.6	1993	Non-Commodity
Singapore	Goverment of Singapore Investment Corporation	350	1981	Non-Commodity
Qatar	Qatar Investment Authority	335	2005	Oil&Gas
China	National Social Security Fund	295	2000	Non-Commodity
Total (10)		**5,555.51**		
Total (All)		**7,409.74**		

A comparison can be made to understand the economic magnitude of sovereign wealth funds. The total economic size of the funds is about 10% of the total gross domestic product of all countries and about 10 times bigger than the Turkish economy [13]. With its growing volumes, wealth funds have faced investment allowances and management risks in the current global investment environment. Sovereign wealth funds are an important and growing investor class with one of the world's largest pools of institutional assets [17]. For this reason, the difficulties of managing their own portfolio lines are the biggest challenge for wealth funds. Figure 2 [17] shows the investment strategies of sovereign wealth funds.

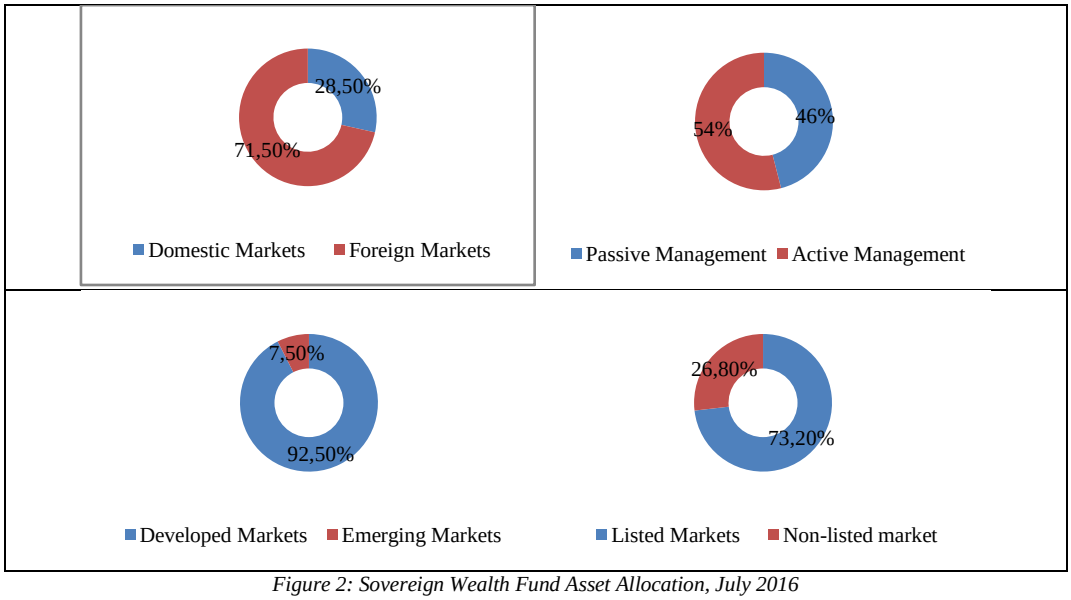

Figure 2: Sovereign Wealth Fund Asset Allocation, July 2016

As shown in Figure 2, the ratio of active and passive management strategies in the management of sovereign wealth funds is very close. There can be many reasons for this. However, long-term prospects and applications is a major cause of the rise in the rate of passive management strategy. In addition, an important point in Figure 2 is that 70% of the wealth fund is invested out of the

country where the fund is located and provided resource. However, almost all of the funds were directed to the industrialized countries. It seems that the investment preferences of wealth funds favor the areas where the free float ratio is high.

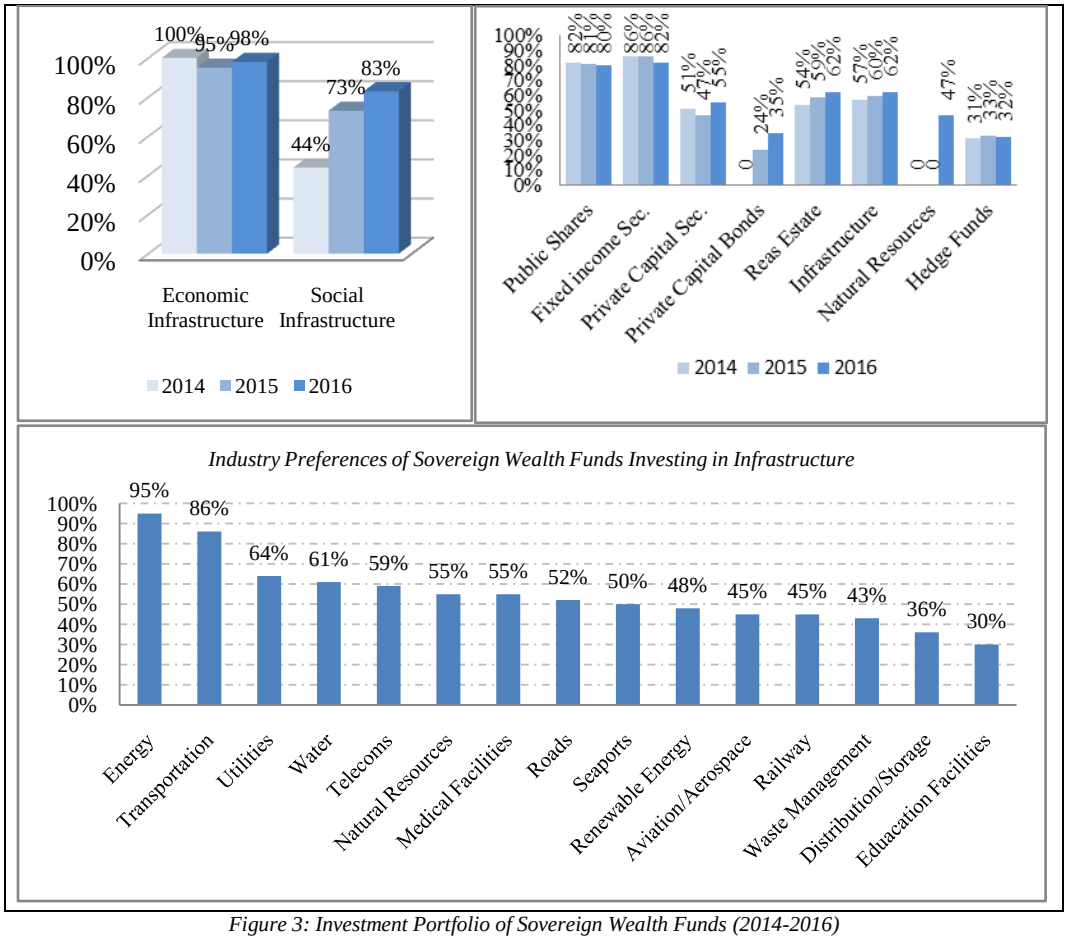

Figure 3: Investment Portfolio of Sovereign Wealth Funds (2014-2016)

Figure 3 [20] provides more detailed information on investment allocations of wealth funds between the years 2014-2016. When Figure 3 is examined, investment appetite for public stocks, fixed income instruments and hedge funds have decreased, and a steady increase in private equity corporate bonds, real estate and infrastructure investments have been experienced. However, the ratio of investors in infrastructure investments to the total number of investors in these areas is 75%. This ratio is 14% in real estate, 4% in private equity and 7% in other areas. This data shows that wealth funds are used as a means of stability and development in line with the general purpose of the establishment. The increase in the number of investors operating in social infrastructure also supports this idea. More than half of wealth fund investors are more interested in investments in energy, transportation, utilities, water, communications, natural resources, health care, road and port.Sovereign wealth funds have become quite a big economy by the end of the 2000s. The lack of an audit framework, which is caused by the fact that the funds are excluded from many regulations due to their economic size and legal structure, has been a matter of concern. In order to overcome for these concerns, The International Working Group of Sovereign Wealth Funds has been established as a result of negotiations with global groups such as the IMF, the FED and the G20 countries. In 2009, the institution changed its name as International Forum of Sovereign Wealth Funds. In 2008, the Institution published the "Generally Accepted Principles and Practices" statement known as "Santiago Principles" in the context of corporate governance and risk management [25]. The Forum will contribute to the development and maintenance of an open and stable work environment and thus support the four guiding objectives underlying the Santiago Principles. These objectives are [12]:

- Assisting in the free circulation of capital, investments and the preservation of the stability of the global financial system,
- To fulfill the valid, explanatory and regulatory requirements of the invested country,
- Invest in risk and return based on economic and financial factors,

- To have a transparent and sound management structure that ensures adequate operational control, risk management and accountability.

The Santiago principals are based on volunteerism and are not internationally binding. However, it is a prerequisite for entry into US and European markets. Therefore, funds strive to comply with the relevant principles [8], [21].All funds within the sovereign wealth fund do not comply equally with the Santiago Principles. For this reason, an index has been developed by Carl Linaburb and Michael Maduell in the Sovereign Wealth Fund Institute (SWFI), a pioneer in research and documentation on wealth funds, to measure the level of information sharing with the public [11].The index is referred to by its founders and is known as the Linaburg-Maduell Index. The index is used globally, is included in annual reports of funds, and functions as a standard global benchmarking tool. The index consists of 10 items and each item is worth one point [16].

4. THE TURKISH WEALTH FUND

The Turkish Wealth Fund (TWF) was established on the date of publication in the Official Gazette on August 26, 2016 by the Law No. 6741 "Amendment of the Law on the Establishment of the Turkish Wealth Fund Management Joint Stock Company". Information on TWF's purpose, scope, management and supervision, resources and economic size are given below.

4.1.The Turkish Wealth Fund's Purposes and Field of Activity

The aims of TWF [23] are:

- To contribute to the diversity and depth of the capital market instruments,
- To bring in the assets belonging to the public in the country into the economy,
- To provide foreign investment,
- To establish and manage subsidiary funds in order to participate in strategic and large-scale investments.

With the establisment of the fund, in addition to the above mentioned items, the law draft submitted to the Grand National Assembly of Turkey (TGNA)with not being included in the text of the law and legislative intention [22], it is targeted that:

- An additional 1.5% increase in growth rate over the next 10 years,
- Acceleration of growth and deepening of capital markets,
- Dissemination of the use of Islamic finance instruments,
- Additional employment for hundreds of thousands of people with investments to be made,
- Ensuring that domestic players are supported by capital and projects in technology-intensive strategic sectors such as defense, aviation and software,
- Financing of large infrastructure projects without raising public sector debt,
- Increasing the share of participation finance sector,
- Direct investment in strategic sectors such as natural gas and oil, which are important for Turkey in order to ensure security of supply, without being subject to legal and bureaucratic restrictions.

In addition, the fund has been assigned to be an instrument to contribute to overcoming the structural problems of the Turkish economy and to enhance the effectiveness of Turkey at the international level. Within the scope of Article 2 of Law No. 6741, the transactions that can be made by TWF considering the liquidity, investment, risk and return preferences in order to reach its targets are as follows:

- Purchase and sale of the shares of domestic and foreign companies, the shares of the issuers in Turkey and abroad and the debt instruments, the capital market instruments issued based on precious metals, fund participation shares, derivative instruments, lease certificates, real estate certificates, custom designed foreign investment instruments and other instruments,
- All kinds of money market transactions,
- Evaluation of real estate, rights based on real estate and all kinds of immaterial rights,
- All kinds of project development, project based resource creation, external project loan provision and other methods of providing resource,
- All kinds of commercial and financial activities are carried out at national and international primary and secondary markets. The company may participate with national investments to the investments to be made in other countries and / or foreign companies in the international arena.

4.2 Management and Supervision of The Turkish Wealth Fund

The TWF is directly linked to the Prime Minister for management. The president, members and general manager are appointed by the Prime Minister in the board of directors consisting of at least five members. As the appointment criteria, the president, members and general manager are required to have experience more than five years in at least one of the fields of economy, finance, law, finance and banking.Sub-funds within the TWF will be managed within the framework of a three-year strategic investment plan, which is prepared by the company and the board of directors and is in force with the approval of the Council of Ministers. The organization, structure, functioning, management and transactions of TWF related funds shall be determined within the provisions of TWF's internal regulations and company's articles of association. [23]. The Board of directors meetings can be held with the absolute majority of the total members. The decisions of the board of directors may be taken by the absolute majority of the members attending the board meetings [1].TFV management has the obligation to comply with the corporate governance principles and regulations under the Capital Markets Law No. 6362. TWF and its sub-funds will be subject to independent audit. Financial statements of the TWF, sub-funds, company and affiliated companies will be audited by at least three central auditors appointed by the Prime Minister. These auditors are specialized in capital markets, finance, economy, treasury, banking and development. Prepared report as a result of the audit is presented to the Council of Ministers by the end of June every year and is examined annually in October by the Planning and Budget Commission of the TGNA through audit reports [23]. With this arrangement, a triple control mechanism is ensured.TWF management is structured as a joint stock company in the private company status. It is subject to the Law on the Chamber of Accounts, the Civil Servants Law, the Public / State Procurement Law, the laws on privatization, the laws of the State Economic Enterprises (SEEs), and the law on the Supervision of the TGNA on Funds and SEEs. In addition, the fund is exempt from VAT and not subjetct to the Capital Markets Law, the Competition Law and income tax, corporation tax, real estate tax, stamp tax, bank and insurance transaction tax, resource utilization support fund withdrawal and some transactions [1].

4.3. Resources and Economic Size of TWF

The capital of the TWF management company, which is TL 50 million , was provided by the Privatization Fund. Full paid capital stocks belong to the Privatization Administration. On 24 January 2017, TL 3 billion belonging to the Industrial Support Fund was transferred to TWF on condition of reimbursement for three months' usage. On January 31, 2017, certain entities and treasury-owned real estate were transferred to the wealth fund [2]. Table 2 lists the companies transferred to TWF.

Table 12: Transferred Corporations to the Turkish Wealth Fund (February 2017)

Corporations	**Treasury Shares (Transferred assets)**	**Capital**	**Assets**
T.R. Ziraat Bankasi Inc.	100,00%	TL 5.100.000.000	TL371.881.925.000[1]
Halkbank Inc.	51,11%	TL 1.250.000.000	TL237.726.267.000[1]
BOTAS Petroleum Pipeline Corporation	100,00%	TL 4.145.000.000	TL20.312.158.318[2]
Turkish Petroleum Corporation	100,00%	TL 3.000.000.000	TL10.981.613.631[2]
Turkish Post Inc.	100,00%	TL 981.530.194	TL3.980.492.637[2]
Borsa Istanbul Inc.	73,60%	TL 423.234.000	TL7.873.409.000[2]
Turkish Airlines Inc.	49,12%	TL 1.380.000.000	TL47.638.000.000[2]
Turk Satellite Communication Cable TV and Operation Inc.	100,00%	TL 1.474.816.334	TL1.980.870.355[1]
Turk Telecom Inc.	31,68% (6,68%)	TL 3.500.000.000	TL26.874.451.000[1]
Eti Mine Works	100,00%	TL 600.000.000	TL3.037.800.000[2]
Caykur	100,00%	TL1.492.400.000	TL2.072.400.000[2]
TOTAL		**TL 23.346.980.528 (=$ 6.342.909.294)**	**TL734.359.386.941 (=$ 199.510.809.319)**
[1]= 2016 **[2]= 2015**			

In addition to the companies listed in Table 2, all winning games licenses owned by the National Lottery are transferred to the TWF. Authorities of the Turkish Jockey Club for domestic and international joint bets and real estates owned by them are also transferred to TWF. In addition to this, the allocations on 46 public buildings in Antalya, Aydin, Isparta, Istanbul, Izmir, Kayseri and Mugla totaling 2,292,815 square meters were canceled and transferred to TWF [2]. At present, the wealth fund has TL 23 billion of equity capital and reached TL 734 billion in asset size. With an asset size of approximately $ 196 billion and a large number of real estate, TWF can be seen as one of the attention grabbingfunds among world wealth funds.

5. COMPARISON OF THE TURKISH WEALTH FUND WITH OTHER WEALTH FUNDS

TWF is different from the world's examples both quantitative and qualitatively. TWF will use the securitization of publicly owned companies, public properties, revenues from privatization transactions, and transactions to be carried out in the capital market as resources. However, when we look at the applications in the world in general, it is seen that the source of wealth funds is the budget surplus, trade or commodity export revenues such as oil, mineral resource, natural gas. In terms of the resources, it is obvious that TWF follows a different path from the examples in the world. But the lack of capital and technology are the biggest problems experienced by developing countries. TWF is a major capital resource. The Fund will support technology-intensive sectors such as defense, aviation and software, and will provide an opportunity to increase competitive advantage by providing high know-how with international partnerships and to raise the country's upper middle income to upper income level [10].Wealth funds are generally established for saving. The goal is to allocate resources in the years when economic welfare is experienced, and to support prosperity in the years when it is reduced. Another objective is to transfer income from resources will be exhausted future generations and to share it with them. TWF will serve as an inexpensive outsourcing tool for the financing of very large-scale investments to be made [27]. Clearly, TWF does not have the essence of wealth funds, because it carries expenditure fund features instead of a savings fund. However, among the targets, the diversity of instruments in the capital markets and the importance given to Islamic finance applications, both the fund and the private sector will be able to reach cheaper financing sources at national and international scale. In addition, the fact that Islamic financial institutions in Turkey can directly reflect national transactions on international market shares will increase the efficiency of the sector. It is a good decision to support this sector which has not received open support by public until today. However, it is a fact that these goals do not match with the practice in the world. Supporting Islamic finance by increasing the share of participation banks is not among the objectives any other wealth fund.In terms of auditing, TWF differs from other funds in the world. Given the international framework is generally true as the application that independent audit firms take part in the supervision. However, supervision with three auditors appointed by the Prime Minister is of concern in two respects. The first is that both the management and the control mechanism are managed from the same hand, which is an application open to misconduct. The second is that the number of central supervisory staff is at least three. The adequacy of a three-person team should be questioned to supervise an enormous economic organization of TL 734 billion. Moreover, the fact that these supervisory auditors are public servants contradicts the independence principle of the supervisor. Instead of leaving the audit duty of the Fund to the TGNA and sending the audit reports directly to the TGNA, it is a more correct approach to leave the audit to the Chamber of Accounts [28]. The most criticized point is contrariness to the principle of unity of the budget. In the general applications of wealth funds in different countries income is transferred to the fund, while TWF has income generating sources directly. The negative effects of the multi-budget system were evident at the beginning of the 1980s, 1990s and 2000s, and the effects of separately funded funds in the crisis have been discussed for many years. The disadvantages of this system are the reduction of income of the central budget, the loss of expenditure priorities [32]. At this point, it is vital that the fund management should constitute and implement the three-year strategic investment plan in a budget-supporting manner.Companies with very different qualities from different sectors have been transferred to TWF as resource. This situation differs from other wealth fund applications. The fact is that the Fund has unfair competitive advantage over the market forces during the activities it will undertake when considering the diversity of activities and the exempted laws. For example, where will the banks in the portfolio be located in the regulations of the Banking Regulation and Supervision Agency (BRSA), how will the Capital Market Law be operated in the process of securitization of assets and how will their income be taxed? There are serious gaps in terms of legal regulations [7]. It is extremely important that the relevant legal regulations should be made as soon as possible.

6. CONCLUSION

Wealth funds, established for a wide variety of purposes, are generally endeavoring to support the economy and increase the level of prosperity. Regardless of the level of development, many countries are benefiting from wealth funds. Turkey has established a sovereign wealth fund in order to provide funds for strategic and large scale investments in general. The companies that are transferred to the fund are the locomotive firms of their sectors and make profit in large quantities. Therefore, transferred assets and companies can be considered as the most valuable companies of Turkey. The Fund may provide a high amount of credit from the market under appropriate conditions by showing these assets as collateral. In addition to cash return gained from these credits through effective evaluation of market conditions, it is possible to obtain value added such as diversification of market and customer portfolio with international investments to be made.However, the current regulations concerning the selection and supervision of the management cadre are the greatest handicap in terms of the effectiveness of the fund and its independent implementation of its policies in line with macroeconomic developments. The fact that the fund management is seen as a unit attached to the executive authority is the greatest danger in terms of fund independence, success and impartiality. Independence is an important threshold for success. At this point, at least one of the management and supervision mechanisms seems to have been passed to the Assembly by the Prime Minister.Besides the establishment and supervision of the Fund, management at

international standards is important in terms of the enforcement of the investments to be carried out and the markets in which they can be influenced. The press conference and the written explanations emphasize the adoption of the Santiago Principles. This has a key prefix for entry into European and US markets, where value added is high. With the transparency and professional management to be provided in accordance with the principles, the fund will be able to achieve its stated objectives.Turkey has a great opportunity with TWF. In today's turbulence macroeconomic environment, a structure that will support the economy has become compulsory. However, the fact that such a large economic organization operates separate from treasury may be regarded as a deviation from the budgetary unity which is one of the cornerstones of economic stability. As a result, Turkey's international voice may be louder, while using the resources efficiently it has. The Turkish Wealth fund's activities in the free market, not in the midst of political conflicts, have a vital importance to the success of the fund.

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19 - 23 April 2017, Sarajevo

Performance-Based Evaluation of the Reuse of Historic Buildings for Cultural Sustainability

Tulay Karadayi Yenice[1], Burak Tok[2]

Abstract

The aim of this research is to evaluate the spatial performance of the Khan building, which is one of the historic and cultural heritage, in terms of reuse. In other words, it is embraced as conforming of spatial and operational necessaries of function and survey of level in the response of existing places to requirements. In the research, performance standards is to determine for evaluation of re-use process and Post Occupancy Evaluation approach defined as comparing current situation are built as a method. This method depends on the detection of spatial and operational requirements of new function, research on response level of current places in a monument to new necessities and upon confirming pleasure level of new users of the structure for designating the level of adaptation of the monument. Adaptation level of spatial qualities in cultural wealth with necessities of given function is presented through applied surveys to current users of the building, interviews, and observations. In a building which is adapted to reuse of structural performance, protection is taken for the aim of sustainability is valued as performance approach that privatizes the work. In this study, advantages and disadvantages re-use are identified with the determination of spatial performance value of Gaziantep Lala Mustafa Pasa Khan, which has the specialty of cultural existence and has changed to restaurant, and of the adaptation level of places through necessities of the function. While evaluation of spatial performances of the re-usable historical buildings in the research is beneficial to take necessary precautions for sustainable given function, it is also thought as beneficial to building's location and function harmony in structures that have potential of reuse, organization and character of current places, spatial necessities of function which will be given, and to processes of evaluation of the level of adaptation potential.

Keywords: cultural sustainability, conservation, restoration, Gaziantep.

1. INTRODUCTION

Sustainability of historical places has become an important subject in the changing and developing world. Historical places; cannot providing comfort suitable for the conditions of new world, and cannot meet the need of users, have been left to their fate. However, these places, reflecting the life style and socio-cultural characteristics of their time, should be handed down the next generations as cultural heritage. That is why, it is crucial to bring them a new function as a living place of society. By doing so, they will be turned into "living places", and enjoyed effectively and continuously [1]. The most correct decision is to protect historical places by using them. Yet, the factor of proper use confronts us as the most important issue at this point. Compatibility of new function can be the answer to the question of well-preservation. Therefore, the best attitude is to evaluate all criteria very well before bringing a new function to historical places. Historical khan structures have been widely functioning as hotels, or restaurants in the last years. This approach and applications lead to new spatial demands in historical places, and these demands mostly have negative impacts on the unique character of historical places. In this study, Gaziantep Historical Lala Mustapha Pasha (Hishva) Khan, now functioning as a restaurant, is examined spatially. The examination is made through analysing the needs of users, and the performances of the place to find out the performance evaluation of the new function. We think that the study would make a big contribution to the effective use of historical places by emphasizing the importance of choosing the right function.

2. MATERIAL AND METHOD

This study involves single-floor Lala Mustapha Pasha (Hishva) Khan, which belongs to the endowment of Lala Mustapha Pasha in 1577 [2]. Main materials of the study are historical written sources about the history of the building, photographs, and gravures. We use a method, defined as the "evaluation of usage period" to study the new function of the building. This method can be defined as the examination of the competence of newly-functioned historical places for people [3]. Main elements of the method are users of the building and their needs [4,5]. The harmony between the new function and the building in historical places, and how the users run the building are systematically studied with this method. Findings

2.1 Definition Of The Historical Building

Lala Mustapha Pasha (Hishva) Khan is situated in Sahinbey district, Karagoz neighbourhood, Handan Bey Bazaar in Gaziantep. It is the most important building of the Islamic-Ottoman social complex, which is composed by public bath, *susamhane*, covered

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bazaar and the khan. Despite there is no epitaph at the entrance of the building, it is deduced from the records of the Gaziantep Sharia Court, and Evliya Celebi's travel book that the building was founded by Lala Mustapha Pasha. The architect of the building is anonym [6]. At the year of built, 16th century, weaving and dye houses were so common, and cotton trade was highly practiced in the khan that it was briefly called as "Hishva", meaning boll [7]. At 1882, Khan was badly damaged by the earthquake, and captiously reconditioned in 1834. That is why, despite being like a ruin during 1900's, the khan still maintains its fame as the oldest khan of the city [2]. Lala Mustapha Pasha Khan was built approximately around 2550 m2, and belongs to the group of single-floor khans. At the West side of the khan, public bath and s*usamhane* is situated; covered bazaar of the East side could not reach today [6]. The khan has a plan schema of shops in different sizes at four sides; and a yard in the middle. According to Ozkarci, the South side and half of the West side of the yard are surrounded by stoops. The entrance of the khan is situated northwardly. In this part, there are double-faced places; looking both to street and to the yard (Figure 1). The crown gate was constituted by a 413 x 145 cm niche. At both sides of the niche, there are 50x80 cm niches to facilitate unlading and getting on horse. There is a 260 x 690 cm place from the gate to the inside of the khan. Covering of the ceiling is vault on top of the wooden beams; and that of the floor is basalt [8] (Figure 2,3). At the West side, there are seven rooms and a well other than the entrance gate. The ceilings of all rooms are covered by pointed tunnel vaults [6].

Figure 1: The North facade of the khan Figure 2: The entrance of the khan Figure 3: The ceiling cover of the entrance

At the East side of the yard, there are ten rooms and an ‘eyvan’. This part has a largely irregular plan because of the land on which the khan is situated, bordering the road. That is why, eyvan is covered by a cross vault, and the places are covered by pointed tunnel vaults. At the west side, there are nine rooms at different sizes. Eight of them are covered by pointed tunnel vaults. Another place of this part is at the sizes of 5.60m x 6.30m, as the biggest place of the khan. It is covered by range-shaped half cross vaults at four sides. At the South side, there are eleven rooms, a tunnel, and a barn. At this part, five of the rooms are covered by pointed tunnel vaults, probably by an intervention of ensuing years. Here, the barn is also covered by pointed tunnel vaults. The entrance of the barn has a drop arch. The barn is organized as two naves in east-west direction. Its coverage is composed by two pointed tunnel vaults, supported by four pointed arches on the five stone pillars of the naves; and two cross vaults [6].Lala Mustapha Pasha Khan is built as a caravanserai. At the North side of the building, shops face the street, and publican rooms face the yard. Other rooms are spared for the accommodation of travellers, as well as store houses and delivery services. It is thought that at the South side of the yard, back of the rooms was a barn [6]. Lala Mustapha Pasha Han is built through masonry work construction. The places are generally covered with pointed tunnel vaults and partially with cross vaults. The walls are bonded with create wall system. Wall thicknesses are around 60-80 cm's [8]. Building materials of the khan are limestone and volcanic basalt. Two types of limestones, locally known as *keymik* and *havara* are used. Limestone is a sedimentary rock that is soft and easily processable when first come out of the source; yet it hardens as aerified. That is why, limestone is widely preferred in architecture. The difference between *havara* and *keymi*k is that the later is more durable to heat, water and strikes. For this reason, external walls of Lala Mustapha Pasha Khan are bonded with *keymik*, whereas the interior were bonded with *havara*. Basalt, being more durable, is used for the floor and ornament. This type of ornament is mostly found in the Eastern and Southern parts of the Ottoman Empire, which is a kind of bonding system that meshes two coloured stones. The entrance of the Lala Mustapha Pasha Khan is also adorned in the same way. Front facades are adorned quite a little, as a characteristic of Ottoman khan architecture. Only the crown gate is adorned with stalactites in addition to the bonding system (Figure 4-6)

Figure 4: The West facade of the khan Figure 5: The South facade of the khan Figure 6: Stalactites at the entrance

2.2 Re-functioning of Lala Mustapha Pasha Khan

Lala Mustapha Pasha Khan is found at the historical city centre of Gaziantep; at the South of the Gaziantep Castle. From its foundation date (16th century) to the 19th century, it was used as a khan. The building was deserted during and after the period of Turkish War of Independence. During that period, some shops of the West side that face the road were used; but their physical conditions were poor. In 2016, the building was restored and refunctioned as hotel and restaurant. Being found in the historical city centre, and going under a total renovation; and taking the advantage of the recreation in front of the castle, the khan was brought into view. Near parking areas also make the khan an attraction centre. However, there is heavy traffic in front of the entrance. Thanks to the new environmental planning, accession to the khan is quite easy.After the refunctioning, the new function and technological changes made some interferences to the original building. The entrance was brought into view after the restoration, and the entrance portal and niche are used as the entrance of the building like their original function. Security cabinet was added to this part after refunctioning. The yard is kept being used as the assembly area; the South part of it was covered with fixed suspended systems and refunctioned as the outdoor of the restaurant. The rooms of the East and West side are organized authentically, and refunctioned as hotel rooms. The places at the South side of the khan are used as restaurant. In this part, the cave under the khan was covered with glass in order to be viewed from the upper part. Stoops of the East and South sides were covered with glass; those of the South side were organized as the restaurant. Stoops of the East side were decorated with wrought iron, domed seats. Two rooms of the North side, which are at the East, are used as hotel rooms; whereas four rooms of the West side are refunctioned as the administration point. The shops that face the road at the North side are kept being used for commercial purposes, and their entrances were covered with tarpaulins (Figure 7).

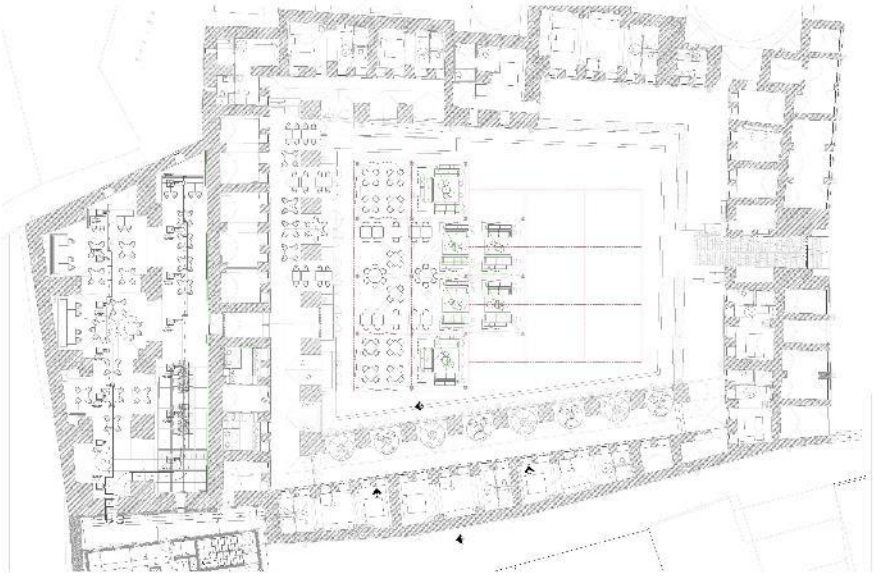

Figure 7: Restoration plan of the khan (by Architect Metin Keskin, 2016)

2.3 Evaluation of the new function

Spatial planning in the architecture is aimed to meet the needs of people. For this reason, they are expected to ensure optimum environmental conditions for the users. Adaptation to the present structure is very important in the refunctioning of monumental structures; which lose their original functions because of social, cultural, and economical reasons. The authenticity of the building, and new users and necessities should be parallel in the refunctioning projects. When the right planning is achieved, the building would lose nothing from its value and characteristics; but gain sustainability [3]. That is why, the concept of performance should be applied systematically to achieve the adaptation of new function. In order to apply this concept, there are six points to be taken into consideration: location of the building in the environment that it is found, protection of its authenticity, protection of its historical characteristics, conceiving the original function while producing the characteristics of new function, minimising the damage originated from new technologies, and making a simple, yet explicit planning of maintenance [9].In the respect of international protection measures, refunctioning of Lala Mustapha Pasha Khan is evaluated around the criteria of environment, function, technique, cognition, and culture. One of the most important criteria of protection is the article of preserving the monument together with its environment. When this point is taken into consideration, Lala Mustapha Pasha Khan is handled with

Gaziantep Castle, Public Bath Museum, *Susamhane*, Cuisine Museum, and Gaziantep Culture Way as a whole. By this means, its protection also achieved to gear up the qualifications of its environment. The environment of the monument could be organised in accordance with the new function, and it became in service together with its environment. This is achieved by means of integrating the shops of North side to social life. The problem of pedestrian accession to historical sites should be solved, and synchronised with vehicle traffic. Being located in the historical city, Lala Mustapha Pasha Khan is easy to access via pedestrian path-ways, public transportation stations, and green-field planning around the castle. Big car park of the Castle, located in the Northeast of the monument, facilitates private car access. Thanks to the easy access, the building is being used substantially, and enjoys a connection with its environment. However, the vehicle road, coming from the North of that structure, and cutting the recreation area badly effects the traffic. According to the international protection criteria, anything that creates visual pollution around the monument is unwanted. Because of the fact that the monument is included in the protection plan of the city centre, there is no visual polluter like bulletin board, brightening lights, etc. around it. It should also be noted that there is no high-rise building around the monument to leave it in the shade aesthetically. In the fourth article of 'Carta Del Restauro' it is pointed out that the new function of the monuments can be accepted as long as they are in relation with their original functions, and do not lead to serious damages during the application. The new function of Lala Mustapha Pasha Khan corresponds to its original function. Khan structures were originally designed for the meals and accommodations of visitors. With its new function as hotel and restaurant, five hundred years old Lala Mustapha Pasha Khan attracts attention with its sustainable function. Thanks to this, there is no remarkable intervention to the characteristics of its facade. Only certain necessities of the time, like personal toilets to each room, and other divisions are made as arrangements. Most of these changes can be found undesirable as fixed elements; yet they are applied compulsorily. However, suspended ceiling system of the yard could be preferred demountable rather than fixed (Figure 8-10).



Figure 8: wet place in the room Figure 9:10: Application of suspended ceiling system in the yard

In order to use the monument for its new function; technical, mechanical, electrical, and acoustical modifications are a must. The important thing is to give the minimum damage to the monument during these applications. In Lala Mustapha Pasha Khan, heating, air conditioning, fire safety, illumination, water treatment works are provided with no damage to the original character, spatial function and structural organisation of the khan. As a negative aspect, most of these are wall-mounted; creating quite big installation channels especially in the restaurant. However, the necessities of the time could only be achieved in this way. These conditions were demanded and supplied in accordance with the general vision, texture, and shape thanks to the concertedly chosen materials. This is a positive and acceptable application in this sense (Figure 11-14).




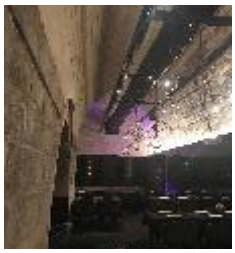

Figure 11: installation inside the room 12: Heating system within the stoops 13: Public toilet of the restaurant 14: Installation shaft of the restaurant

As part of protection principles, monuments are expected to maintain their cultural values, and historical qualifications in their new function. As a positive aspect, Lala Mustapha Pasha Khan do not lose its cultural perception; maintaining its original function.When the re-use function is evaluated perceptively, how the original character of the components and order of the place is protected, and what effects they have on the user should be dealt. Colour, form, texture, and furnishing of the materials in the new function are crucial to understand the originality and historical characteristics of the place. Lala Mustapha Pasha Khan has too many new equipment because of the comfort expectations in the new function. Especially the rooms with individual toilets, wardrobes, and complementary wall coatings make the place dissimilar. However, these changes are limited to certain elevations;

original materials of the building are mostly visible, and the cover coat system of the building can be seen clearly. These all help to perceive the original character of the building. Especially the glass covers of the stoops do not let the loss of perception. The covers inside the restaurant are also glass, and material choices are compatible with the structure; preserving the historical perception (Figure 15-18).




Figure 15: Glass covers of the stoops Figure 16:17:18: Use of materials and furnishing inside the rooms

3. CONCLUSION

Historical structures are the most important heritages that reflect former cultures, life styles, and socio-economic characteristics of societies. Restoration and refunctioning are indispensable to hand down the worn-out, damaged historical structures to the next generations. The important thing at this point is to act in accordance with the protection criteria. Refunctioning is just a means to protect these places actively, and ensure their historical, cultural, environmental, and economical sustainability with their new function. Re-functioning of Lala Mustapha Pasha Khan involves both positive and negative aspects when taken into consideration according to the performance criteria. It is very important to treat a monument as a whole with its environment, and to achieve the sustainability of its original function in the new function. One of the most favourable point is to remain loyal to the original plan in the division of places. With the new function, many fixed attachments were applied to the building as a negative impact. However, it should be noted that these attachments can be accepted as compulsory modifications according to the protection criteria. The colours, and texture of the furnishing materials are compatible with the original material and covers are made with transparent glasses. These create quite a positive perception about the building.Refunctioning of historical places should aim long-term sustainability. For this reason, after the performance analyses, the building should also be evaluated during the use. By doing so, any negative outcome of the new function can be eliminated. And, the most important thing for the monument, the long-term sustainability, can be achieved.

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ICSD INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Sustainability of Traditional Buildings Located in Rural Area

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Abstract

In this days, sensitivity to environmental issues of people increased together with the awareness of the concept of sustainability. The structures, which are built in a rural residential area, are integrated with the natural environment. In Turkey, local traditional structures are structures that can be produced easily in place and materials are being used wisely. These houses which are used renewable natural materials carries a lot of features of the sustainable approach. Traditional structures have been shaped by the region where they are, because of the necessity. In this study, materials and construction systems of the traditional buildings which are located in rural areas are discussed and the buildings have been evaluated the context of ecology and sustainability.

Keywords: Traditional buildings, rural area, sustainability

1. INTRODUCTION

The rural settlements which have natural, historical, and traditional values have an important part of our cultural heritage. Nowadays, this settlements' traditional culture has begun to disappear for several reasons. This traditional texture has included some clever solutions about the usage of material and also sustainable design value. Constituting the majority of part of the historical texture in rural areas has many examples of civil architecture as mostly residential buildings [1]. (Tasci and Pekdogan, 2015).Traditional buildings have better relations with the environment than the contemporary ones. Traditional buildings in Turkey inherit the values of various civilizations that have lived on these territories for centuries. Environmental factors have played an important role in design of these buildings, which rendered them more harmonized with the environment [2]. (Esin and Yuksek, 2008).Turkish houses have features which unite them with antiseismic construction elsewhere. In almost every part of Turkey, there exist a large proportion of traditional buildings with ecological properties, energy and natural resources save-low environmental impact, which were built at various times in history [2]. (Esin and Yuksek, 2008). Sustainability is a new concept with various perspectives in communities. Cities and rural areas are in the core of attention for developing.There some elements which are needed to establish a sustainable economy in rural areas that are infrastructure, clean seeds, guidance in crops and livestock production, and credit as well as cooperatives, education, marketing facilities, farm machinery, water supplies, and diverse economic activities. All of them are necessary to establish a sustainable and efficient rural development in each village [3]. (Zolfani and Zavadskas, 2013).Sustainability, as a new paradigm in the past three decades, showed through some scientific evidence that flora and fauna species, water, air, forests, deserts and other ecosystems began to destroy and natural resources were overused. Since sustainability is a multidimensional issue (local, regional, and international dimensions), it have to be developed at a level that people live, work and interact with each other and with nature such as local level [3]. ((Zolfani and Zavadskas, 2013).The various sustainability issues are interwoven, and the interaction of a building with its surroundings is also important. The environmental issues share, in common, concerns which involve the reduction of the use of non-renewable materials and water, and the reduction of emissions, wastes, and pollutants [4]. (Braganca et al., 2010).Although social, economic, and cultural indicators are of significant importance to the concept of sustainable building, this concept is often based on environmental properties [4]. (Braganca et al., 2010). The concept of sustainability with respect to buildings is still poorly defined. Much of the focus is on the use of energy in buildings. Although sustainable building is a multidimensional concept, attention to the issue often focuses solely on environmental indicators, ignoring the substantial importance of social, economic and cultural indicators. Building sustainability involves various relations between built, natural and social systems [5]. (Mateus and Braganca, 2011).Research in the area of sustainability has produced a significant amount of knowledge that is presented in the literature.The aim of sustainability assessments is to gather and report information for decision-making during different phases of the construction, design, and use of a building.

2. RURAL AREA AND RURAL STRUCTURAL TYPES in TURKEY

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Rural population (% of total population) in Turkey was last measured at 26.60 in 2015, according to the World Bank. Rural population refers to people living in rural areas as defined by national statistical offices. It is calculated as the difference between total population and urban population.This page has the latest values, historical data, forecasts, charts, statistics, an economic calendar and news for Rural population (% of total population) in Turkey [6]. Rural population is given Figure 1. (http://www.tradingeconomics.com/turkey/rural-population-percent-of-total-population-wb-data.html)

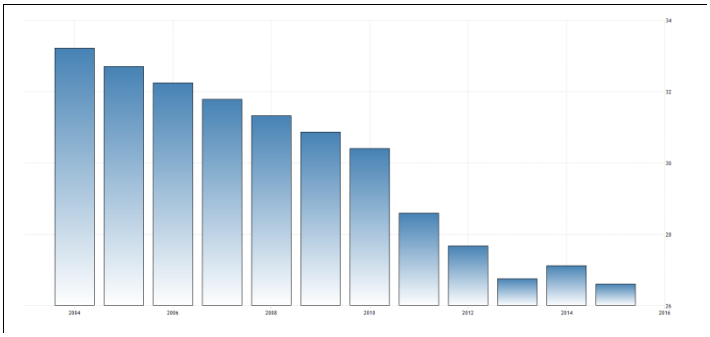

Figure 1. Rural Population of Turkey [6](Korkmaz et al., 2010).

Buildings built in rural areas show significant differences depending on climatic conditions, preferred or locally available construction materials, traditions, income levels of the owners and their social habits. Rural housing types show themselves in different forms in different regions of our country. However, a particular type is most common in the area and it is said that this type of rural residence dominates the region [7]. (Bayulke, 1984). In rural houses, whatever building materials stone, mud brick or wood, primitive construction technology is produced with materials and construction techniques close to each other all over the world [8]. (Arioglu ve dig., 1974).Rural and urban settlements are the units that have different attributions and they do not have similar localities. These settlements have different lifestyles that have distinctive characteristics according to the economical and social activities and the relationship with the nature. Rural areas are qualified according to density of rural functions. These functions are showed up in using of land, in style of production style, in professional structure, in the characteristics of rural area and in the magnetic field of the producer and the service society. Because hegemony of the rural functions means less urban functions at the same time, 'rural areas' can be characterized as places that do not belong to urban areas [9] (Gur et al, 2003).The meaning of Rural Residence is the structures built by the dwellers themselves without any engineering services and with the use of local/regional material and technology. In addition to the rural areas many structures, which is located in around the metropolis, have been built without engineering services such as architectural design and static calculation. while building these structures people maintain to use constructional techniques, which are formed by instinctively rather than technically. The fact that the rural residences are still being constructed with the use of similar materials and construction technology all over the world is a factor easing their classification. There are many types of structural systems traditional rural domestic architecture in Turkey, resulting from cultural attributes, related to material availability and climate. Modern buildings in the cities are generally built as reinforced concrete. Traditional wooden buildings were generally constructed in the ancient parts of city [10-11] (Dogangun et al., 2006; Korkmaz et al, 2010).The rural residences are still being constructed with the use of similar materials and construction technology all over the world is a factor easing their classification [11]. (Korkmaz et al, 2010).There are different approaches to the classification of rural structures in Turkey. A classification based on the carrier characteristics of the building systems is given in Figure 2.2. and Distribution according to regions is given in Table 2.1. [12]. (Korkmaz, 2007).

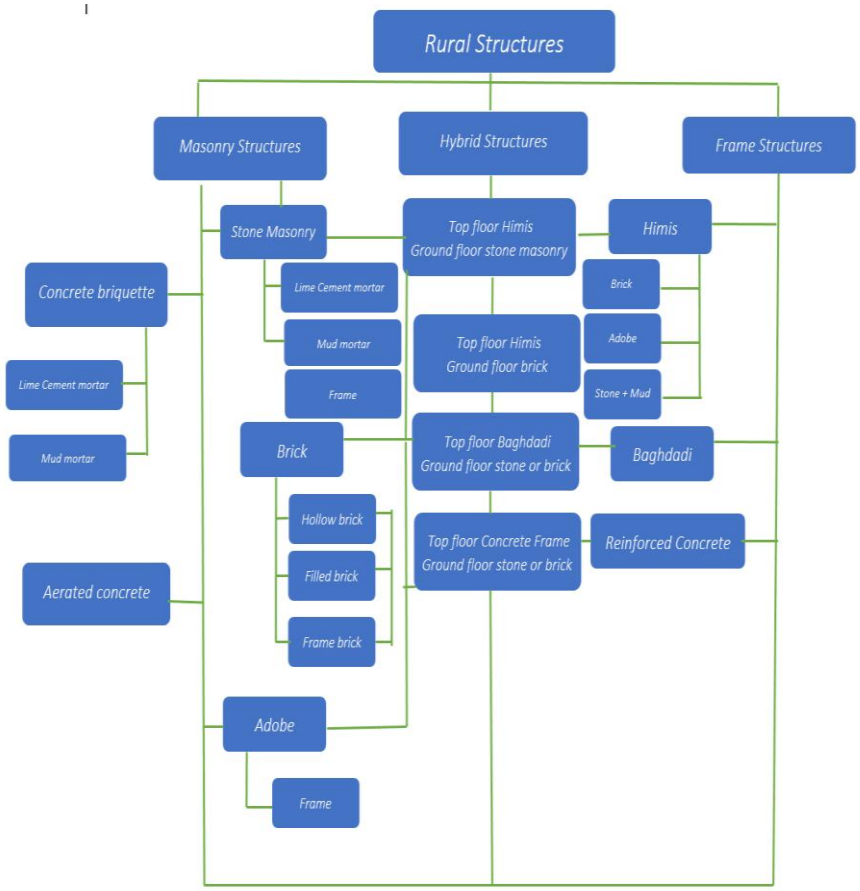

Figure 2. Classification of rural buildings in Turkey

Table 1. Classification of standard buildings in Turkey [12] (Korkmaz, 2007)

category	type	Region	description
wooden frame buildings	Rural "Himis"	North and West Anatolia	Frames made of unsorted and uncomplicated wood logs are filled with stone or mud brick. The dams are heavy, sometimes soil.
	Urban "Bagdadi"	West Anatolia	The thin horizontal slats are crushed and the wall padding is light and plastered to the wooden carrier frames that are carved and painted carefully.
Masonry Structure	Adobe	Central Anatolian	Walls made of mud, sometimes plastered with mud and heavy soil drips. Lintel and joinery are used from the tree logs.
	Stone	Eastern Anatolia	There are various types from mud mortar rubble to cement mortar stones. Sometimes only basements are made of stone.
	Blend Brick	All Region	It's a common building material. Lightweight, economic and also aesthetic constructions can be achieved.
	coring brick	All Region	It is used for making buildings such as bricks. The building is secured with lintel and lentiles.
	mixed	All Region	Concrete reinforced concrete structures on perforated brick walls and simple reinforced concrete columns with adobe filled walls
Reinforced concrete Structure		All Region	On-site pouring carcass buildings and fitted upholstery. Rarely prefabricated buildings are also found.

3. EVALUATION OF TRADITIONAL HOUSING ARCHITECTURE IN THE CONTEXT OF SUSTAINABILITY

In our country, where 35% of the population lives in rural areas, sustainable rural development is increasingly a challenge. In sustainable rural development with economic, social and environmental dimensions, one of the most important problems is the sustainability of the existing structures in the countryside and, together with this, the sustainability of local architecture and construction traditions in new constructions [13]. (Gorgulu and Koman, 2013).Local architecture is adaptable or exhibits features that can be improved over time as needs and conditions change. It is the basis for the sustainability of the interpretation of architectural designs in terms of the value of the local architects' own structure and the current technology. While local characteristics are being maintained, building a balance between the past and the future, depending on changing conditions, makes the architecture sustainable [14]. (Ovali and Delibas, 2016).The purpose of sustainable construction is "The creation and management of healthy environments based on the effective use of resources and ecological design". While traditional construction in rural settlements focuses on cost, performance and quality objectives, sustainable construction focuses on these goals in addition to minimizing resource consumption and environmental degradation and creating a healthy environment [13] (Gorgulu and Koman, 2013). Sustainable structure can be summarized as a reflection of sustainability and sustainable development in the construction sector. Three sustainability indicators stand out in sustainable structures. These; Ecological sustainability, economic sustainability and social / cultural sustainability.There exist several studies about rural structures and some of them given in Table 2. Table II summarizes scientific works available in the literature considering sustainability of the rural structures.

Table 2. Some works available in the literature about sustainability of rural structures

Authors	*Year*	*Fields of application*	*Objectives of the evaluation*
Tasci and Pekdogan [1]	2015	Sustainability, ecology, rural settlements,	To evaluated rural area and structures in terms of settlement of topography, relationship between green texture and housing, space organization also building materials and building forms variances
Altinkaya at all. [15]	2011	Sustainable housing, rural settlement	To evaluated Sustainability in Rural Settlements
Kusat [16]	2014	Rural development, Rural area, Sustainable development	To evaluated sustainable rural development
Gorgulu and Koman [13]	2013	Rural housing, sustainable rural development, rural setlements, masonry construction.	To determine a masonry wall type for rural housing in the case of Kayseri
Sagiroglu and Karayazi [17]	2017	Rural Dwellings, Sustainability,	To Preservation of Traditional Rural Dwellings
Ovali and Delibas [14]	2016	Environmental sustainability, vernacular architecture	Analysis of rural area Within the Scope of the Sustainability of the Vernacular Architecture
Tutkun [18]	2015	sustainability	To evaluated Sustainability in Rural Settlements
Arpacioglu at all. [19]	2016	Rural Sustainability, Adobe, Traditional Construction, Energy Efficiency	To Conservation of Village Houses in the Context of Rural Sustainability

4. CONCLUSION

Preserving the local architectural heritage and transferring it to future generations is important in terms of sustainability. Local architecture must be studied and assimilated in order to determine the knowledge of production cultures based on experience and to convey the knowledge acquired in the production cultures created today.Traditional settlements have been produced from existing sources, from readily available and transformable materials. They use the available resources to maintain thermal comfort without additional measures and thus carry sustainability principles. It is observed that traditional textures have a certain ecological sensitivity when their production and usage stages in the historical process are examined.

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19 - 23 April 2017, Sarajevo

A Review on Sustainability and Risk Management

Merve Er Kara[1], Seniye Umit Oktay Firat[1]

Abstract

Sustainability and risk are two significant concerns in today's business world. These two concepts are intertwined and there is a multidimensional relationship between them. Basically four different approaches have been observed in the literature: The first approach treats sustainability as a new factor that broadens the scope of risk management. The risks that arise from the considerations of sustainability of organizations, society and the earth are called sustainability risks. Some examples to these risks include scarcity of raw materials, climate change, hazardous waste, energy consumption, volatile energy prices and social responsibility risks etc. The second approach focuses on the role and importance of sustainability practices to decrease risks. The third approach addresses risk management as a tool for sustainable development. Identification, assessment and mitigation of risks are vital for the sustainability of organizations. The fourth approach deals with the risks resulting from the implementation of sustainability efforts.The aim of this study is to investigate the relationship between sustainability and risk management with a multidimensional point of view via reviewing the relevant literature. This study brings together the two concepts and gives insights about their integration to the researchers that work on these two fields.

Keywords: Enterprise Risk Management, Risk, Sustainability

1. INTRODUCTION

"Sustainability" and "risk" are two important research fields that have gained increasing attention from companies and researchers [1],[2]. Some trends and developments force companies to deal with sustainability issues such as environmental awareness of customers, customer demand for eco-friendly products and services, pressures imposed by internal and external stakeholders, and major risk events [3],[4]. Risk is an important issue that threaten the sustainability of organizations, society and environment. Companies need to integrate their risk management systems into their sustainable business policies and strategies in order to cope with the dynamic and risky business environment. Although there are a lot of researches both in the sustainability and risk management literature, only a few authors examined the relationship between these two areas [1],[5]-[7]. The authors summarized some of these studies in a previous study [2]. SC risk and sustainability are interrelated and intertwined areas and there is a strong relationship between them. Risk Management techniques progress in parallel with the developments in sustainability concerns [8]. A practice, action or policy applied in one area affects the other. Basically four different approaches have been observed in the literature regarding the links between these two issues. The first approach treats sustainability as a new factor that broadens and enhances the scope of risk management. Besides traditional risks, enterprises started to give an increasing importance and attention to both environmental and social issues with the emergence of sustainability concept. Organizations may increase the effectiveness of risk management process by incorporating sustainability [9], [10]. The risks that arise from the considerations of the sustainability of the organizations, society and the earth are called sustainability risks. Some examples to these risks include scarcity of raw materials, climate change, hazardous waste, energy consumption, volatile energy prices and social responsibility risks etc. [10]. The second approach focuses on the role and importance of sustainability practices to decrease risks. The third approach addresses risk management as a tool for sustainable development. Companies may increase their sustainability by managing the inherent risks effectively [7]. Identification, assessment and mitigation of risks are vital for the sustainability of organizations. The fourth approach deals with the risks resulting from the implementation of sustainability efforts. Sustainability initiatives both create opportunities and risks including cannibalization of the main business, misuse of sustainability, greenwashing, false claims, wrong perceptions and, incomplete or faulty reports etc. [2],[5].The aim of the study is to investigate the relationship between sustainability and risk management with a multidimensional point of view via reviewing the literature. First, sustainability and risk concepts and their comparison are presented in Section 2. Then the four different approaches about the relationship between sustainability and risk management in the literature are explained and discussed in Section 3. The advantages that are gained by integrating these two areas are highlighted. Finally Section 4 concludes the paper. This study brings together the two concepts and provide a background to better understand the link between them. This study also aims to emphasize the importance of risk management for sustainability and give insights to researchers about their integration.

2. SUSTAINABILITY AND RISK MANAGEMENT CONCEPTS

The roots of sustainability concept dates back to a debate that began in the early 1970s about the benefits of economic growth and the preservation of environment and the social structure [10]. Sustainable development has been defined in many ways. World

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Commission on Environment and Development defines sustainable development as: "development that meets the needs of the present without compromising the ability of future generations to meet their needs" [11]. Most of the definitions of sustainability refer to preserving and balancing the triple bottom line of environment, society and economy [12]. Bansal and DesJardine [13] discriminate sustainability from responsibility and other concepts with the consideration of time in sustainability. Pressures imposed by government, customers, employees, industry, society and media drive companies to conform to sustainability principles and standards [14]. Aras and Crowther [15] explained four facets of sustainability to evaluate sustainability activities: manageable, measurable, equitable (distributional) and technological. The effects and consequences of sustainability efforts must be measurable and manageable. Technology facet refers to the value added by technology and innovation.Risk is an important issue that threaten the sustainability of organizations, society and environment [2]. Wehrmeyer and Pediaditi added a risk dimension to sustainability as in Figure 1 [16], [17]. Risk dimension is incorporated to the three pillars of sustainability as a fourth dimension and covers the other dimensions.

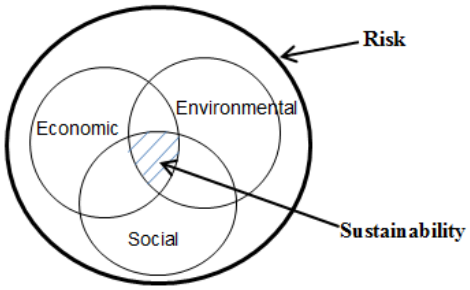

Figure 1. Risk Dimension of Sustainability [16]

The origin of the word "risk" can be either the Arabic word "risq" or the Latin word "riscum"[18]. Both of them have connotation of a fortuitous and favourable event. Risk is defined as the effect of uncertainty on objectives in ISO 31000 Risk management principles and guidelines. Basically we can define risk as the probability of occurrence of a failure, damage or loss from unforeseen events [19]. March and Shapira [20] described risk with a classical decision theory perspective as follows: *"reflecting variation in the distribution of possible outcomes, their likelihoods, and their subjective values".* Risk management gained increasing attention especially after past big risk events and scandals [21]. Risks may be categorized based on different perspectives [2]. Bradley [22] compared frequent versus rare, catastrophic disruptions in supply chains.Supply Chain Risk Management (SCRM) is the implementation of strategies to identify, assess and manage risks within the supply chain for reducing vulnerability and ensuring the sustainability of the supply chain [23]. SCRM has gained attention in the late 1990s with the occurrences of supply chain risk events such as the fire in Philips Semiconductors' New Mexico plant in 2000 [24]. SCRM is the intersection of SCM and risk management. The goal of enterprises to use SCRM systems is to have resilient SCs that can handle with disruptions [25]. There are various methods and strategies in SCRM [26]. Understanding risks and vulnerabilities is the first step to improve sustainability and resiliency. McLellan et al. [12] examined the links of sustainability researches with vulnerability and resiliency areas. Sustainability policies and practices provide various benefits for organizations such as: a high level of competitiveness, improvement in financial performance, decreases in risk levels and better reputation [27].

3. THE RELATIONSHIP BETWEEN SUSTAINABILITY AND RISK MANAGEMENT

There is a multidimensional and strong relationship between sustainability and risk concepts. Smith [17] states the relationship between sustainability and risk as follows: "risk and sustainability are two sides of one coin…One cannot be understood without the other". Although there are a lot of studies in the sustainability and risk management areas, nearly all of the studies are done individually. There are very few researchers that study these two issues concurrently [1],[5]-[9]. Carter and Rogers [1] stated that although risk and its management were not included in the definitions of sustainability, risk management has been frequently mentioned in the sustainability literature. Buddress [6] evaluated the interaction between supply chain risk and sustainability by giving some examples. He also presented a figure to show the connections between different categories of supply chain risk and sustainability.

3.1 Improved Risk Management By Incorporating Sustainability:

Traditional risk management approaches generally consider economic, strategic and operational factors [10]. However this approach is inadequate to survive in today's highly uncertain, risky and dynamic business environment. New risks emerge with the changes in the business requirements, trends and methods. Risk management has enhanced and broadened especially with the awareness about the importance of sustainability issues. Sustainability concept provides a broader view for ERM by including social and environmental considerations and thus increases the responsiveness of the companies to emerging risk areas [9],[10]. Some researchers explained how to integrate sustainability into ERM. AON explores the use of sustainability as a platform for risk management and its benefits [10]. They represented how sustainability broadened ERM by incorporating environmental and social factors as in Figure 2.

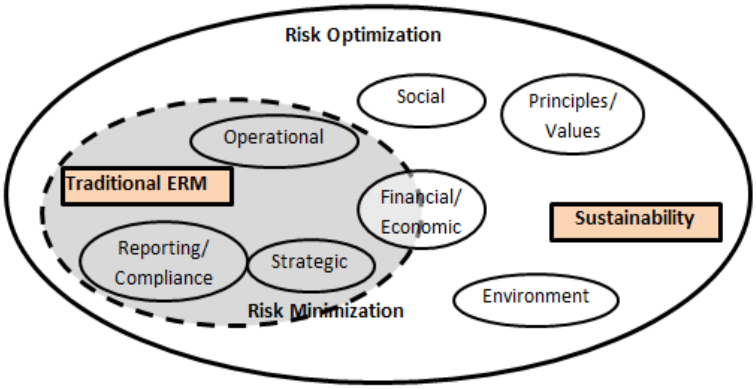

Figure 2. Business Sustainability Platform [10]

WBSCD [28] published a report about the integration of sustainability and ERP. According to the report, ERM function is collaborated with sustainability function and risks are disclosed to stakeholders (and sometimes to the public) by annual reports, sustainability reports and legal risk filings [28]. Weber et al. [29] incorporated sustainability criteria into commercial credit risk management process and predicted SMEs credit risks. The results of their study show that these criteria increase the prediction performance of the credit risk rating process.Smith [17] proposed the holistic organizational sustainability risk model in Figure 3 to represent the link between risk and sustainability. This model takes into account environmental, economic and social dimensions of sustainability within an organizational context and deals with equity, viability and bearability issues. Arrows represent the impacts and question marks express the three questions that will be directed for these impacts.

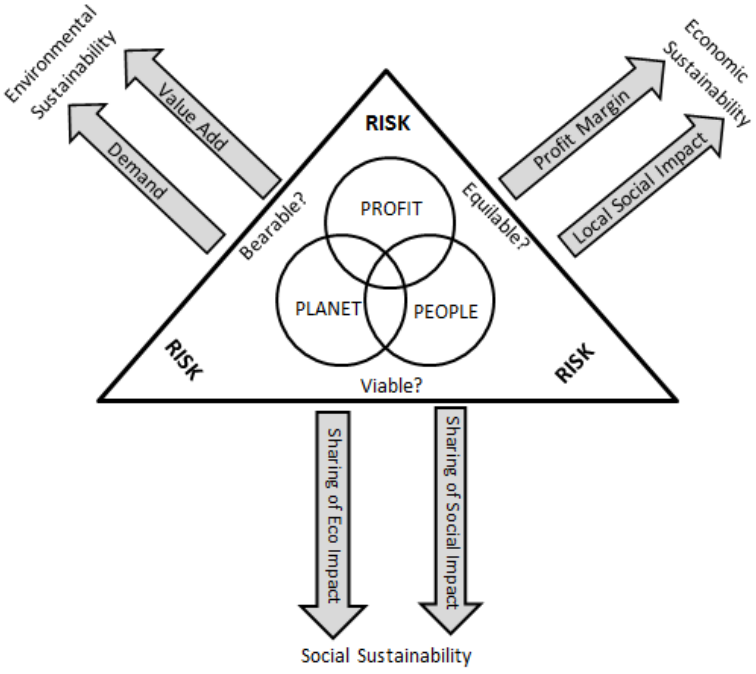

Figure 3. Organizational sustainability risk [17]

The risk issues emerged with the consideration of sustainability concerns are referred as sustainability risks (or sustainability-related risks) by some researchers [10], [30]. Sustainability risks consider the three pillars of sustainability and include the risks related with the environmental, economic and social hazards. Examples to these risks include; global warming, climate change, resource scarcity, job safety, damage to corporate's reputation, social justice, salary fairness etc. [10], [29]. Sustainability risk also includes the opportunities that arise due to changing social, environmental or economic factors [28]. Enterprise Sustainability Risk Management is a risk management strategy that deals with both traditional risks and, environmental and social risks with a holistic approach [31]. Giannakis and Papadopoulos [27] identified 30 risks under the three main pillars of sustainability by literature review and interviews. They also applied failure mode and effect analysis (FMEA) to identify the root causes and effects of sustainability-related risks and assess these risks and their inter-relationships. The most important risks are listed as follows; greenhouse gases, natural disasters, child/forced labor, financial crisis, bribery/ corruption, pollution, non-compliance with sustainability laws and energy consumption. In addition the results of their study indicate that there is a need for integrated risk

management approaches for effective sustainable strategies.According to the report of WBCSD published in 2017, discussions and surveys with risk management and sustainability practitioners show that 89% of the respondents agree that sustainability risks could lead to a significant impact on business, however 70% think that risk management practices are inadequate to address sustainability risks [28]. There are various reasons that decrease the efficiency of sustainability risk management including: lack of sufficient knowledge about sustainability, not considering sustainability opportunities in risk management, lack of collaboration between sustainability and enterprise risk management functions, the length of timeline required to measure and track sustainability risks [28]. The importance and criticality of sustainability risks have been increasing due to the increased importance of sustainability issues, rapidly changing standards and regulations and increased awareness and expectations of stakeholders and public on sustainability [32].Risk management and sustainability efforts should be integrated in order to survive in the competitive business environment. Disconnection of these two areas threat the business of companies. Nottingham [33] listed three factors that lead to a gap between ERM and sustainability: i) unclear terms, ii) unclear roles and responsibilities for risk management, iii) unclear corporate leadership and engagement on sustainability.

3.2 Sustainability Practices Decrease Risks:

Today organizations have to integrate both sustainability and risk management concepts into their business strategy in order to mitigate risks and exploit new opportunities arising from sustainability practices [34]. Most companies treat sustainability for complying with regulations and ignore the positive impacts of sustainability on business results. Sustainability management is a strong driver of value, success and good reputation for the companies. It also helps to reduce risks. Past major risk events showed how these risk events may cause serious consequences. As an example, in 2006 PepsiCo came under fire for excessive water usage in India and the reputation of the company was damaged [30]. Then the company reduced this risk by applying sustainability initiatives and saved 10.143 million liters of water. Other examples to risk events may be horsemeat scandal of European supermarkets, poor working conditions in Apple's suppliers etc. [27]. Major big companies including General Electric, Unilever and L'oreal discovered that effective sustainability policies, efforts and practices help to increase the growth rate of companies and also reduce risks [30].McLellan et al. [12] stated that there is a significant connection between sustainability and resilience & vulnerability research areas. They studied on the link between the sustainability practices in the design of energy systems and the risks in natural disasters. They especially stated that frameworks that aim to increase operational sustainability level of energy systems can also help to mitigate risks in the case of natural disasters.

3.3 Risk Management As A Tool For Sustainability:

Past risk events increased the awareness on the importance of risk management and an increasing number of organizations in various industries have started to adapt risk management programs [2]. Risk management is regarded as an important tool for sustainability. Ural [35] examined the major disasters that effect tourism destinations and focused on the importance of risk management for the sustainability of tourism. Disasters and international events (e.g. earthquake, climate change, political crisis and war) may have severe negative consequences on the tourism sector. Hence implementation of effective risk management strategies for the management of the negative effects of these disruptive events is vital for the sustainability of the sector.Krysiak [36] stated that sustainability needs to be stated in terms of risks and proposed a framework in which tools from risk management can be employed for sustainability. Yilmaz and Flouris [34] proposed an integrative conceptual framework for sustainability risk management by adapting ERM framework. The proposed model aims to resolve sustainability challenges through risk analysis, coordination with internal and external stakeholders and robust management systems. AON [32] stated that many of the risk measures have a direct effect on the areas in the standardized reporting framework which is provided by the Global Reporting Initiative (GRI) for organizations' sustainability disclosure. Besides their use in the detection and assessment of risks, risk measures may also be used in promoting sustainability. ABN AMRO Bank [37] aims to increase its business relations to obtain a sustainability performance level that is at least equal to the sustainability risk level of the business relation's activity. Figure 4 represents the relationship between sustainability performance and risk levels. If the sustainability risk of a transaction is high, a high sustainability performance of the business relation will be required to mitigate this risk.

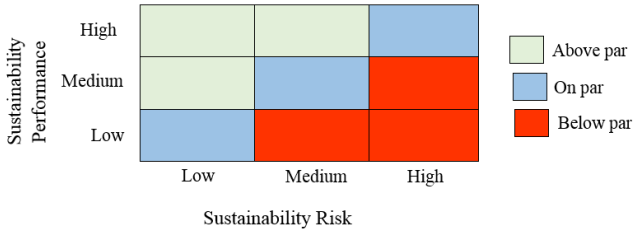

Figure 4. Relationship between sustainability performance and risk levels [37]

Garcia and Rigobon [38] examined the debt sustainability with a risk management approach and proposed a risk based measure to assess debt sustainability.Carter and Rogers [1] developed a sustainable supply chain framework that is based on the triple bottom line and four supporting facets of sustainability: risk management, transparency, strategy, and culture. Altuntas and Turker [39] embedded risk management into sustainable supply chain management framework. They also proposed to evaluate suppliers in terms of risk in order to manage supplier-related risks and enhance the sustainability of the supply chain.

3.4 Risks Resulting From The Implementation Of Sustainability Efforts:

Ignoring sustainability threat the future of the business of the companies and bring various risks including regulatory incompliance, damage to the reputation of the company etc. [30]. However, on the contrary, sustainability efforts may also create risks such as fraud, misuse, greenwashing, false claims and wrong perceptions [5], [14]. Organizations should consider the uncertainties and risks of their decisions on the environment and the society [27]. Hitchcock and Willard [5] listed three risks in pursuing sustainability: i) Greenwashing, ii) improper cannibalization strategies that damage the own business of the company, iii) Wrong perceptions and unrealistic expectations about sustainability. Greenwashing term gained importance especially after the 1980s [40]. It refers to excessive and exaggerated claims of companies about their environmental efforts to increase the market share. PwC [14] published a paper named "How to assess your green fraud risks" that includes an overview of green fraud risks and the methods to mitigate these risks. Some of the green frauds that are presented in the report are listed as follows: recycling or double selling of carbon emission reduction certificates, bribery and corruption, and lack of consistent measurement standards in reports of different companies etc.Orlitzky [41] emphasized unintended and negative consequences of sustainability resulting from the following issues; i) Overlooking a variety of potential sustainability actions due to an inadequate definition of sustainability, ii) Difficulty in accounting and predicting economic costs, returns and trade-offs of sustainability projects, iii) Inadequate information of investors and other market actors about the sustainability efforts of the company.Incomplete or faulty sustainability reports, lack of transparency and lack of true metrics to measure sustainability are another factors that may cause risks for organizations [2].

4. DISCUSSION AND CONCLUSION

Corporate sustainability and risk management are two critical issues for organizations in today's dynamic, competitive and risky business environment. There is a myriad of academic and business researches both in the sustainability and risk management fields. These two areas are intertwined and there is a strong link between the activities performed in these two areas. However, there is a limited number of researchers that examined the relationship between these two fields. Although the interest regarding this issue is increasing in the business world, there is a research gap especially in the academic literature. Basically four different approaches have been observed regarding the relationship between sustainability and risk management in the literature: According to the first approach, the scope of risk management is enhanced with the emergence of sustainability concept. Traditional risk management approaches examine risks based on a limited number of issues. However risk management frameworks should be developed and enhanced to include three dimensions of sustainability in order to cope with the highly dynamic and risky environment. Despite the increasing awareness on the importance of sustainability, a small number of companies incorporate it in their ERM [30]. The second approach focuses on the role and importance of sustainability practices to decrease risks. The third approach addresses risk management as a tool for sustainable development. The fourth approach deals with the risks resulting from the implementation of sustainability efforts. Organizations face various risks by ignoring sustainability. However, on the contrary sustainability efforts and practices may also cause different risks such as frauds, greenwashing, misuse, cannibalization of the main business and wrong perceptions etc. Additionally, there are lack of common measurements for sustainability factors and lack of standards for sustainability reports. There is a need for studies in developing standards in these areas. Organizations should be aware of the risks arising from sustainability initiatives. Especially investments in the sustainability field should be evaluated carefully and, returns and trade-offs of sustainability projects should be measured with accurate economic measurements.

ACKNOWLEDGMENT

This study is supported by Marmara University Scientific Research Project Coordination Unit (BAPKO) with FEN-C-DRP-100914-0339 project number.

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BIOGRAPHY

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19 - 23 April 2017, Sarajevo

Ecological and Cultural Networks: Example of Ankara Province and Its Periphery

Meltem Gunes[1], Duygu Dogan[1], Sukran Sahin[1]

Abstract

Besides threatening natural areas in the periphery of the city, increasing population and urbanization also put pressure on historical structures as well as cultural and recreational resources. This issue has direct impact on the continuity of natural resources, characteristics of the structures that are historical heritages, and the resource value of cultural and recreational areas. Ecological and cultural networks are one of the efficient tools used in preventing mentioned negative aspects. This study assesses the natural and cultural areas (historical sites/structures, cultural and recreational areas) within the scope of ecological and cultural networks in Ankara province and its periphery. Applied model tackles natural areas with their asset value and identifies the potential ecological network setup via Geographical Information Systems. In addition to that, the potential cultural network is detected by considering the historical, cultural and recreational areas in the city and its periphery as well as the road network and road concentration. Consequently, the aim is on one hand to ensure the ecological sustainability of the city by assessing the natural and cultural network structure and centers together, and to demonstrate the potential recreation routes on the other. The ecological and cultural networks to be established will protect the natural cultural and historical values and they are linear spatial elements that also enable the demonstration of idiosyncratic identity of the cities, in other words the urban landscape character.

Keywords: ***Ecological network, cultural network, historical structure, natural landscape, recreational resource, Ankara.***

1. INTRODUCTION

Ecological and cultural networks are important for the protection and sustainability of ecological processes and cultural structure. Ecological network is a model developed in 40 years with the purpose of protecting the integrity of environmental processes [1] and it is widely recognized for protection of wild life in areas that are fragmented as a result of human activities [2]. In order to facilitate the exchange of genes between different populations, ecological networks connect ecosystems and populations of species that are threatened by fragmented habitats Thus, it ensures the mobility of animal species and sustainability of biological exchange within an ecosystem [3] and increases the chance of survival for threatened species [1]. In addition, while identifying the ecological networks, it also aims at ensuring the sustainability of species' life cycles in ecological processes in the landscape with habitat connections [3].According to Crooks and Sanjayan (2006), connection is a kind of movement in nature and is concerned with the degree of movement of the organisms, or less movement, less connectivity [4]. The cultural network ensures the preservation of existing cultural structures and areas and and creation the recreational areas.According to Elbakidze and Angelstam (2007) definition, cultural connectivity in landscape is, are composed of different complex components such as buildings, plants, vegetation, different land use and their spatial structure [5]. A cultural network includes both cultural and historical dimension. Antonson et al. (2010) defines it "as a functional, economical or social connection of human processes between two points in the landscape, which can be manifested in tangible or non-tangible features and has an historical dimension" [6].Moreover, ecological and cultural networks do not only enable the protection of natural, cultural and historical assets, but they are also linear spatial elements that enable revealing of a city's particular identity values or in other words, its landscape characteristics. The study aims at identifying potential ecological and cultural networks between natural and cultural areas (histories area/structure, cultural and recreational areas) in Ankara city and its periphery. In this context, natural areas were considered core areas in identification of potential ecological networks and the networks between these areas were identified with the help of Geographical Information Systems. At the end of the study, the objective is to ensure ecological and cultural sustainability of the city by considering natural and cultural network structures and centers together.

2. MATERIAL AND METHOD

The method of the study is Ankara city located between 39 57' N latitude and 32 53' E longitude [7] (Figure 1).

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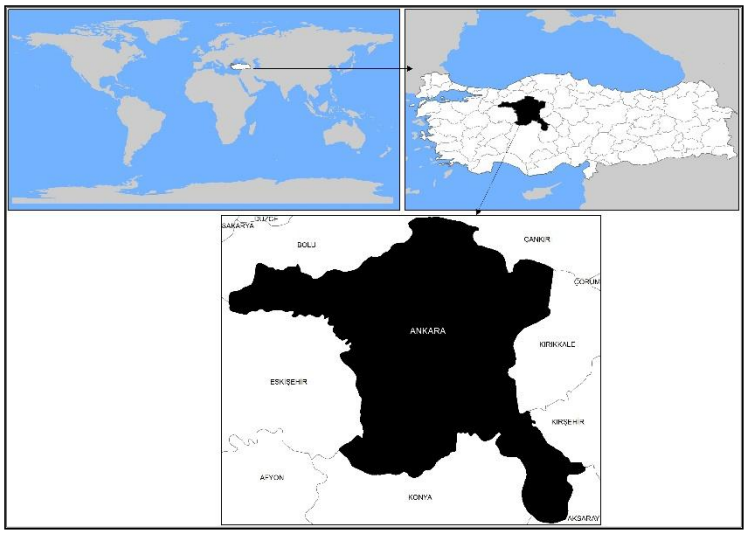


Figure 3 Location map

The study was conducted in two phases. Firstly, ecological connectivity between natural areas in Ankara city was identified. At this phase, CORINE 2012 data was used in identification of natural areas. Potential connectivity routes were identified between the discussed natural areas with the help of Linkage Mapper [8] tool. The tool forms connectivity routes by using core area and resistance surface. Resistance surface is measured based on consumed energy, difficulty or risk of death while passing through cells [8, 9]. Accordingly, natural areas were considered as core areas. Resistance surface was identified using the method by Dogan [9] In this method, resistance values are calculated by using human foot print effect [10] and hemeroby degrees [9, 11].Within the scope of this study, the data on natural areas which were considered core areas regarding ecological connectivity and land cover/land usage data which were used in calculation of resistance surface were obtained from 2012 CORINE Land Cover/Land Usage data prepared by European Commission [12]. Highway data, another data that is used in calculating resistance surface, was based on1/250.000 scale highway map obtained from Mulga Ministry of Environment and Forestry. These data were reclassified in line with the 2012 traffic and transportation information (2013) prepared by Department of Traffic Safety, Transportation Studies Branch Office (Figure 2).In prioritizing specified ecological networks within the borders of study area, protected areas and important nature areas were taken into consideration. There is a total of 15 protected areas and 14 important nature areas some of which are 1 national park, 8 natural sit areas, 1 nature park and 8 wild life protection areas within the borders of the study (Figure 3). The ecological networks that specifically connect these areas hold significant importance.

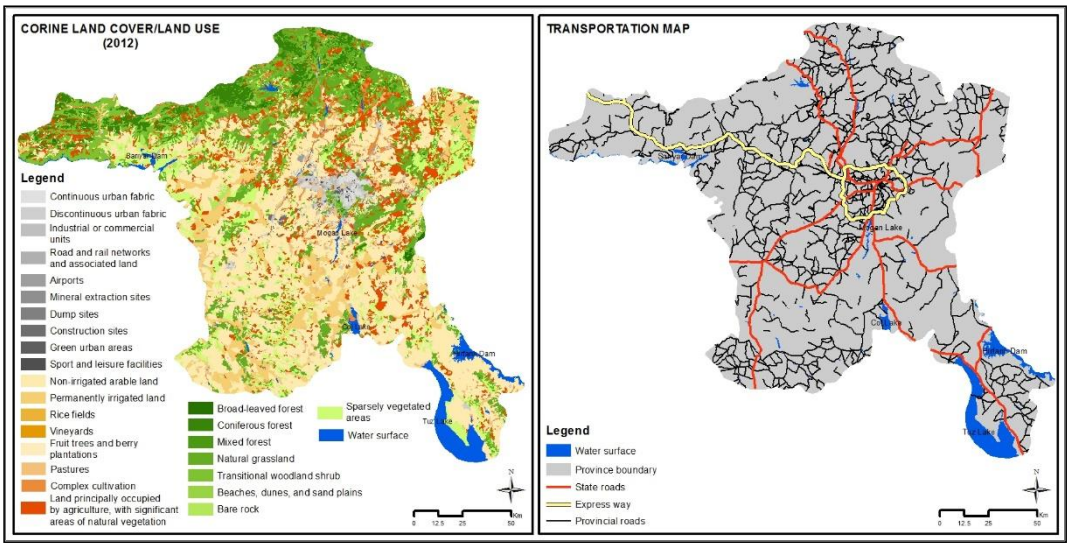


Figure 4 CORINE 2012 [12] and Transportation map by Department of Traffic Safety, Transportation Studies Branch Office (2012).

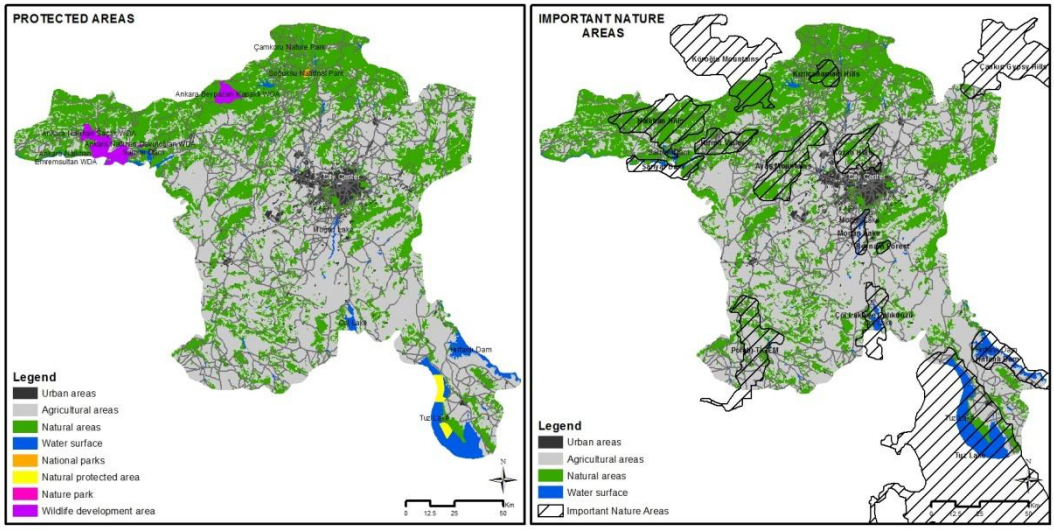


Figure 5 Protected areas [13] and Important nature areas [14]

In the second phase of the study, cultural connectivity in Ankara city and its periphery was identified. Cultural connectivity elements were determined as historical, cultural and recreational areas in Ankara city. In designating potential routes in this phase, urban parks, neighborhood parks, military areas, embassy gardens, graveyards, university campus areas, afforested areas and forest areas were considered by using City of Ankara Development Plan and 2023 Master Plan Report by Ankara Metropolitan Municipality [15] in figure 4. The corridors that will provide cultural connectivity are designated according to the method by Sahin vd. 2010 [16]. These are water trails (river or creek routes), road landscapes (roads, railways, etc.), valley landscapes, scenic roads and historical / archaeological routes using Ankara Metropolitan Area Transportation Master Plan, 2013 obtained from Transportation Master Plan Project Office prepeared by Gazi University and Ankara Metropolitan Municipality [17]. These data were reclassified as subway, highway, banlian railway and Ataturk bouleward. Streams play a corridor function as linear elements in identification of ecological networks. However, only the streams in the city and its periphery were analyzed as recreational area within the scope of this study. Streams were determined in this study with the help of Ankara Stream map [18]. Finally, the cultural network was identified by means of the overlay method using historical, cultural and recreational areas and corridors.

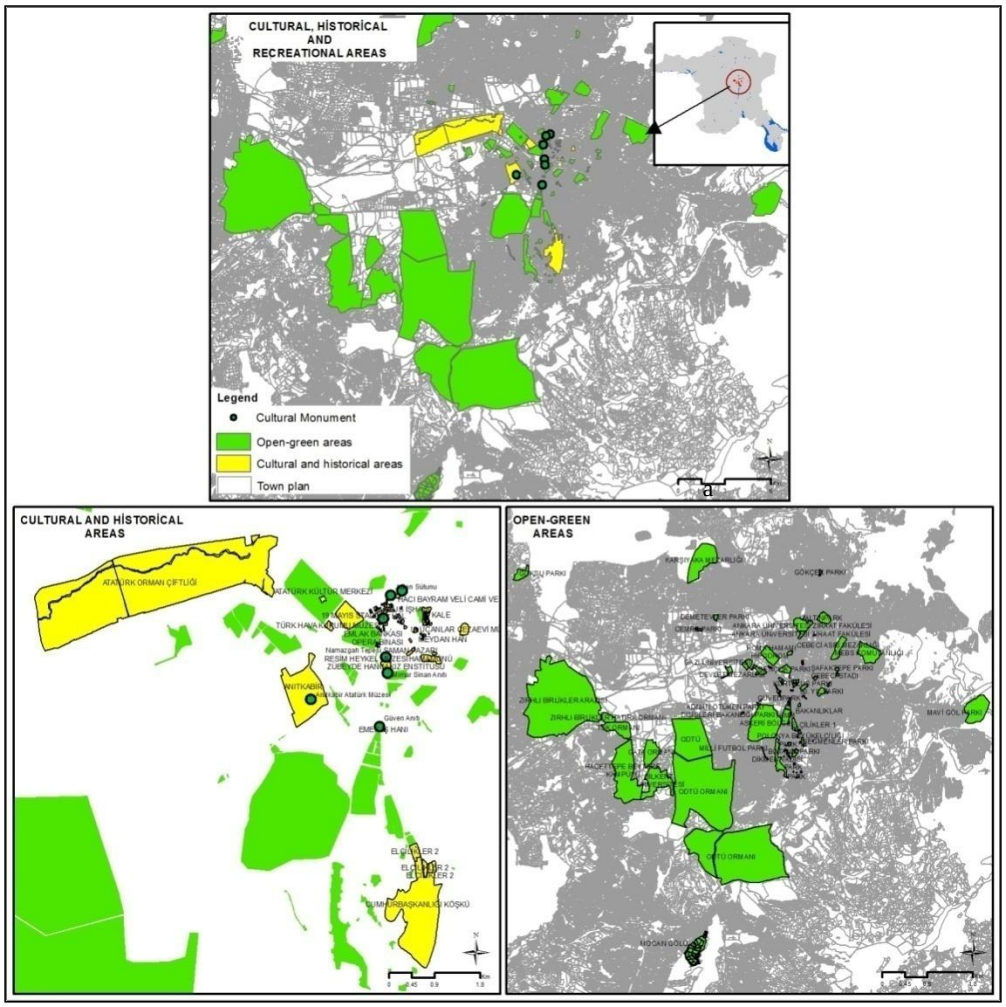


Figure 6Historical, cultural and recreational areas (City of Ankara Development Plan and 2023 Master Plan Report)

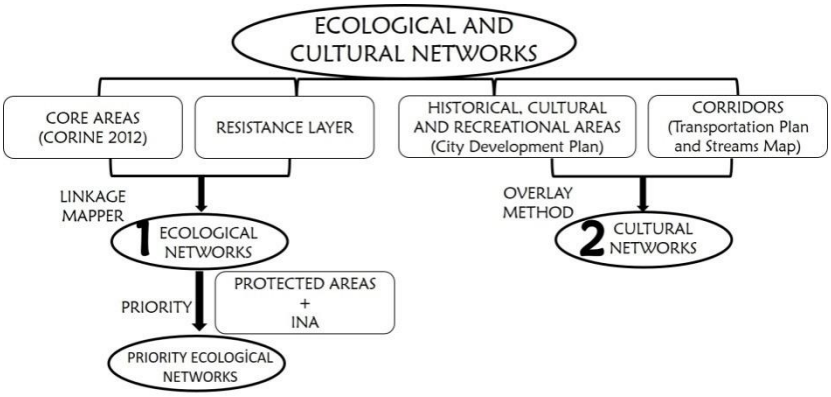


Figure 7 Flow chart

3. RESULTS AND DISCUSSION

Ecological networks obtained in line with the methods section are presented in Figure 7. In this scope, resistance degree of the area is identified. Resistance values which were identified according to the method by Dogan (2016) range between 1-100. As the

value approaches 100, the resistance gets higher [9] (Figure 6). Resistance value becomes the highest especially on highways, residential areas and their periphery and becomes the lowest in natural areas [9].

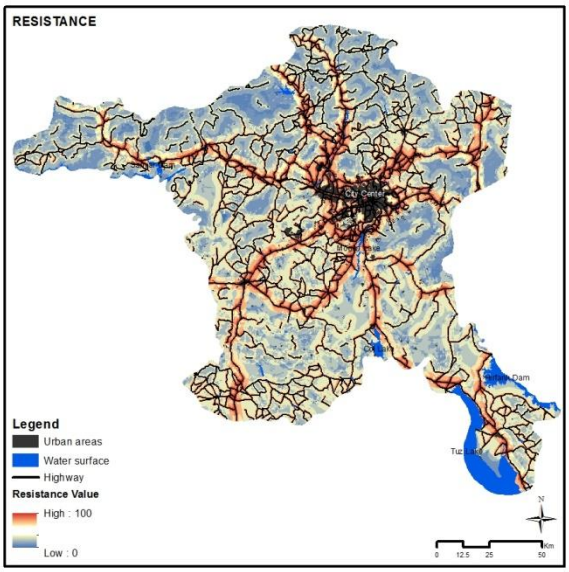
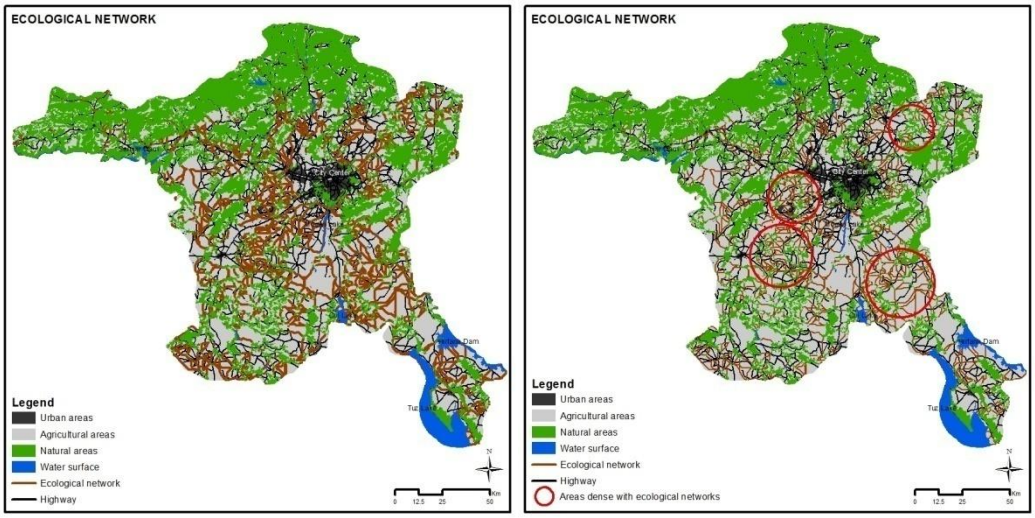


Figure 8 Resistance layer

Ecological networks between the natural areas are identified according to the map (Figure 7a). Ecological networks get dense at areas where natural areas are small in size and likely to be isolated (Figure 7b).



a *b*

Figure 9 Ecological network

According to the map presented in Figure 6, ecological networks cross agricultural areas mainly. In addition, there are points where they intersect with highways. Wild life bridges should be built at these points. Protected areas constitute one of core areas that is important for ecological networks. Protected areas aim at long term protection of nature and related ecosystem services and cultural values. They are clearly defined geographical areas which are known, require dedication and are managed with legal or other effective methods. They provide a safe refuge for plant and animal species whose habitats are under treat. 80% of the species in the red list of IUCN are in protected areas [13]. From this aspect, protected areas have an important position in protecting biodiversity and may play an important role in protection of ecological integrity of ecological networks [1]. However, since they are fenced and isolated living units, they may face serious problems regarding habitability [1]. Due to both reasons, they are significant for ecological networks. Important nature areas signify the geographical area that has significant value for sustainability of species' upcoming generations in the nature based on area protection and their significance is recognized internationally in line with scientific criteria [14]. These areas are selected based on distribution and population of species that are in need and based on concrete criteria that are standard, globally applicable and in line with threshold values. These areas are

important for ecological networks since they are important for biodiversity. These areas were taken into consideration in prioritization of ecological networks within the study (Figure 8).

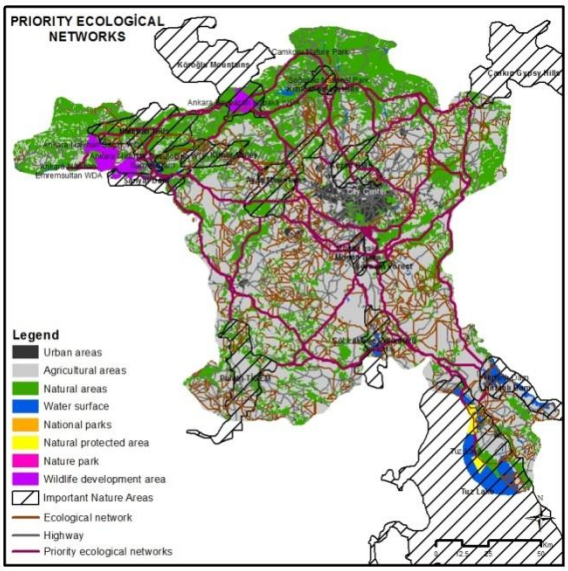


Figure 10 Protected areas and ecological network

Cultural connectivity elements are identified accordingly are presented in Figure 9 using overlay method. Ulus historical city center that includes architectural structures and areas belonging to prehistorical and Ottoman periods and Ataturk Boulevard that includes Republican period structures and areas have the characteristics for being the main corridors of the city. Ataturk Boulevard is an important corridor as it is a recreational, historical and cultural route. Corridors are determined as follows:

- Ankara, Ova and Cubuk rivers and Incesu stream
- Banlian railway
- Subway line
- Highway as scenic road with significant road routes
- Ataturk boulevard as historical /archaeological route

Hatip and Cubuk stream corridors have been influential in forming usage areas and green systems in city plans for Ankara which is located within a basin that is shaped by these two streams. The green belt around especially Incesu River which starts from the south and flows across the city reaching Ankara stream starts from Imrahor Valley and crosses Kurtulus Park, Abdi Ipekci Park, Genclik Park, 19 Mayis Sport Facilities, AKM 1st Region (Old Hippodrome Area) and Forest Farm [19].

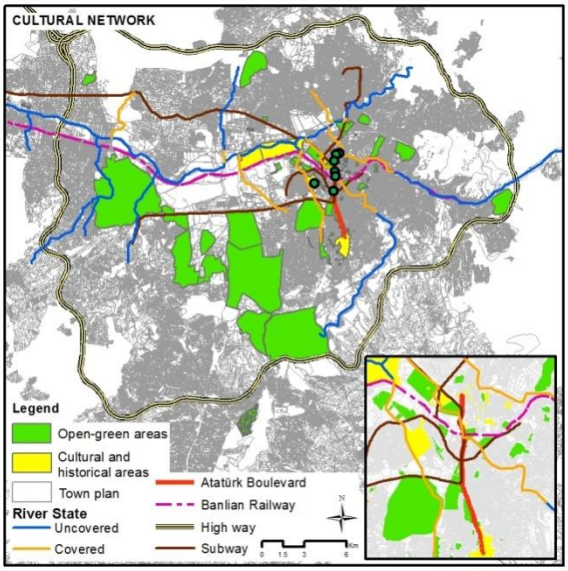


Figure 11 Cultural network

On the basis of two different methods, ecological and cultural networks in Ankara and its periphery were identified in the study (Figure 10). In the method used for the phase of ecological networks identification, it was not possible to identify ecological networks due to scale of the study and the city structure of Ankara. Cultural networks identified within the city do not only have cultural and recreational functions but also have a supportive role in ecological terms.

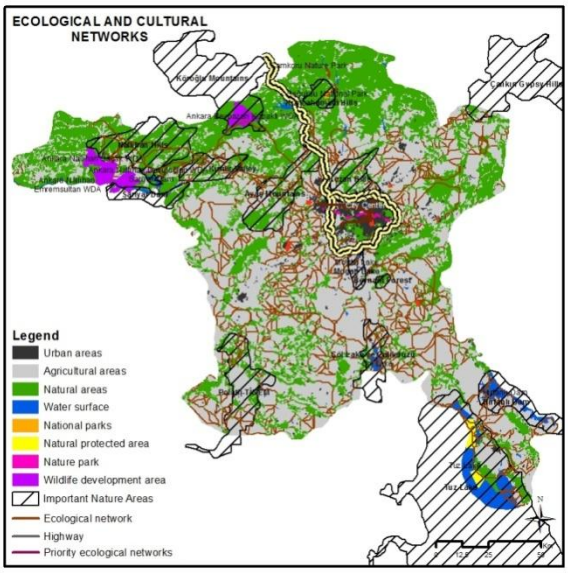


Figure 12 Ecological and cultural networks

Another point in identification of ecological networks is to identify width of linear elements. At this point, fauna and habitats must be identified in the city. Ecological networks must be reevaluated based on habitats and required width for the passing of fauna must be identified.It can be considered to build potential wild life bridges at the intersections of roads and linear routes in natural areas that are fragmented by high speed roads.

4. CONCLUSIONS

Ecological and cultural networks are important elements in ensuring ecological and cultural sustainability of a city. A consistent and flexible ecological network would help wild life in coping with ecological and climate changes. At the same time, it would improve natural environment's ability to provide high quality ecosystem service today and in the future. The study is important in terms of sustainability of natural areas, wild life and ecosystem services in Ankara city and its periphery [2]. As a result of planned ecological network, isolation of natural areas and fragmentation of wild life habitats will be prevented and biodiversity

will be more protected. Cultural connectivity, on the other hand, can increase the sense of place in the community by through the preservation and development of common values that emerge from the past over the course of time.The study is important in terms of integrated approach towards ecological and cultural networks. The ecosystem and city's ecology will be protected with ecological networks identified in the periphery of the city and the city's identity will be protected and its cultural sustainability will be achieved with cultural networks.

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Comparison of Solar Tracking Systems Made for Increasing Efficiency of Photovoltaic Systems

Sabir Rustemli[1], Mustafa Akdag[1], Zeki Ilcihan[2]

Abstract

Solar Energy is the most used type of energy among the renewable energy sources.Photovoltaic (PV) panel converts the sunbeam coming its surface to electrical energy. Researches are ongoing to increase efficiency and to reduce cost of PV panels. Most of these researches are about the chemical structure. On the other hand, some researches are ongoing to increase efficiency. The more vertical the sunbeam coming on the panel surface, the higher the electric energy produced by PV panel. In order to ensure the continuity of sunbeams coming vertically to the panel Solar Tracking Systems (STS) are used. STSs are designed so that PV panels to absorb maximum energy from sunlight. In this study the classification of STSs are made with the follow-up axis, single axis and dual axis control. According to control structure, gravity based, sensor based and astronomical data based systems are explained. The advantages and disadvantages of these systems are mentioned by comparing the STS made with control structure. A comparison of single axis STS, double axis STS and fixed angle solar systems is made. PV panels without solar tracking systems has average annual power of 5.5 kWh/m2, where this power is 7.2 kWh/m2 with single axis STSs and 7,4 kWh/m2 with double axis STSs. By these data single axis STS energy gain is %30.9 compared to fixed angle systems. Double axis STS energy gain is %34.5 compared to fixed systems. Effects of STS on PV panels' energy gains are examined by comparing the STSs with each other and with other systems and some suggestions are presented.

Keywords: Solar Energy, PV Panel, Solar Tracking Systems

1. INTRODUCTION

The sun has been placed in a very important place in civilizations throughout history and accepted by every society that the energy it provides means life. The distinguishing feature of solar energy from other energy sources is that it is clean and can be obtained without causing any environmental pollution. But since the past centuries, fossil fuels have always been ahead of renewable energy sources because they are cheap and easy to use. Reduction of fossil fuels in recent years, concern about pollution and global warming has brought the importance of renewable energy sources [1, 2].Solar energy can be used for many different purposes. People from the past to the present day used solar energy for processes such as heating and drying. With technological developments, solar energy has started to be used in electricity generation. There are many ways to produce electricity from solar energy but these methods are generally based on two basic principles. First one is directly producing electrical signals from the sunbeam, the second is to produce the electrical energy with the heat effect of the sun by heating specific surface or a liquid with conventional methods [3, 9].

2. SOLAR TRACKING SYSTEM

Solar power plants are designed for increasing the power that provided from sun by tracking the movement of sun all day long with solar panels. With these systems the amount of solar radiation absorbed more and with this the solar panels daily performance and yield increases [4].As seen in Figure 1, the arrival angle of the sunbeam changes with two factors; the first of these is that the rays of the sun will change during the day due to the rotation of the earth on its own axis. The second is the arrival angle of the sun rays during the earth's rotation around the sun. This angle changes seasonally. For this reason, it is necessary to follow these two changes correctly. The tracking system must move at least two axes in order to be able to follow the sun at any time [3, 5].

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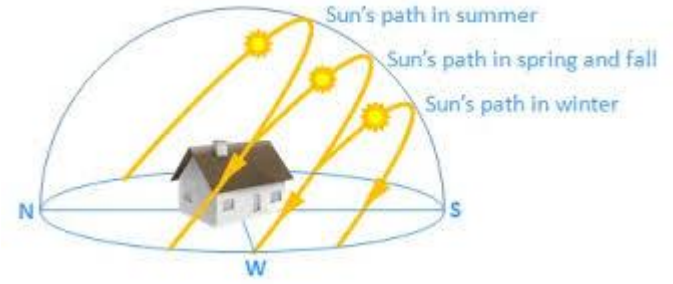

Figure 1. Orbits that the sun follows according to the seasons [2].

2.1 Classification Of Solar Tracking Systems

2.1.1 ByTracking Axis

2.1.1.1 Single Axis Control

Single axis tracking systems perform one of azimuth or vertical movements for solar powered systems. Taking Turkey into consideration, for single-axis motion, if tracking in the east-west direction is performed 240 °, if the follow-up is to be carried out in the vertical axis, a motion field of 72 ° is created [6]. The reason why single axis motion is preferred is the area where the free space is mounted. For example, while parabolic grooved systems tend to follow the azimuth angle, most roof applications only observe elevation angle due to space constraints of the PV system [11].

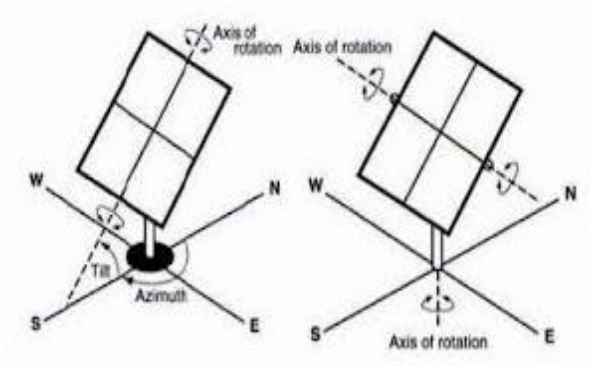

Figure 2. Vertical systems in single axis, horizontal and vertical [4].

2.1.1.2 Two-Axis Control

In double axis control system, the tracking system works with two angles that indicate the sun's position in the sky. One of the axes in this control system acts on the azimuth axis and the other acts on the zenith axis. Two-axis control system improves panel efficiency by 30-40%. The Azimuth axis controls the panel's east-west movement, and the zenith axis controls the height of the panel [1].

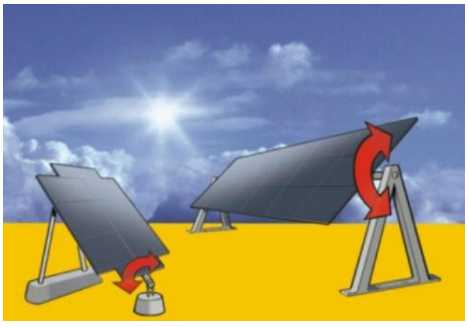

Figure 3. An example of a working principle for a biaxial solar tracking system [8]

2.1.2 ByControl Structure

2.1.2.1 Systems Using Gravity

In these systems there are two tubes which are placed on the right and left sides of the panes and have a special liquid inside them. These tubes are connected to each other and there is a liquid transition between them. The liquid inside the tubes is sensitive to heat and the expansion factor is high. Panels are first placed in a balanced manner according to the center of gravity [9, 10].

Figure 4. Systems operating with gravity feature [8]

2.1.2.2 Systems Using Sensors

It is a closed-loop system that provides the position information required for the system to follow the sun by means of the sensors. These systems use optic sensors as standard. These sensors are positioned close to each other and at an angle to the calculated angle. This creates the voltage and current difference between the two sensors. Figure 5 shows the usage patterns of the sensor to be used. [7].

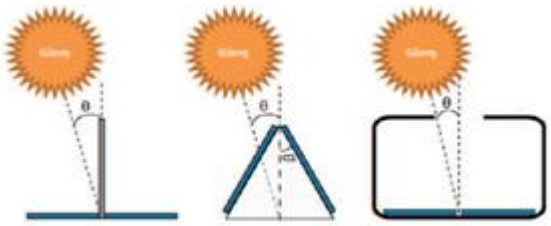

Figure 5. Tracking system from left to right: separator, angled assembly, router [7].

2.1.2.3 Systems Using Coordinate Data

These systems are open loop tracking systems that does not use any sensor system to provide position of the sun. The Position of the sun can be modeled mathematically by using some approaches based on the annual and daily behavior. These solar tracking systems have a processor that does these calculations]. The latitude and longitude information with constant value is entered as this operator input data. As a variant, the clock information is taken from the RTC (real time clock) [6]. The most important feature of this system is that it can monitor with the desired sensitivity to absorb direct sunlight. If desired the program used for monitoring can be 0.01 ° or 25 ° with direct incoming radiation, the PV panel can be absorbed without ever seeing the sun [11].

3. COMPARING SOLAR TRACKING SYSTEMS THAT USE SENSORS AND TRACKING SYSTEMS THAT USE COORDINATE DATA

In Solar tracking systems with coordinate data the addition of the coordinate information of the place where the system is used and the written software is enough for the operation of the solar tracking system. Solar tracking systems use sensors always try to follow the sun through the sensor, it causes the solar tracking system to turn on and off too much to the motors, thus causing more energy consumption. In this respect, the solar tracking system with coordinate data has less energy consumption than the sensor solar tracking systems [1, 6, 7]. Solar tracking systems with sensors scan in rainy, cloudy weather until the values on the sensors are equal and make extra energy consumption when the installations of the solar tracking systems are compared, the installation of the sensor tracking systems is very easy. Tracking systems with coordinate data must be carefully set during the southern setting, and at the same time, the latitude, longitude, time and date information to be entered into the system during installation must be entered. If this information is entered incorrectly, the system will not operate properly. In the case of sensor systems, the system will not work properly if the sensor is affected by the external environment and the result of the shock is corrupted.

4. SOLAR TRACKING SYSTEMS COMPARED TO FIXED SYSTEMS

Table 1 shows the measurements of the effect of solar tracking systems on energy gain by the US National Renewable Energy Laboratory (NREL), one of the cities of Denver-CO and Australia-Melbourne located in the northern southern hemisphere [9].

Table 1: Latitude: 39°45 Longitude: 102 ° 52'W Daily solar radiation by month of Denver CO in kWh / m² (Panel angle = Latitude angle)

Month	Panel angle = latitude angle		
	Fixed	Single axis	Double axis
January	2,06	2,06	2,24
February	2,75	2,82	2,94
March	3,9	4,79	4,81
April	4,25	5,99	6,06
May	4,87	7,21	7,41
June	5,05	7,5	8,1
July	4,87	7,21	7,69
August	4,45	6,46	6,62
September	4,02	5,19	5,2
October	2,95	3,27	3,33
November	1,95	1,95	2,11
December	1,83	1,83	2,02
Average	3,57	4,68	4,88

PV panels without solar tracking system has annual average power of 5.5 kWh/m². If a single-axis solar tracking system is used annual average power would be 7.2 kWh/m². If a double-axis solar tracking system is used annual average power would be 7.4 kWh/m². Accordingly, the energy gain of the single-axis tracking system is 30.9% compared to the fixed systems. The energy gain of the dual axis tracking system is 34.5% compared to the fixed systems.

5. CONCLUSION AND RECOMMENDATIONS

In order to make PV panels economical, various integrated systems in addition to PV panel systems can increase the gain of electricity from PV panels and allow the panels to amortize themselves in a shorter time. Thus, it is possible to realize that the costly PV panels have less money. In biaxial solar tracking systems, it increases by 37% and ensures that solar energy is less costly.So solar tracking systems have turned into a technology that makes the use of solar energy more attractive. Solar tracking systems are especially recommended for use in space-constrained applications. For example ships, the number of panels to be used to obtain the energy required in vehicles such as caravans,For example, in vehicles such as ships and caravans, the number of panels to be used for obtaining the necessary energy can be reduced by reducing the number of panels with solar tracking systems. When large-scale power generation plants are considered, return on investment is shortened.

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The Performance Analysis of a Solar Power Plants

Sabir Rustemli[1], Mustafa Akdag[1], Zeki Ilcihan[2]

Abstract

In these days, for developed and developing countries one of the most important agenda items is energy. Energy production is increasing in parallel with population growth, industrialization, and social development level and technological developments. In this respect, the need for electric energy is increasing very fast day to day. Most of the Electric energy production is providing from limited fossil resources like oil, coal and gas reserves. Because of limited fossil resources Turkey is largely dependent on foreign production in terms of energy resources. Therefore, the efficient use of existing energy resources is very important. In this respect, effective use of renewable energy resources is importance. Solar energy is the most used among the renewable energy resources. Turkey has a significant potential in terms of solar energy compared to other countries. Unfortunately, the use of solar energy is very low compared to other countries. The most commonly used method of obtaining electricity from solar energy is Photovoltaic (PV) panels. In this study the solar energy potential of Mus city was investigated trough data of an active solar power plant. This solar power plant application made as roof based plant with placing 240 PV panels on two different building roofs and has 60kW installed power. In this facility, three 20kW inverters used. The data is analyzed by comparing 2016 data of the solar power plant. Using the results obtained with this data, the annual Solar Energy potential of Mus is shown. As a result, solar energy potential of Mus is evaluated in Turkey for investment purposes.

Keywords: Mus, Solar Energy, PV Panel

1. INTRODUCTION

In the present day, a large part of the energy generation is fossil-based, limited; Oil, coal and gas reserves. In parallel with population growth and technological developments, the energy requirement of the world increases by approximately 4% - 8% each year [1,2]. Fossil fuels, on the other hand, have many harmful effects on the environment and human health. This situation arises the importance of renewable energy sources. Renewable energy sources are extremely important for the future of the world in terms of environmental degradation that may occur in the interaction of energy and environment and ecological balance in the world [3].Among renewable energy sources, solar energy stands out because it is natural, dominant, ergonomic, abundantly usable and environmental friendly. The density of the energy coming from the sun is 1.35 kW/m2 on the atmosphere. At this density, the solar power coming from the world-wide area is 18, 86 GW. The solar energy on the entire surface of the Earth in one year is equivalent to 122.000 billion TCE (Tons of Coal Equivalent) or 81.400 billion TOE (Tons of Oil Equivalent) [4].In other words, solar energy coming to the world in one year corresponds to 50 times of the known coal reserve and 800 times of the known oil reserve. In the work done by IEA-International Energy Agency, it is stated that between 2009 and 2035 world energy demand will increase by 51% if current energy policies and energy supply preferences continue. In this case, the world's primary energy demand would reach the level of 18.300 billion TOE by 2035. From here it is crucial for the world to consider the use of solar energy in terms of population growth, industrialization and environmental phenomena [5, 6].Turkey is not an energy-rich country in terms of available energy resources. Given the current situation, 72% of the energy consumed is imported. In 2012, imports of energy products were $ 60 Billion, while in 2013 this figure was $ 55.9 Billion. This decline continued in 2014, imports of raw materials for energy decreased by 18% in 2014 compared to 2013 as 54.9 billion. The installed capacity for electricity generation was 69,516.40 MW at the end of 2014, but increased by 3.8% at the end of 2015 to 72,156.6 MW. The Figure shows total installed power with respect to energy sources in 2016 [7]

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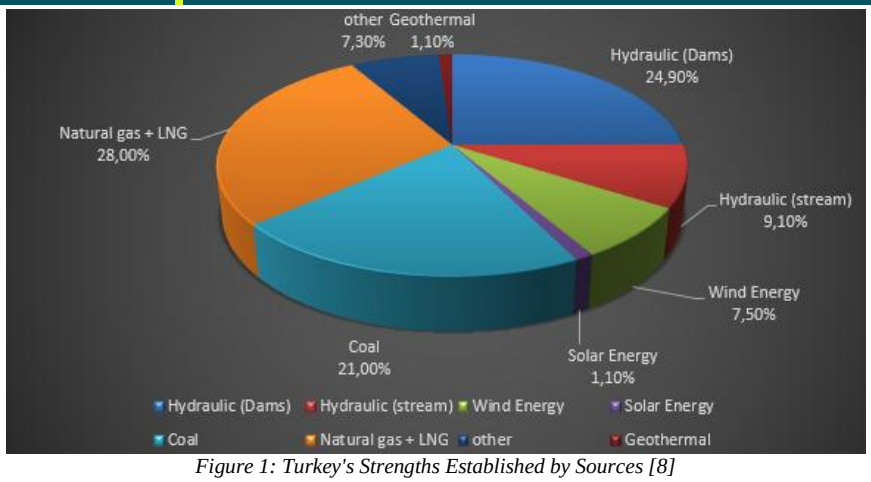

Figure 1: Turkey's Strengths Established by Sources [8]

Table 1: Turkey's Strengths Established by Sources [8]

Source Type	Installed Power (MW)	Installed Power Share (%)
Hydraulic (Dams)	19715,3967	24,90
Hydraulic (stream)	7205,2253	9,10
Wind Energy	5938,3725	7,50
Solar Energy	870,9613	1,10
Coal	16627,443	21,00
Natural gas + LNG	22169,924	28,00
Other	5780,0159	7,30
Geothermal	870,9613	1,10
Total	79178,3	100,00

2. PRODUCING ELECTRICITY ENERGY WITH PV PANELS

PV panel converts the sunbeam coming its surface to DC electrical energy. This DC voltage inverter is converted to a network compatible AC voltage by means of inverters. After this step, if the generated electricity is connected to the network, it is called on grid system, and if it is not connected it is called off grid system [9]. Solar energy is less preferred due to its high installation costs and low efficiency compared to other renewable energy sources. However, solar energy is a type of energy that cannot be used despite its high potential on earth. Even though the installation costs are high, the operating costs are lower than other energy types. Researches are ongoing to increase the productivity and to reduce costs [10].

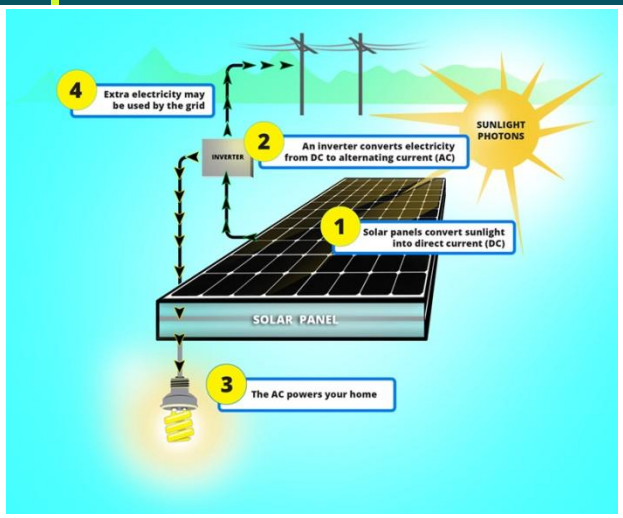

Figure 2: Generating Electrical Energy by PV Panel

3. SOLAR ENERGY POTENTIAL FOR MUS

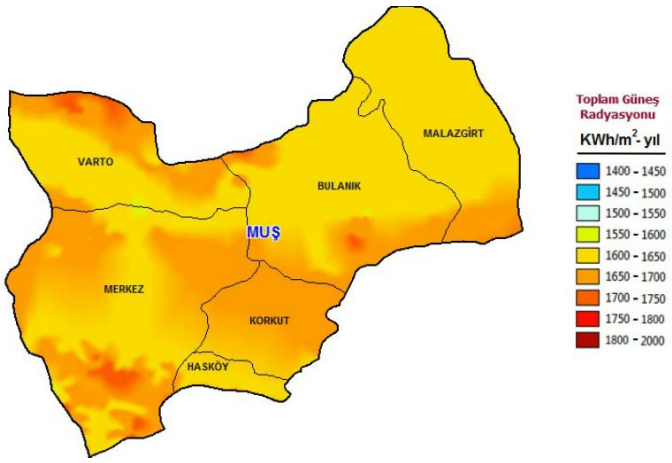

Figure 2: Solar radiation potential for Mus

Mus annual average solar energy global radiation value is 1.591.5 kWh / m ^ 2 –year and average sunshine time is 2686.3 hours-year. It has been confirmed that the average annual total irradiance of Turkey is 1.524 kWh / m ^ 2(Totally of 4.17 kWh / m ^ 2 per day) the total sunshine duration is 2737.5 hours (Total of 7.5 hours per day) [11].Mus both solar energy global radiation value, with the duration of sunshine is close to the average value of Turkey. Considering the parameters affecting the efficiency of PV panels used in electricity generation Mus is one of Turkey's solar energy potentiality. Figure 3 gives the radiation and sun values for Mus.

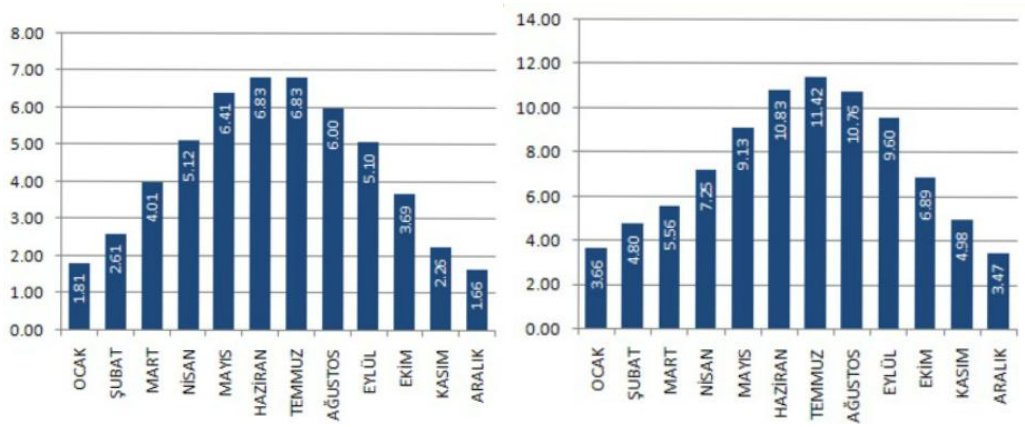

Figure 3. The radiation and sun values for Mus [11]

Within the scope of the Solar Power Plant project, which the Eastern Anatolian Development Agency (DAKA) has offered for its renewable energy support program, a 60Kw powered solar energy plant was built in Industrial Vocational High School of Mus that is in the center of the Mus City.

Figure 4. View from solar power plant

In this work, 60kW solar power plant installed at the roof of Industrial Vocational High School of Mus building is examined. It has 240 pieces 250Wp LDK marked PV panels and 3 pieces 20kWp REFULOG marked inverters. Instant radiation and temperature values are shown in the figure 5.

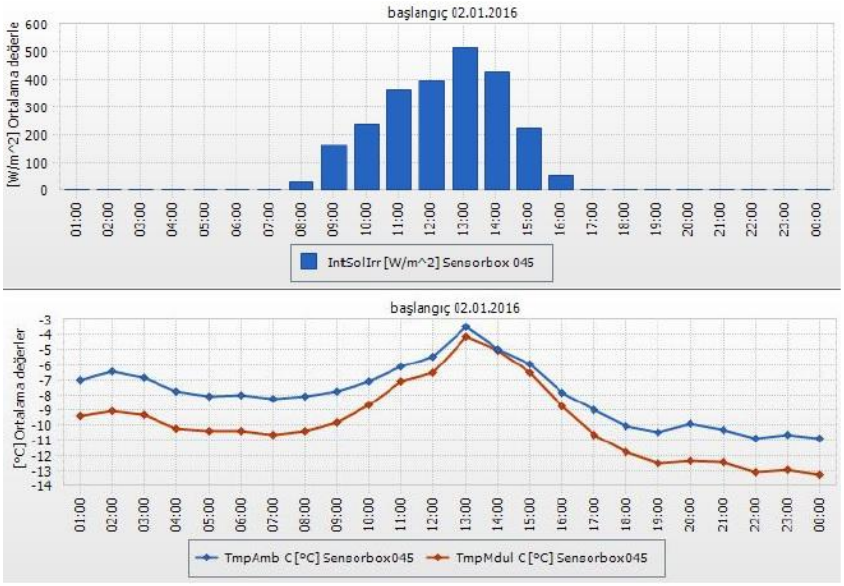

Figure 5: Instant radiation and temperature values

Figures 6 and 7 show daily and monthly power generation values.

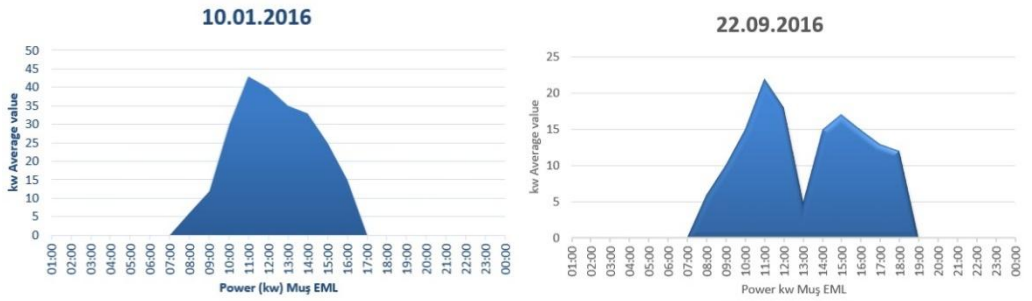

Figure 6: Daily Power generation

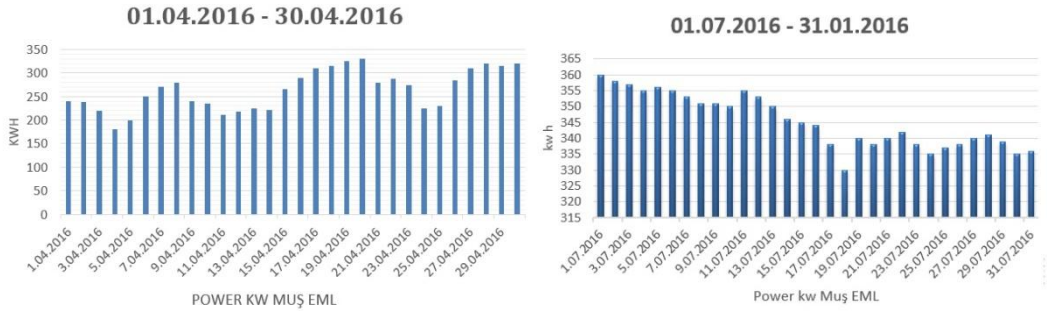

Figure 7: Power generation for April and July

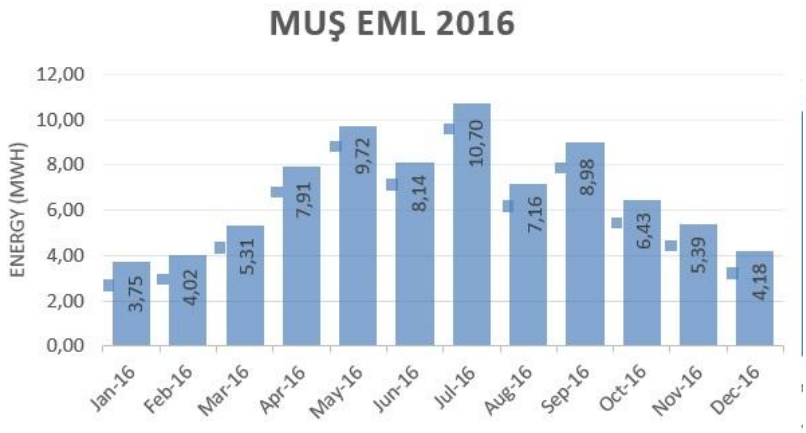

Figure 8: Monthly power plant generation for the year 2016

4. CONCLUSION AND RECOMMENDATIONS

In this work, the performance analysis of the solar power plant at the roof of Industrial Vocational High School of Mus building in Mus is stated The reason for low performance of the plant in December, January and February is due to bad weather conditions such as snow, fog. The yearly production of the power plant in 2016 is 81, 69 MWh. In order for solar energy to be used in Turkey, public institutions, universities, foundations and associations should encourage the society and inform society about this by organizing various activities.

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Some Natural, Forced and Mixed Convection Benchmark Studies for Indoor Thermal Environments

Erhan Pulat[1], Bahadir Erman Yuce[2]

Abstract

In this study, some well-known experimental studies related to natural, forced and mixed convections were used for validation of k-ε and k-ω turbulence models. For this purpose ANSYS-Fluent 16.0 is used. A tall differentially heated rectangular cavity, International Energy Agency IEA Annex20 room, and a mixed convective air flow within a square chamber with a heated bottom wall were considered for natural, forced and mixed convection respectively. Standard, RNG and Realizable models of k-ε group, and Standard, SST and BSL models of k-ω group with enhanced wall treatment for near wall modeling were tested by comparing the velocity and temperature distributions with available measurement values of employed geometries. In total, the results of Standard and RNG k-ε models are in good agreement with experimental measurements. Although the performance of k-ω group models is well in natural convection, some results of these models do not agree well with test data in forced and mixed convection cases.

Keywords: ***CFD, validation, turbulence models, velocity and temperature distributions***.

1. INTRODUCTION

Airflow and velocity characteristics are very important to regulate and control the indoor air parameters such as temperature, humidity and contaminant concentration. These parameters also have significant effect on air quality, thermal comfort, health and energy savings [1].The main aim of HVAC is to provide fresh air and to regulate indoor air for comfortable conditions for occupants in buildings [2]. Room ventilation can be achieved in different types of distribution systems. Despite of the low speed velocity regions, system air flow is often turbulent because of mechanical blowing system. Ventilation can be classified into natural, mixing and displacement ventilation. Mixed and displacement ventilation types are commonly used types.According to data of United Nations Environmental Programme [3], buildings use about 40% of global energy, 25% of global water, 40% of global resources. Also, energy consumption in buildings can be reduced by 30 to 80% using available effective technologies. Investment in building energy efficiency is accompanied by significant direct and indirect savings, which help offset incremental costs, providing a short return on investment period. Building ventilation has an important role in energy consumption in buildings. In addition, the productivity and efficiency of occupants are dependent on the conditions of thermal environment [4], [5].Pioneering Computational Fluid Dynamics (CFD) study was first introduced in the ventilation industry in the 1970s [6]. Air distribution is all about airflow and transport of heat and airborne pollutants. Air distribution is governed by the conservation principle. It is mathematically described by a set of partial differential e quations, known as the Navier–Stokes equations. These can be solved analytically only for simple and ideal conditions. For complex geometry and/or complex boundary conditions, numerical methods may be used to solve these equations or solve their modeling versions, given the initial and boundary conditions, i.e. Computational Fluid Dynamics (CFD) [7]. Indoor environment design requires details of air velocity/temperature distributions, relative humidity maps, contaminant concentrations, and turbulence levels. Most indoor airflows are actually rather complicated, and often driven by both pressure gradient and thermal buoyancy forces. There are three typical convection modes; i.e. forced convection like spring free cooling flow near the ceiling, natural convection as winter heating by radiators, and mixed convection as summer cooling using an air-conditioning unit. Despite the challenges in predicting the airflow precisely, both experimental measurements and computational simulations have been used in the past. Most experiments adopt a full-scale test chamber to setup an artificial environment to isolate the space from the external. While this permits the controllable flow and thermal boundary conditions, the cost would be high and turn-around testing period is normally very long [8]. So in recent years, CFD has taken a prominent role in the simulation of indoor environment airflow problems [9], [10]. However room ventilation is a complex turbulent system and it requires reliable benchmark studies especially for simulation studies required turbulence model using. In this study, some well-known experimental studies related to natural, forced and mixed convections were used for validation of k-ε and k-ω turbulence models. For this purpose ANSYS-Fluent 16.0 is used. A tall diferentially heated rectangular cavity, International Energy Agency IEA Annex20 room, and a mixed convective air flow within a square chamber with a heated bottom wall were considered for natural, forced and mixed convection respectively.

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2. METARIALS AND METHOD

In this study, a tall differentially heated rectangular cavity, International Energy Agency IEA Annex20 room, and a mixed convective air flow within a square chamber with a heated bottom wall is used for natural, forced, and mixed convection respectively to compare different turbulence models.

Two groups of two equation turbulence models, k-ε (Std. k-ε, RNG k-ε, Realizable k-ε) and k-ω (Std. k-ω, SST k-ω and BSL k-ω) groups are considered. Enhanced wall treatment (Ewt) is used for near wall modeling. Two-dimensional and steady Reynolds Averaged Navier-Stokes (RANS), continuity and energy equations are solved through ANSYS-Fluent 16.0 software. The gravity force is taken into consideration with the Boussinesq approach, and this effect is expressed as follows in terms of Archimedes number, Ar. Fluent uses the finite volume method and first order decomposition is used to solve the discretized equations. Convergence criterion is 10^{-6} for all parameters. Standard forms including default coefficients are used for all turbulence models and further information about them can be found in [11]. For all considered cases, geometries, boundary conditions, and mesh independency studies are given in the subsequent sections. In the mesh independency studies, Std. k-ε turbulence model with enhanced wall treatment are used for all cases. Very fine meshes were constructed in the near walls of all considered cases since enhanced wall treatment was used in the near wall modeling. For example, representative maximum mean y^+ value is 2.22 for mixed convection case in selected grid size of 160x160.

2.1 Forced Convection

Forced convection is a type of heat transport in which fluid motion is generated by an external source like pump, fan etc. This case is studied with well known IEA Annex20 room which is showed in Figure 1. Results of this study will be compared with experimental results of Nielsen [12].All walls are assumeded as adiabatic. There are no temperature differences between walls so buoyancy effect is neglected. Air enters through the channel on the upper left corner and blow out of the channel on the lower right corner. Dimensions are given in Figure 1. Grid structure is one of the most important parameters affecting accurate solution. Element number and quality of the grid structure not only achieves the accurate result, but also affects the duration of the solution progress. A denser grid structure was obtained in the walls, and hexahedral element type was selected. Results were obtained at four different element numbers [4000, 18150, 28100, 43100] to ensure obtaining mesh independency. Almost all velocity profiles coincide each other as seen from Figure 2 and element number of 28100 was selected.

2.2 Natural Convection

Natural convection is another type of heat transport in which fluid motion is generated by buoyancy force due to density variations of fluid with temperature. A tall cavity which is well known in natural convection studies is used for this case. An experimental study which is performed by Betts and Bokhari [13] is used to validate numerical results. A tall cavity domain and boundary conditions are shown in Figure 3. The cold and warm wall temperature are 15.1 °C and 34.7 °C respectively. Top and bottoms walls are adiabatic.

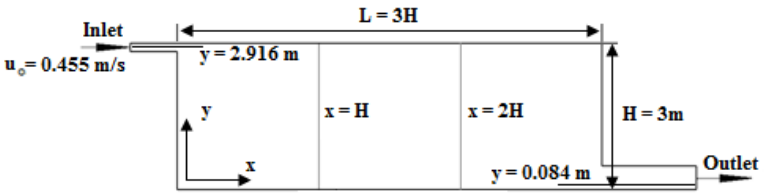


Figure 13. Geometry of IEA Annex20 Room

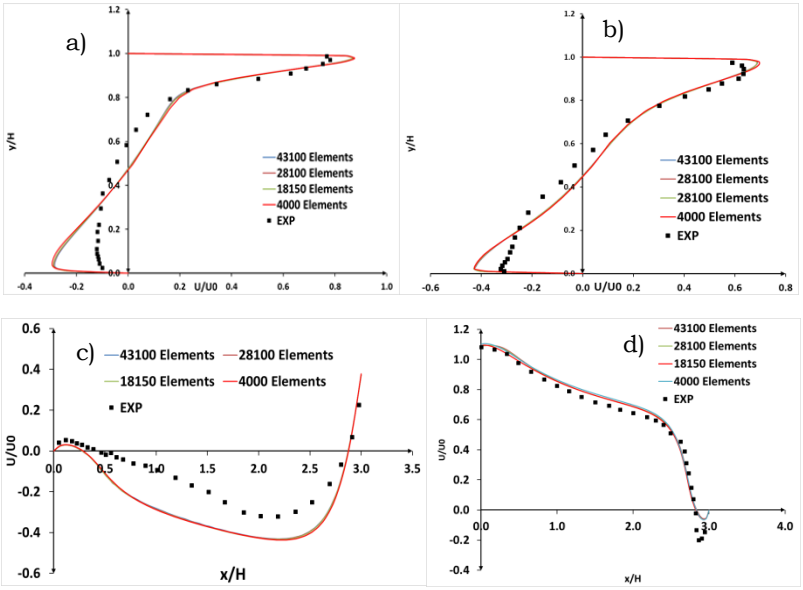


Figure 14. Mesh independency study: Dimensionless x-component velocity a) at X=H, b) x=2H, c) y=0.084m and d)y=2.916m

Results were obtained at four different element numbers [20x40, 20x80, 20x160, 80x320] to ensure mesh independency as seen from Figure 4 and 5. Almost all temperature and vertical velocity profiles coincide each other. The most consistent temperature distributions are obtained at y/H = 0.1. As a result 40x160 elements were selected.

2.3 Mixed Convection

Mixed convection is a type of heat transfer mechanism and occurs when both natural and forced convection act together. In this case, momentum and buoyancy effects interact together. To obtain numerical results on mixed convection, a bottom heated 1x1 m^2 cross-section cavity is considered which is studied by Blay et al. [14] as seen from Figure 6. Results were obtained at four different element numbers [120x120, 160x160, 200x200, 300x300] to ensure mesh independency as shown in Figure 7. By inspection of Figure 7, 160x160 elements were selected.

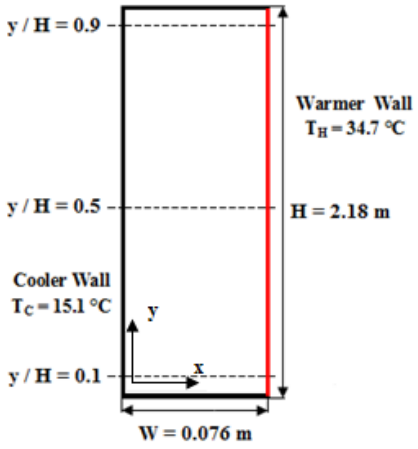


Figure 3. Geometry and boundary conditions of Tall Cavity

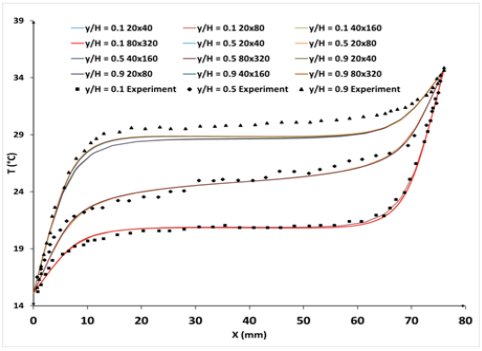


Figure 4. Mesh independency study: Temperature variations on x directions at various y / H sections

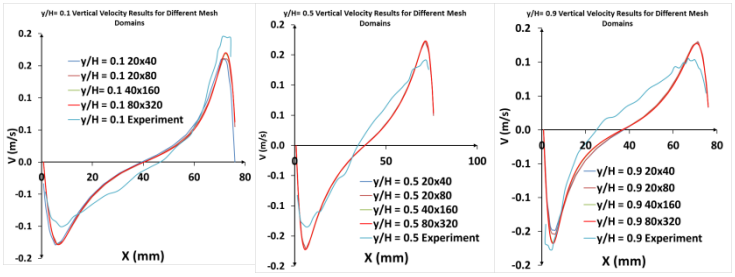


Figure 5. Mesh independency study: Vertical velocity variations in various y / H sections

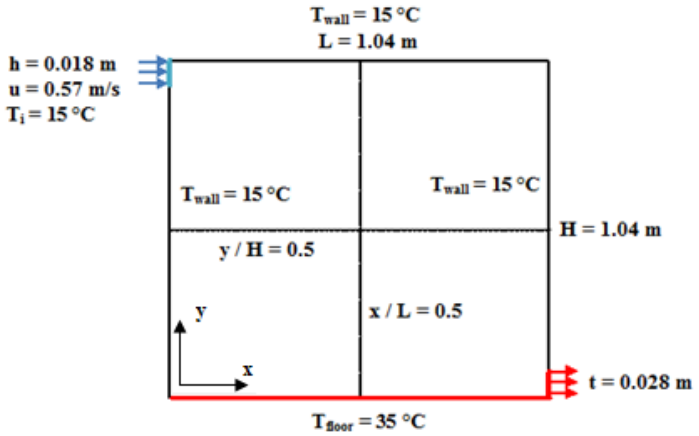


Figure 6. Geometry and boundary conditions of empty room for mixed convection

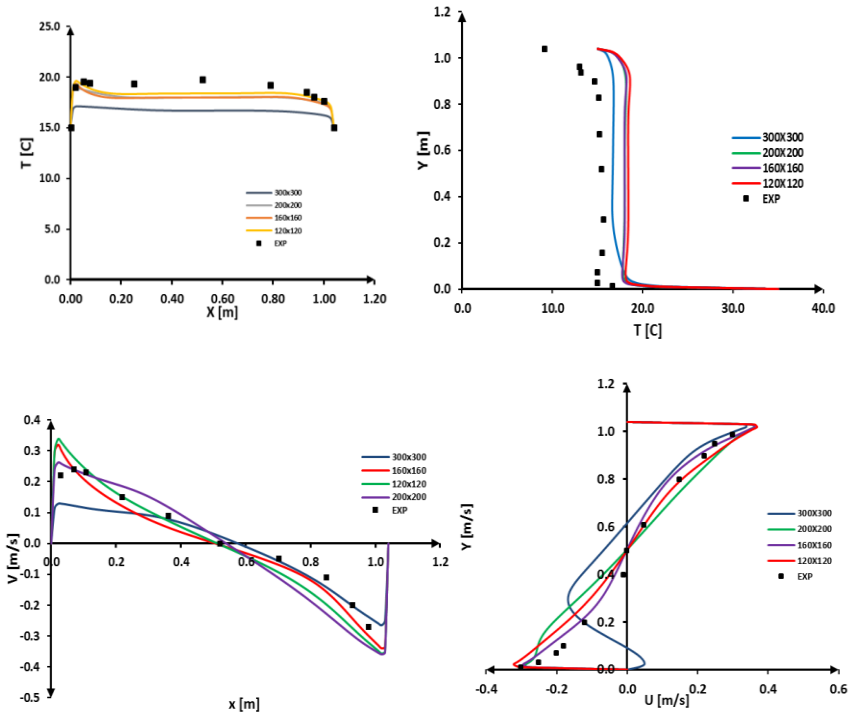


Figure 7. Mesh independency study: Horizontal and vertical temperature and velocity variations in x/L = 0.5 and y/H = 0.5

3. RESULTS AND DISCUSSION

3.1 Forced Convection

At x=H, dimensionless x component velocity profiles for k-ε and k-ω models in comparison with Nielsen's measurements [12] are given in Figure 8. For k-ε models, velocity predictions are consistent with measurements in the middle of the room. But in the floor, and partially in the ceiling, predictions deviate from the measurements. For k-ω models, similar to k-ε models, velocity predictions are consistent with measurements in the middle of the room except SST k-ω model. Again in the floor and the ceiling, predictions deviate from the measurements. In the floor, flow reversal occurs in the std. and SST k-ω models. Both k-ε and k-ω models are isotropic models and these deviations can be attributed to turbulence anisotropy in the near wall region. At x=2H, as seen from Figure 9, almost all models have similar performance, but in the ceiling, k-ε predictions are slightly better than k-ω predictions. In addition, flow reversal disappears in this case and all k-ω models have same performance except SST k-ω model in the floor. The most consistent predictions with measurements are obtained with std. k-ε and BSL k-ω models.At y=0.084 m, opposite the previous vertical cases, velocity predictions are consistent with measurements near the floor and the ceiling as seen from Figure 10. There are discrepancies in the middle of the room and this type of discrepancies can be attributed to fluctuating part of the turbulent velocities. At y=2.916 m, agreement is better than the case of y=0.084 m, and k-ε model predictions are better than k-ω ones as seen from Figur 11. Predictions of Std. and RNG k-ε models are better than realizable k-ε model. All k-ω models have similar performance.

3.2 Natural Convection

At various y/H values, temperature and vertical velocity predictions in comparison with Betts and Bokhari's measurements [13] are given in Figure 12. At y/H = 0.1 and 0.5, agreement in temperature profiles is very good for all turbulence models. There are small discrepancies at y/H = 0.9, and best prediction is obtained with SST k-ω model. In the case of vertical velocity results, almost similar agreement is obtained for all turbulence models at all y/H values. SST k-ω, std. k-ω and SST k-ω models exhibits the best prediction at y/H =0.1, 0.5 and 0.9 values respectively.

3.3 Mixed Convection

At y/H = 0.5 and x/L = 0.5, temperature and velocity predictions in comparison with Blay et al.'s measurements [14] are given in Figure 13 and 14. At y/H = 0.5, although all k-ε models exhibit similar performance in the temperature distributions, they exhibit

slightly different performance in the velocity distributions. All k-ε models underpredict the temperature values but degree of difference is acceptable. In case of k-ω models, BSL k-ω model is not consistent with measurements for both temperature and velocity distributions. Temperature predictions of std. and SST k-ω models are slightly better than k-ε models except BSL k-ω model. However velocity predictions of k-ε models near the walls are slightly better than std. and SST k-ω models. At x/L = 0.5, again, although all k-ε models exhibit similar performance in the temperature distributions, they exhibit slightly different performance in the velocity distributions. All k-ε models slightly underpredict the temperature values. In the case of k-ω models, the agreement in temperature distributions is very good except BSL k-ω model. Std. and SST k-ω models predict temperature distribution slightly better than all k-ε models. In contrast, all k-ε models predict velocity distributions better than k-ω models.

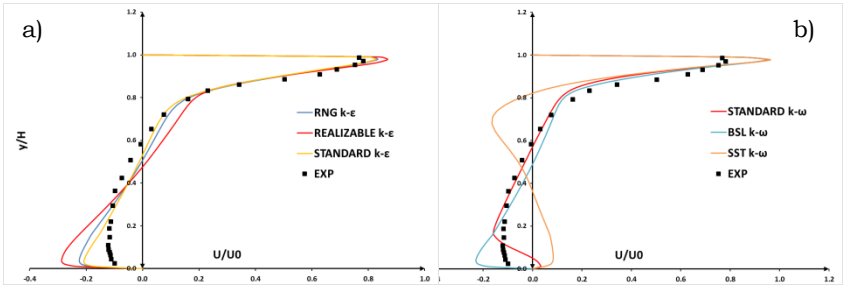


Figure 8. Dimensionless x component velocity profiles at x=H for a)k-ε models and b)k-ω models

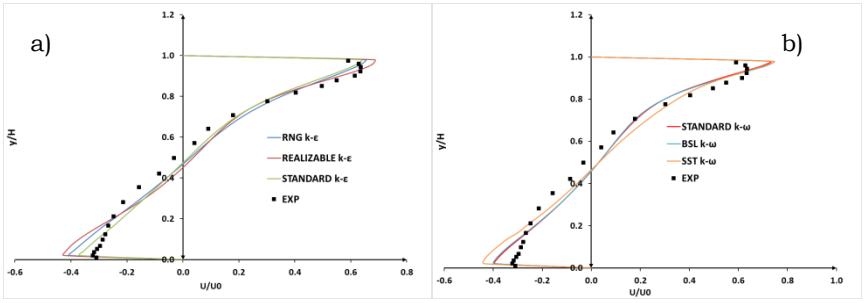


Figure 9. Dimensionless x component velocity profiles at x=2H for a)k-ε models and b)k-ω models

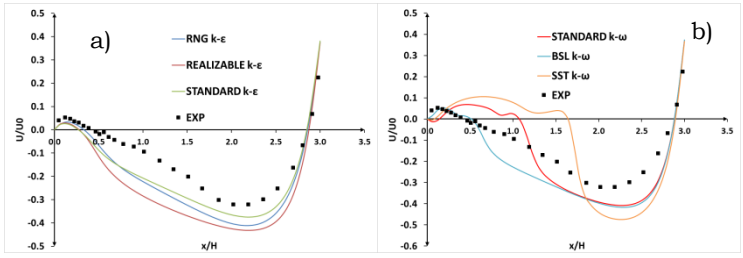


Figure 10. Dimensionless x component velocity profiles at y=0.084 m for a)k-ε models and b)k-ω models

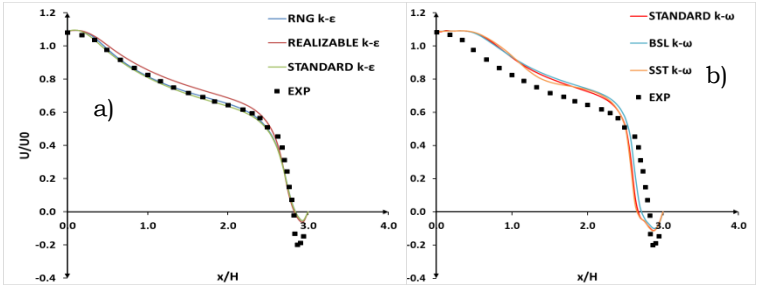
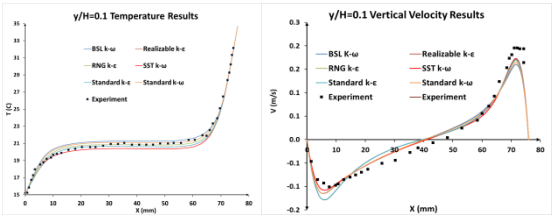
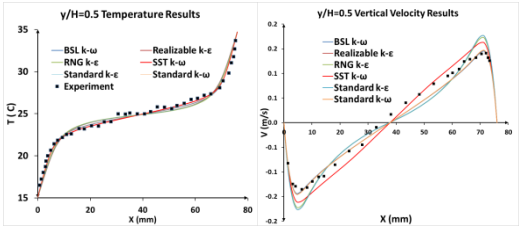


Figure 11. Dimensionless x component velocity profiles at y=2.916 m for a)k-ε models b)k-ω models



a)



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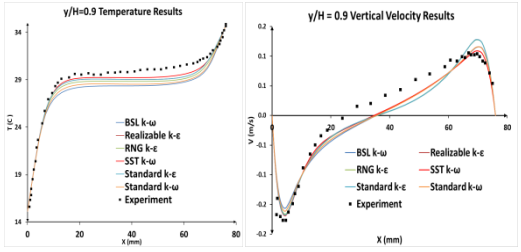
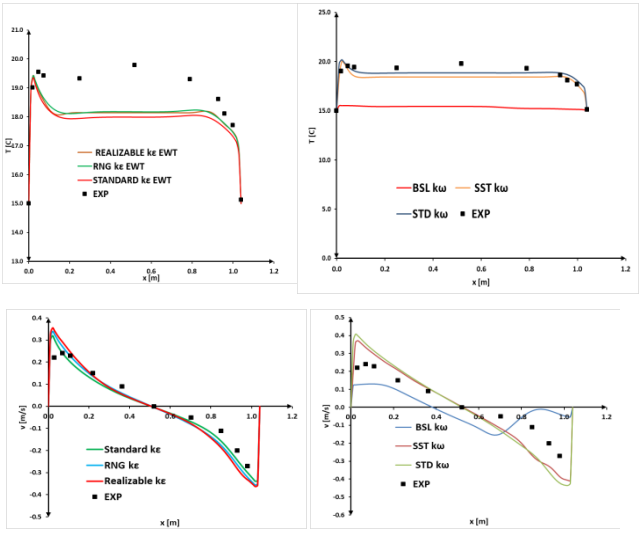


c)

Figure 12. Temperature and velocity profiles a)y/H = 0.1 b)y/H = 0.5 c)y/H =0.9



a) b)

Figure 13. Temperature and velocity profiles at y/H = 0.5 for a) k-ε and b)k-ω models

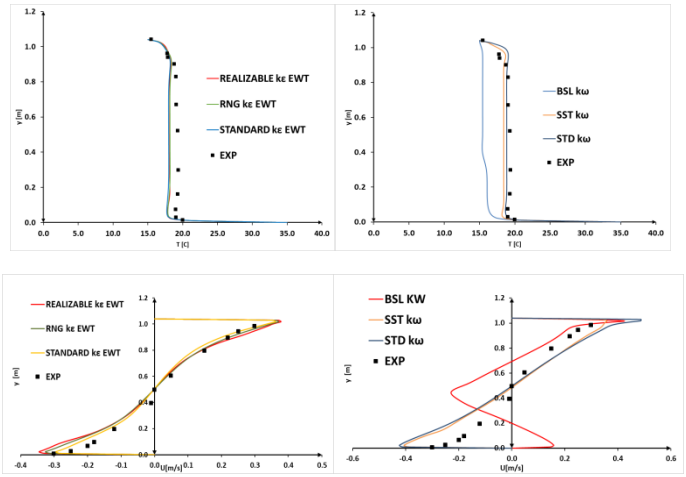


Figure 14. Temperature and velocity profiles at x/L = 0.5 for a) k-ε and b)k-ω models

4. CONCLUSION

In this study, a tall differentially heated rectangular cavity, International Energy Agency IEA Annex20 room, and a mixed convective air flow within a square chamber with a heated bottom wall were considered as benchmark cases for natural, forced and mixed convection respectively. Standard forms including default coefficients are used for all k-ε and k-ω turbulence models with enhanced wall treatment. In forced convection case, Std. k-ε model exhibits better performance although BSL k-ω model is the best among other k-ω models. In natural convection case, SST k-ω model exhibits slightly better performance among all other models. In the mixed convection case, Std. and SST k-ω models predict temperature distribution slightly better than all k-ε models. In contrast, all k-ε models predict velocity distributions better than k-ω models. In addition, enhanced wall treatment improves the predictive capability of Std. k-ε model by using proper mesh size and structure.

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19 - 23 April 2017, Sarajevo

The Effects of Urban Transformation on Sustainable Urbanization: Case Study, Isparta Gulistan Neighborhood

Hasan S. Hastemoglu[1], Engin Kepenek[2]

Abstract

In the realization of sustainable urbanization, the role of the ownership form and the influence of who owns the property is very important. The legal regulations introduced in Turkey after 1960's have an important role in changing the ownership structure in cities. It can be said that the ownership structure in cities have prevented the sustainable urbanization in Turkey which transformed into fragmented (multi-part) structure and private ownership dominant as a result of legal regulations and transformations that have taken place in socio-cultural and economic life. "Law on the Conversion of Areas under Disaster Relief" known as Urban Transformation Law in Turkey which is in force in the present day, is aimed at solving the problems but it has increased the existing problems with the wrong practices. In this context, the examples and results of urban transformation after the 1960s in Gulistan neighborhood and surrounding area are selected in the scope of the study that can clearly explain the present situation of Turkey. Gulistan Neighborhood is a rent zone formed in 1960's by day to day with legal regulations. Today area of study is similar to the area of a large construction site for the province of Isparta. Within the scope of the study, Turkey has been portrayed with a critical and academic point of view on the applications, problems and solutions proposed by the government. In the conclusion, what needs to be done is given for sustainable urban development.

Keywords: Sustainability, Sustainable Urbanization, Ownership Relationships

1. INTRODUCTION

Cities are the places that are in constant social development where people meet the needs of settlement, accommodation, work, rest and entertainment. Urban specific qualities must be sustained so that the cities, which are living organisms, can survive [1].However, the modern cities of 21st century carry the load of people more than they could handle. Cities are exploited to an extreme extent and are the settlement units with high energy consumption. Their growth trend is to spread over large areas. If these trend plows ahead, the continuity of cities as settlement areas will become significantly more difficult [2].In this context, "sustainability" is one of the most important approaches for the continuity of cities in the 21st century. "It is a principle of morality that has emerged in the environmental movement and is widely accepted and the contents of which is tried to be constantly re-determined within the political process" [3].Sustainability has never been a concept that can be defined within certain boundaries even in the 2000s. Sustainability is based on economic, social and ecological components (see, for example, Council of European Architects, 2005) Each of the economic, social and ecological components, as expressed in Figure 1, is valued, but sub-themes must be identified with components that make them sustainable.

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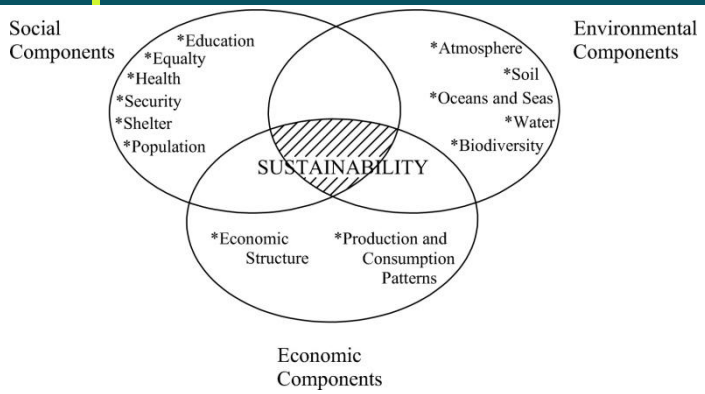

Figure 1. Surdurulebilirlik Olgusunun Bilesenleri [4].

Cities are also nodes that directly connect with the three components of sustainability. They are areas where production and consumption take place, and therefore the economy emerges. It is the centre of the socio-cultural interactions that people experience together. They are the physical spaces where most of the environmental threatening activities take place. Therefore, every action and every fact that takes place in the city can be directly or indirectly linked to sustainability.In the literature, sustainable cities, sustainable urban settlements, eco-cities, green cities, liveable cities, and approaches that have different meanings in each case, in essence and in the first place, express that the city and urbanization shall be in harmony with the environment [5].This coincides with the environmentalist content of sustainability in the 1960s. However, in the course of the 2000s, when sustainable urban development is approached from different dimensions, and considering the very wide content of the environmental issue, there is a change in the meaning. Accordingly, the question of how sustainable cities will be provided becomes important [6].At the point reached, it is possible to bring a definition and solutions to the problems by approaching various areas from sustainable urban and urbanization starting from environmental solutions to urban management in 2000s. In this context, it is stated that the realization of sustainable cities is a fundamental problem that needs to be overcome in the work "Europe, Architecture and Tomorrow" (2002), which is generally known as the "White Book". In order to obtain sustainable cities, many different proposals such as the necessity of rearrangement of city walls in a way that will not require the use of cars, the necessity of transforming and refining waste for reuse are introduced [7].From here, it can be deduced that the sustainable city is the city that favours pedestrians over vehicles, has a valid method of waste management, is sensitive to the environment, human, and the energy saving. Creating urban identity, having humanitarian and aesthetic dimensions, and preserving historical and cultural values can be added to those.Sustainable urbanization and sustainable cities also foresee that the planning and management of land resources shall be dealt with an integrated approach. The general purpose is to facilitate the allocation of land to the uses to grant the highest benefit for sustainability and to support the transition of land resources over to sustainable and integrated management.The social cost of the transformation of urban lands into urban estates consists of well-planned settlement decisions and infrastructure investments. Increasing urban land value merely by the support of the public sector gradually turns them into a commodity [8].In the city, the use of this commodity leads to profit, and therefore conflicts of interest. Conflict occurs on the one hand between the public and the individual, on the other hand, directly between the individuals [9].This individualistic situation, which ignores the benefit of society, contradict with sustainable urbanization and urban approach. In addition, in terms of sustainable urbanization and urban approach, it is necessary to consciously and regularly use a scarce and non-renewable resource such as land. It would be out of discussion that such a resource is left as a private initiative without consideration of society. In other words, it is not appropriate for individuals to make use of the land, which is a commodity that cannot be manufactured or renewed, according to their own interests [10].However, the cause-and-effect relationships of sustainable urban development must be considered in the context of the specific use of soil and land. For this reason, it is necessary to show that for the sustainable urban development, community peace is more important than personal gain [11].

2. INVESTIGATION OF SUSTAINABLE URBANIZATION - PROPERTY RELATIONSHIP IN TERMS OF SUSTAINABILITY COMPONENTS

2.1 Environmental Dimension of Sustainable Urbanization - Ownership Relations;

As the populations of societies increases and this population accumulates rapidly and extensively in urban areas, balanced use of environmental facilities, equitable sharing and mixed use in urban areas become increasingly difficult. Crowded cities, polluted air and water, loss of land, declining forests, insufficient energy, and increased noise reach the measure which threatens the physical and mental wellbeing of people [12]. It is in contradiction with the understanding of wrong and excessive utilization of the city land, protection of the society and the environment. The nature of land ownership lies in the source of this strand. In environments where the free market mechanism prevails, those who own land will direct this resource to the types and intensities

of use that are most beneficial to them. Problems arise depending on the prevalence of this attitude. Natural and social balances deteriorate. In this context, housing constitutes the highest use of land in the city. For this reason, giant environmental problems are important and common areas. The rapidly increasing need for housing in urban areas leads to unplanned or hastily planned housing congestion and excessive concentration. Adding to the lack of infrastructures, such extreme density, air and water pollution in residential areas, garbage, noise and so on. Environmental problems [13]. Therefore, in order to achieve sustainable urbanization and sustainable urbanization, it is the FIRST OBSTACLE in front of sustainable urbanization and urban formation**.**

2.2 Social Dimension of Sustainable Urbanization - Ownership Relations;

According to classical law, ownership is a direct relationship between the rights holder and the goods. Its content is the unlimited right of authority. The use of authorities is limited to private and public law. This, however, does not match with the nature of ownership of property. In contemporary opinion, the content of the concept of ownership consists of authority and duties. Limitations are caused not by the external but by the self. It is not just a right, it is a social-legal institution [14].However, an ownership system must answer four basic questions. First is the principle of acquisition. It determines the conditions under which an object can be owned. The second one is the hand replacement principle. The property indicates on what terms the subject matter is going to be owned by someone else. The third is the principle of use. It determines what anyone with an object can do on that object, how to benefit from it. The fourth is the correction principle. It contains rules on how to correct an object if it has been acquired, manipulated, or used in violation of the first three principles [15].The most concrete phenomenon that constitutes the social dimension of sustainable urbanization and its relation to the ownership structure of the city's components is the establishment of the urban spaces necessary for social facilities. One of the most important problems of land ownership in the urban arena is the lack of space for urban equipment [16]. In urban areas, the size of the face of the land in public and individual property and the imbalance of distribution in the site are often the basis of this problem. Because this imbalance plays a role in promoting the consequent problems of the planning decisions of those who possess the urban territories - their opposition to the right to property. In other words, when individual ownership dominates, planning work is negatively affected. One of the most important reasons for the planned and unplanned resettlement is to prevent the implementation of planning decisions on the right to property. This is the SECOND OBSTACLE for sustainable urbanization and urban formation.There is a close connection between the level of services the city has in the urban area and the level of ownership of urban land. Failure of the public administration to obtain the large scale and position needed for the urban services that it is obliged to provide leads to the lowering of the standards of the so-called urban technical and social infrastructure and the uneven distribution of space. In other words, the urban infrastructure needs often have to be done on small, fragmented and scarce public property land, where the location is accidentally connected, easily obtainable, relatively inexpensive, but expensive to operate. This is the THIRD OBSTACLE for sustainable urbanization and the city.

2.3 Economic Dimension of Sustainable Urbanization - Ownership Relations;

Ownership of property can be gathered in two main titles: private ownership and public ownership. Private ownership gives the owner the right to use and control what he / she owns. In a legal sense, it has the right to use directly what is relevant to the right of ownership, to take advantage of its natural and civilized societies, to consume it in a direct and legal way [14]. The right of ownership is protected by society. In legal terms, the owner may demand that the right of property to be respected by all. The right to property is of great importance in terms of social class separation, income distribution and social order. The right of ownership provides the opportunity to live with the property. In this regard, people make great efforts to be a proprietor, to preserve and expand their wealth. The concept of ownership itself is an economic phenomenon in itself. The right to property can also be defined as one of the inevitable elements of the capitalist system, that the property right on the means of production is entirely in private hands, or that the means are rented by individuals. In the collectivist system, the source of injustice is seen in property. It takes private property as its own and removes private ownership. In practice this is the case. On the means of production, the right of ownership of individuals is almost non-existent [17]. But while private property is maintained in some capitalist models, state ownership is maintained on properties such as urban land.In mixed economies, on one hand, there is private ownership over the factors of production, while on the other hand, the right of ownership of the publicly accepted instruments belongs to the state. Briefly, in such schemes, it is possible to see both private and public ownership. But, as far as the economic forces of the individuals are concerned, they do not prevent them from having the means of production. However, it is also suggested that the property, which is considered as an equality and justice principle, which is considered to be an absolute and sacred right and which is supposed to give happiness, is in fact a source of all injustice, unhappiness and inequality. According to this approach, property is the right of people not to benefit from something, but to prevent others from taking advantage of it [18]. Individual behaviours of private property owners' savings, expectations of interest and similar attitudes can therefore create problems.The ownership of urban land is also very striking in this sense. Whether in private or in public, it directly affects the economic life of cities. However, the main factor that causes this economic phenomenon is the planning studies. It is of great importance to try to distribute the resulting rent appropriately to all sections of the society, especially in the case of ownership situations where sudden and rapid changes are made in the planning works, especially those that become private property or become multi-part property and produce high amount of rent. Otherwise, the distribution of income among different segments of society changes unfairly [19]. Moreover, the resources required for the continuation of the zoning activities are difficult to characterize. If this does not happen, it is not possible to talk about a healthy sustainable urban development. In this case, FOURTH OBSTACLE in front of contextual sustainability for urbanization and city not to waste both social justice and resources is the collective turnover of urban rents, the lack of the property structure that the mechanisms that enable the city to invest in the city. In other words, it is the sovereignty of private property and multi-part construction.Therefore, if public interest

is in question, the state should restrict the structure of property of urban lands [20]. This phenomenon is practiced in many different countries of the world. In some applications, certain methods are expropriated at the end value, while in some applications the public tries to expropriate the land, which is increasingly needed by the individual in the way of the soil installation [21]. In Turkey, the unhealthy urbanization started after the 1950s, and the emergence of immigration is accelerated by the resumption of agricultural structures in parallel with the weight given to the industrialization of the changing political power by the changing political power and to the roads in transportation. However, the problems of speculation and excessive price increases on urban land reach larger dimensions. When necessary, it is very difficult for the public and the individual to provide the cheap and equipped urban arsenal determined by the plan.Starting from 1951, following the long preparations which were made with the understanding to direct the planned development of the cities from the centre, "Construction Law No. 6785" was put into effect in 1957. A year later, it follows the establishment of the Ministry of Reconstruction and the Ministry of Government. The Urban Development Law No. 6785 introduces a number of restrictions on the use of property rights in order to protect the public interest in the regulation of urban land. The most important legal regulation regarding the property issues of the year 1965 is the "Property Law of the Floor". A new area of speculation emerges with the law, which comes as a solution to the inability to build up the expensive urban arcs that gain the right of dense structures, where the organization is weak. In the city, renovations in small built plots, existing building and infrastructure stocks are consumed, and municipalities are again pushed into large financial difficulties. As the public struggles to solve their problems by selling land as well as buying land when necessary, the pressure to increase the density of the cities resulting in the economic valuation of the city lands increases [22]. Because the effect of the Property Law on Houses is directly on settlement. The municipalities are going to find short-term speculative solutions to the problem by going to the floor of the existing parcel, instead of producing new policies and looking for a solution to cheap land production for housing construction. The fact that the law has the chance to distribute the property on smaller private pieces of property over the existing private property causes these parcels to become apartment buildings in a short time. As a result, the density in the area increases and public service areas become insufficient. Infrastructure problems arise. The law of cooperatives, which became law in 1969, brought together the individuals from the low income groups and further increased the apartment building resulting from the rapid urbanization. With the populist approach of local governments, the agricultural land near the cities is rapidly accepted as a means of producing cheap land. Building cooperatives are supported. This construction, which takes place in a rapid and uncontrolled manner under the conditions of the period, is transformed into areas suitable for determination of risky areas and reserve building areas according to the Law on the Conversion of Areas under Disaster Relief dated 2012 and number 6306. The easiest way to achieve transformation in these areas is to increase the density of building. Isparta Centre Gulistan Neighbourhood, which has been chosen as the study area, is an application area where the above-mentioned legal processes are directly experienced. Examination of the structure of this region will ensure that the results of this section are clearly visible.

3. EXAMPLE OF ISPARTA CENTRE, GULISTAN NEIGHBOURHOOD

Findings strengthen the intelligibility of the observation of the specified criteria at a certain time and on the platform. Such a timeframe could be the 1960s when sustainable urbanization emerged and the environment was predominant. As a venue, important issues such as sustainable urbanization can be recognized late and Turkey and Turkey, where important urbanization problems are experienced. Given the transformations that have taken place in many cities in Turkey since the 1960s, it can be said that living transformations have led to the loss of many of the essence of cities in terms of sustainable urbanization and city. The study and determination of these examples in concrete examples can contribute to reaching a prediction in sustainable urbanization and how the ownership structure of urban land should be for the city in Turkish cities.

Figure 2. Isparta Ili

Isparta is the central district of the province of Isparta. According to the population census of the year 2014, the population of the city centre is 207.266. The height of the city from the sea is 1035 meters. The city is known for its local hand-woven carpets and rose farming. Isparta; It is one of the most important cities of the Mediterranean Region. Gulistan neighbourhood is a neighbourhood built near to the city centre by the cooperatives in 1970s. As an example of neighbourhood planning, worship, trade, education and health facilities were constructed in the centre. Sufficient amounts of social facilities, green spaces and parks were built..

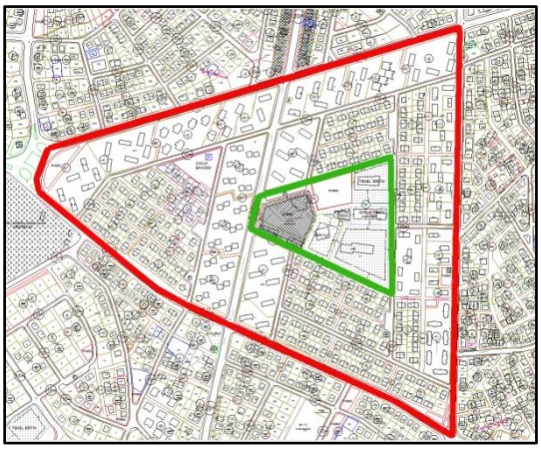

Figure 3. Gulistan Mahallesi

In this process 36 blocks (yellow) apartment with 3 floors and 3 floors in 36 parcels of 20 floors and 36 apartments (blue) with 8 floors and 8 floors with 4 floors in 38 parcels with 16 constructions in Gulistan district were constructed. As a result, 8,000 people live in about 2000 housing units in the area.

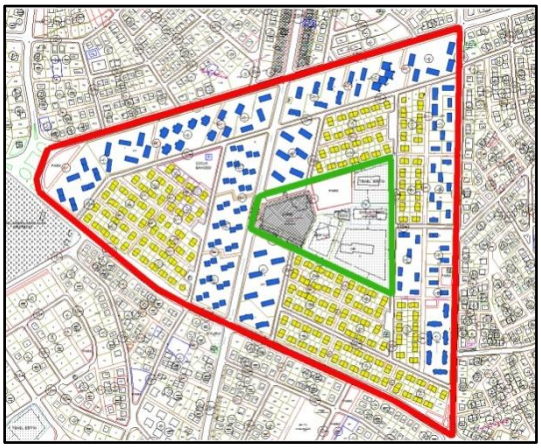

Figure 4. Gulistan Mahallesinde Yapilasma

Figure 3. Gulistan Mahallesinde Mevcut Kooperatif Yapilasmasi

However, in accordance with the Law on the Conversion of Areas Under Disaster Risk, numbered 6306 of 2012, the area has become an area suitable for the determination of risky areas and reserve building areas. The local government changed the development application E: 1 hmax: 15.50 to E: 2.4 hmax: free by 2014, in accordance with the decision of the municipal council,

without any social facilities, roads and infrastructure to provide transformation in the region. Rapid building process started in the region.

Figure 5. Gulistan Mahallesinde Mevcut Kooperatif Yapilasmasinin Yikilmasi

Figure 6. Gulistan Mahallesinde yeni yapilasma

As a result, the region is now fully transformed into a site area. The number of newly built projects will increase from 2000 to 5000 and the number of people will increase from 8000 to 20.000. However, it is not possible for the region to remove this density of social infrastructure areas and infrastructure. In the near future the region expects much bigger problems. In other words, a transformation process for sustainable urbanization has been missed before sustainable urbanization and new problems have been introduced in the future.

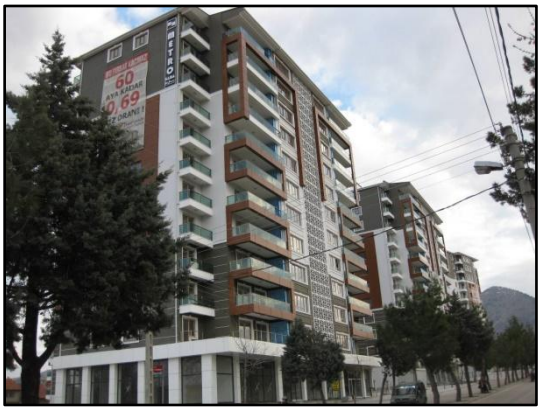

Figure 7. Gulistan Mahallesinde yeni yapilasma

4. CONCLUSION

In this context, the two cases constituting the reason for the limitation of the ownership structure of urban land are important. The first is that the ownership of urban land has a "private property" structure. Secondly, the property structure is fragmented. In the case where the private ownership and / or the fragmented ownership structure of the urban land is dominant, the formation and results of FOUR OBSTACLES can be embodied as follows;The use of customs proponents who think that private property owners will benefit the most, the inability to use mixed use, the maximization of profits and the use of all kinds of zoning limits at the highest level constitutes the FIRST OBSTACLE and creates a contradiction with the principle of sustainable urbanization to create a liveable healthy environment for society. This is because the phenomena such as human dimension, aesthetic anxiety, parcel - building - road alignment, settlement - green field balance, etc. Are ignored in the construction and consequently the intensive structures that are lacking in liveable environmental features arise from the features of sustainable urbanization that have been clarified and remained in 1960 ' Cause. This kind of construction has negative effects on people's perception of the environment. It can put pressure on people's psychologyFor the domination of private property and the fragmentation of ownership over urban lands, and as a result of lack of sufficient public lands, the SECOND OBSTACLE occurs as urban facilities need to be built on small, fragmented and scarce public property lands, in locations that are randomly and easily acquired, relatively cheap to acquire but expensive to operate. This situation does not coincide with the principles of sustainable urbanization and urbanization, the healthy delivery of public services and the proper use of resources. It has an adverse effect on sustainable urbanization. People have difficulty reaching these public services. The necessity of transportation to the areas where these services are provided is a necessity. The wrong location of the given public service leads to errors in the urbanization and construction of the selected region. The economic rent, which is paid by the public and paid by the urban development which is revealed by the zoning studies, is not transferred back to the public and the return to the individuals negatively affects the distribution of income in the society from the one side and makes it difficult to supply the financial resources which will be needed again in the future. This constitutes THIRD OBSTACLE. Sustainable urbanism, social justice and the correct use of resources contradict their principles. In this context, sustainable urbanization and urban formation are inextricably linked. Sudden changes occur in the distribution of income in the society. This causes people to see land speculation as one of the legitimate ways of having high income. The sudden change in the distribution of income causes the consumption patterns in certain segments of the society to change rapidly, leading to excessive revenues.Taking decisions on land planning, which is of great importance in terms of sustainable urbanization, makes it difficult to make decisions because it will be difficult to meet the individual interests of each landlord individually. as a result, the process is delayed or never takes place. this leads to serious problems in delivering public services. it is difficult to bring the new functions needed for urbanization, renovation and / or urban future into existing urban areas. in this case, especially in the urban centres, which have been transferred through inheritance in the historical process and turned into a very sensitive property, there may be urban depressed areas, which create physical grounds for the formation of urban crimes and cause the city to spread outwardly and prevent sustainable urbanization in these contexts. this plays a role as the fourth obstacle and removes the urban identity from the values of sustainable urbanization. it poses a threat to the historical and cultural heritage of the city. since the rehabilitation of such areas is not possible in the short term, community members who do not experience deterioration in the premises will soon try to remove themselves from these regions. while these important regions in the centre of the cities are being lost, those who abandon these regions are directed to satellite cities outside the city. the density of transportation in and around the city, and therefore environmental pollution and energy use increase.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Recommendations To Enhance Life Quality With Sustainable Planning In Rural Areas

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Abstract

Rural areas are geographically and humanly classified sites or regions where settlements with low population density are seen in demographic terms and production is based on agriculture and animal husbandry rather than industrial quality. Dependence on the center is related to the utilization of the settlement units which are located in the geographical area of the city centers or outside the city, from the services such as administrative organization, education and health in the center or city dependent manner.The low standard of living in rural areas creates a vicious circle in this area due to economic troubles. In addition because of Inadequate need for arbitrary settlement in rural areas, the primitive conditions of farming and animal husbandry activities makes the conditions of life become even more difficult.People living in rural areas tend to leave their land and migrate to city centers. As a result of this migration, leaving their tradition, culture and farming and animal husbandry activities which they have full of knowledge in the rural area and try to do jobs they do not know bring about different problems, too.
People in rural areas are faced with cultural differences in city centers, and at the same time, the bottlenecks of cities increase the size of the disturbances by adding psychological and sociological problems for rural people.We will analyze the reflections of the interactions by analyzing the natural life sciences, observations, current conditions and situations that we want to achieve.

Keywords: Rural, Culture, Immigration

1. INTRODUCTION

Today, sustainability and environmental problems come to the forefront according to researches conducted from global scale to local scale. Especially in rural areas, the lifetime of the structures with the development of the technology to meet the need for human settlement as well as the operations performed affects the ecosystem. For this reason, in the field of architecture, recyclable materials should be used to reduce the energy use to reduce environmental damage, to produce sustainable energy from renewable energy sources, and to reduce the natural resources spent the materials used should be friendly to the environment. Strategies and materials that are compatible with the environment should be selected in the design.In this context sustainable architecture addresses green design, ecological buildings, environmentally compatible building. For a sustainable future, clean energies must be used for ecological enrichment of the environment, effective evaluation of climate, natural resources and building materials. According to this perspective, design parameters should be applied according to the criterion that is required during production and operation in building design.One of the aims of sustainable work in rural areas is to adopt and develop sustainable architectural understanding. The importance level of sustainability criteria are different in rural areas. These criteria need to be considered according to the level of importance. To use an effective model is the most important requirement for determining the importance level of sustainability criteria. The objectives to be set forth in the model to be developed must be clearly defined and needs to be developed and a model that can be a solution to these requirements. A systematic design process should be established. Sustainable evaluation criteria should be defined by the design team. The purpose of this study is to assess the parameters for sustainability by ensuring sustainability in rural areas, adapting to modern world requirements by using useful and efficient building materials in rural areas, and ensuring sustainability.

2. STRATEGIES FOR SUSTAINABLE BUILDINGS IN RURAL AREAS

Engineers often evaluate sustainability in terms of energy savings through innovations in electro-mechanical systems. But city planners and architects look from a broader perspective. Sustainability in environmental, cultural and socio-economic dimensions includes resource conservation, life cycle approach and design principles for man for architecture and urban planners. The main issues in sustainable design in rural areas are land, environmental texture, topographic features in the region, selection of building materials and insulation materials suitable for the climate of the region, water saving, waste management, energy conservation, utilization of renewable resources. Another important issue is; Is the lack of socio-cultural structures in rural areas. Multifaceted studies should be done in the rural area by eliminating the deficiencies of socio-cultural structures. Experts from different disciplines should come together and identify the deficiencies in that area and resolve them individually. As a result of the work to

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be done in this way, the desire to migrate from rural areas to cities will also be significantly reduced.In addition to architecture, the sustainable rural life requires the rural areas to be covered in rural areas, as opposed to the past forms of energy, water and food. It must be thought that sustainability in rural areas will be an important approach in directing global policies today. For this reason, a multidimensional discussion on the concept of sustainability needs to be made. Design should be brought to a different perspective. The main purpose of the design should be to contribute to the process of environmental formation as a designer. Thus, ecological design has gained importance and recycling becomes a very important place in different areas of design. Especially in rural areas, it is necessary to start using recycled materials that are compatible with the environment. One of the most important parameters in the process of this process is that the social, economic and political forces must make the decisions they make by making a careful decision in production and recycling process. To ensure sustainability in rural areas; Technology, aesthetic values, environmental balance, climatic conditions, natural characteristics of the region, topographic structure should be considered as a whole. Ecology has been on the agenda for the 21st century and the organic architecture has come to fruition in order to ensure the sustainability of natural life, taking into account the harm that human nature and the negative effects of unnatural things have on humanity and the environment. To ensure the sustainability of rural areas, these organic forms should be included in the designs. In America and Europe, ecological design has given considerable importance in recent years. However, one of the most commonly used materials in organic and recycled ecological designs is wood building materials. The idea that wooden building materials will reduce the trees in nature has come to the forefront. In order not to experience this problem, it is important to prefer the technological building materials in order to use the recycled materials more efficiently.

3. PASSIVE SOLAR DESIGN

Geographically independent design in ecological rural area design and analogy to this form of box is an important debate. The design to be designed needs to be designed according to climate and geographical directions. The limitation imposed by the geometry of the arches to which the design is applied should be given importance. The design has more design freedom in terms of plan form and settlement for purposes such as directing towards the sun, utilizing natural light and, in part, providing natural ventilation. The building mass must be placed towards the sun. The building should benefit from natural light. Passive heating and cooling should be provided by natural means to save energy in the building. Geographical and climatic data should be used to naturally ventilate and illuminate buildings. Natural shading should be done on the front of the building.

4. BENEFITING FROM SOLOR AND WIND ENERGY

It should be noted that rural areas are mass consumers of natural energy sources of designed buildings. Renewable energy sources such as solar and wind energy should be exploited in addition to reducing building energy requirements through passive design methods. These energies are used to generate electricity and heat energy in the buildings. When examined in this way, it is especially important to obtain electricity from the sun's rays. With the development of technology, it is expected that more electrical energy will be produced by using solar and wind energy in the buildings. Solar power collectors and photovoltaic (PV) panellas can be integrated into buildings to generate heat and electric energy. With this system, sustainability is ensured. It also provides economic sustainability for users living in the buildings. They will not pay for energy and warming.

5. ECONOMIC SUSTAINABILITY

It covers the costs related to building costs. The economy is very important in the stages of design, construction use, maintenance-repair, operation and demolition. The economics of the buildings depend on the material used, the energy, the workmanship. Although it may seem like an additional cost to the initial investment for sustainability of buildings, it will be economical to work on insulation and energy saving in long term. Non-economic buildings will be abandoned after a while due to user dissatisfaction. The design of the buildings oriented towards the sun will provide additional cost savings while providing heat location and natural lighting, but also reducing the heating-cooling-ventilation system and reducing the use of light energy will save electricity. The natural ventilation system used in the buildings provides considerable savings in the use of the building. Economic designs can be made thanks to the technological developments in building materials

6. ECOLOGICAL SUSTAINABILITY

Natural resources used include energy and environmental issues. It is also integrated with the natural environment. It is very important to integrate the buildings with the natural environment in the rural areas. The topography, vegetation, and traditional building materials of the land where the buildings are located should be considered in the rural areas. In rural areas, environmental impacts of buildings, natural resource consumption, energy-water-material consumption, pollution, waste management should all be considered as a whole. The use of natural resources should be designed to allow the reduction of the sources of nature. Natural ventilation, lighting, heating and cooling should be provided by using renewable resources such as sun, wind and water. Little use of energy resources is very important in terms of environmental pollution. Assessment of wastes derived from buildings will be provided for ecological sustainability through the use of landscape applications and recycled building materials. Ecological sustainability is an important parameter of economic sustainability. Assessment of waste, reduction of environmental pollution, economical contribution of renewable energy resources.

7. SOCIAL AND CULTURAL SUSTAINABILITY

The social life and cultural values around the building must be carefully analyzed. The quality of life will be increased. Providing comfort for human health and comfort, natural ventilation, lighting, facilities for obstacles should be provided. In addition, cultural structures and historical textures must be preserved. Modern living conditions include parking, elevators, communication, socio-cultural sustainability. Buildings, shopping malls, restaurants, gyms, dance centers, swimming pools, walking tapes for horizontal communication are parts of socio-cultural sustainability. Wastewater should be designed so that it can be used in the garden water and toilets after it is collected and treated in underground storage. Energy saving can be achieved by using electric lamps with sensors. Water saving should be ensured by using sensor systems in usage waters. Use of grass in roofs and terraces must be protected from the harmful effects of summer sun. In design, natural light utilization should be maximum. For the comfort of the users, the lighting should be arranged on sun-fired facades. In socio-cultural context, street, street and neighborhood should be considered together with the area. The interaction with the environment in which the structures are built should be congruent.

8. DETERIORATION OF UNDERGROUND AND ABOVE WATER QUALITY

The effect of cement production and use on the subsurface and surface waters of the hydrology of the region. The wastes in the environment will cause ground water pollution as a result of leakage.Water will adversely affect quality. The mixing of chemical wastes into clean water is dangerous and risky. The deterioration of the quality of underground and surface water resources will deteriorate the comfort and health of the people living in the housing districts, and they will not want to live in that area. The sustainability of life in that area will be negatively affected.

9. ENVIRONMETAL PLANNING AND GREEN AREAS

Environment; Covering all living things and inanimate things on earth. The roads and pavements are increasing day by day. Natural vegetation is decreasing from day to day. In urban areas air is warmer than rural areas. Rural areas have a climatic advantage. The reason for the warmer urban areas; The darkness of the roads and pavements create climatic heat differences due to the frequent and dense buildings, low landscaping and natural circulation. The rise of heat in urban areas also accelerates the formation of fog in urban areas. One of the most important elements in urban and environmental planning in the near future is, of course, designs on preventing the development of heat differences. In planning, attention will be given to green spaces and landscaping, and the air flow will be calculated taking into account the altitude differences between the buildings. In this way the wind will be roughened. It is also very important that the colors of the buildings and roads are chosen appropriately.

10. SUSTAINABLE ARCHITECTURE AND BUILDING MATERIALS IN RURAL AREAS

Architecture in rural areas is also very important for future generations to have a better environment. All problems that can be caused by the use of natural resources and the effects of these natural resources on people and the environment should be examined and evaluated on a universal scale. It is possible to appreciate the importance of sustainability by taking into consideration the buildings, houses and structures of the rural areas in the human life, as well as the effects on the universe. In order to provide sustainability; It is necessary to use recycled building materials that do not harm ecological balance. Sustainability in architectural structures while minimizing energy expenditure throughout life cycle The use, processing, use, maintenance and repair of building materials are materials which do not harm the environment and human health during waste formations.

11. DISCUSSION AND CONSLUSIONS

Uncontrolled industrialized natural resources on the earth are running out. Planners, architects, and local governments should work to correct this process for the changing world ecosystem. By using natural resources efficiently, waste should be reduced and resources should be reused. In this way the needs of future generations will be met. The cycle of sustainability in the ecosystem will also be preserved. Effective use of energy, water and materials should be provided by economic, ecological socio-cultural design. Design should also be designed with maximum usefulness, comfort and sustainability on minimum land. In rural areas, sustainable buildings should be designed using positive interaction of sun, air, water, forest, landscape. The design of structures for sustainability plays a very important role in rural areas. The indispensable element of the economic and social development process is that the structures are integrated with the environment, topography and climate. Wrong designs that are not in harmony and those that are not planned correctly will be inadequate in the long stay and will be abandoned. It will not be economically sustainable due to these reasons. In order to achieve sustainability in rural areas, environmental performance must be evaluated at the maximum level. Secondly, new technologies should be applied along with the design approaches that come up from the past to the present day.However, the sustainable approach has a large number of complex design factors compared to the conventional approach. Passive solar design, use of recycled materials, life cycle approach, environmental quality, energy performance will be provided. It is of utmost importance that a planner, architect, structural engineer, or even other professionals work together in a sustainable design in the rural area. Sustainable design decisions in rural areas are reflected in many different ways to the sub-systems that make up the building. The facade systems to be applied in the building design, the carrier system applications affect the natural lighting. Landscape studies, green roof applications will affect the building system, so design decisions should be made together. As a result, they should be able to take advantage of renewable, sustainable sources of energy

as long as they provide social benefits with the answer to this question, "are buildings sustainable in rural areas?" The best systems should be applied to suit human health with environmental sensitivities. Sustainability principles and strategies should be integrated with modern and traditional design methods to ensure maximum utilization in national conditions.

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19 - 23 April 2017, Sarajevo

Research of Use Of The Glass As A Sustainable Material In The Respect Of Performance Criteria In Interior Design

Esra Avlanmaz Bilecen[1]

Abstract

The concept of sustainability can be defined as rendering life and nature persistent and keep them for the future. Can glass considered as a sustainable material? The answer is very straight forward "Yes", because glass is among the most preeminent sustainable materials. The aim of this study is to analyse the use of glass as a sustainable material in buildings and to examine thoroughly the qualifications of the glass according to the performance approach. In other words, the study focuses on to measure the physical and economical effects of glass as a sustainable material and examine performance according to the user requirements. Method of the study is based on research method according to the performance approach of the glass material. The reason of selecting this method is, the method itself contains sustainability approach criteria within. These criteria are, user requirements, physical requirements and economic requirements. The psychological, ergonomic and sociological effects of glass material on users were examined in the user requirements. Natural daylighting, transparency, solar control, colour and light reflection effects were taken into consideration in the physical requirements. In the economic requirements, fully recyclability for decades and energy saving properties and thus sustainability of glass as an organic building material were mentioned. This study is considered to contribute developing application opportunities of glass material in interiors and buildings and protecting environment, health, natural resources and energy saving and thus sustainable development.

Keywords: Glass, sustainable material, natural resources, recyclability.

1. INTRODUCTION

Bruntland Commission published its report, 'Our Common Future', in an effort to between the issues of economic development goals and environmental. In doing so, this report provided the oft-cited definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [1]. Sustainability is increasingly becoming an important consideration of building designer and practitioners with the goal of increasing economic efficiency, protecting, and restoring ecological systems and improving human well-being. Besides, to achieve sustainability, the following objectives should be met:a) Minimize consumption of material and energy; b) Re-usability and recyclability of the material; c) Human satisfaction; d) Minimum environmental impacts and embodied energy [2].It is important to minimize the consumption, as while a material is consumed, its chances for future use are diminishing; hence, its potential utility to future generation is lost [3]. Another aspect of minimizing the consumption is either reusing the same material or recycling the material to mold into a different or similar building product. This also ties into the third criteria i.e., meeting a certain level of end-user satisfaction [4]. Trade-offs are inevitable when selection on a material, and mostly are between resource consumption and human satisfaction. Human satisfaction level also changes with time and is correlated to various external factors, such as, costs, ensuring human comfort, safety and enriching the human spirit [5]. Human satisfaction level is also driven by the sustainability goal that in turn dictates the material selection process. Addressing the need of human satisfaction is very important. Another important aspect of material selection is its environmental costs and energy associated at various steps of its manufacturing process. However, to define a sustainable material, numerous factors have to be considered.In this study the importance of glass in terms of its characteristics and sustainability is mentioned starting from the historical process. The research shows that more use of glass material in buildings and interiors contributes to energy in terms of environment and human health. Moreover, it discusses the physical and psychological effects of glassware on humans, evaluation of the performance of the material and contribution to sustainable development.

2. MATERIAL AND METHOD

In this study, a method based on evaluating sustainability of glass as building material according to benchmarking criteria has been followed. The benchmarking criteria of sustainability is examined in there stages. The first of these stages is the manufacture stage. Sustainability benchmarks in the manufacturing stage are mainly waste reduction, pollution prevention, recycled content, embodied energy reduction, use of natural materials. The second stage is use stage. The usage head is consist of criteria's as a reduction in construction waste, energy efficiency, water treatment/conservation, use of non-toxic or less-toxic materials, renewable energy systems, to have longer life. Final stage is the disposal stage. Disposal stage is assessed on the basis of reusability, recyclability and biodegrade ability. Sustainability of glass material especially used in interior design is evaluated within the framework of these benchmarking variables.

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3. RESEARCH FINDINGS

3.1 Historical Information of the Glass Material

The Glass, which's root is derived from Latin words glesum or glaseum meaning amber, was named as vitrum by the Romans. It was resembled amber and perceived as a jewel. There is no precise information about where and when the glass was first manufactured in the history [6]. There are various statements about the glass has been accidentally invented. According to the historian Pliny, the marines of the Phoenicians on a merchant ship discovered the glass by chance in BC5000. Marines, who lighted a fire on a riverbank of a shore, used the soda blocks which they carry as a load on their ships, when they cannot find a stone to place their containers over fire. The next day, they find bright translucent pieces of glass between the ashes of the fire. As in this example, although it is an argument how the warmth can reach to such high temperatures which will provide the glasification, it is obvious that fire-related arts are showed rapid development after invention of the fire and controlling it to reach higher temperatures.[7]

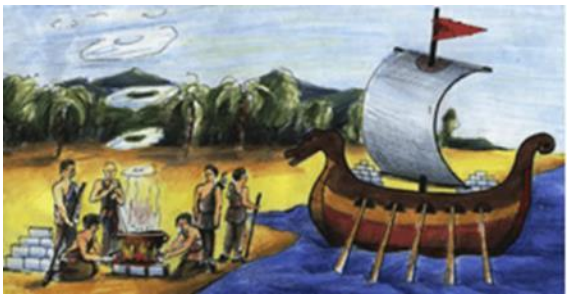

Figure 1.Dicovery of glass.

The first use of glass in architecture was seen in the Romans times. Plate glasses used in villages and urban baths in Pompei and resembling as flat glass today, were used without frames in the openings of the structures or in bronze or wooden frames. The thickness of these plates which is sized 30x50 cm, varied between 3 and 6 cm in these days. Although the glass cylinder technique was known at that time, the glass layers in this example were produced by casting and cutting method in place. In this technique, glue-like adhesive paste is poured on a framed table and sand was sprinkled on it, and then stretched by attaching iron hooks. With the destruction of weather conditions in times, these glass layers of the Romans gradually lost their transparency and changed the color into the green tone of the blues [7].The glass material, which we use in our indoor and outdoor spaces, has become an important tool of transparency as well as our connection with the outside world by the technological developments. The massive walls in the masonry buildings, built before the Industrial Revolution, had a structural role. Use of concrete after cast iron and steel frames used in skeletal systems widespread the use of limited glass use in the construction. These developments have removed the dependence of the massive walls of the carriers on buildings. One of the first examples of this development is, the Crystal Palace Building, built by Joseph Paxton in 1851 for the London Exhibition (Figure 2).

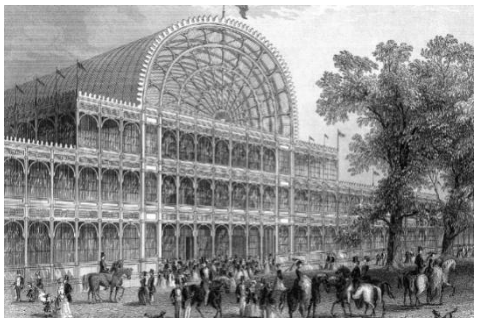

Figure 2. Crystal Palace Building, Joseph Paxton, 1851, London Exhibition.

After these developments in the structure, the concept of interior and exterior has been reformed; also the exterior space has become more closely related with the interior spaces. The entrance of light into the interior has opened an new era in architecture, which provides integration of nature and the human that are inside. The light we get into the interior is not only a means of illumination, but also a form of interior design. Reflection of light in different times and climates and formation of shadows, affect sociologically the integration of the user with the outside world. It has been found that the daylight makes the place visible and the natural lighted spaces have psychologically a positive effect on the user, thus people have a more efficient time in the interior places.

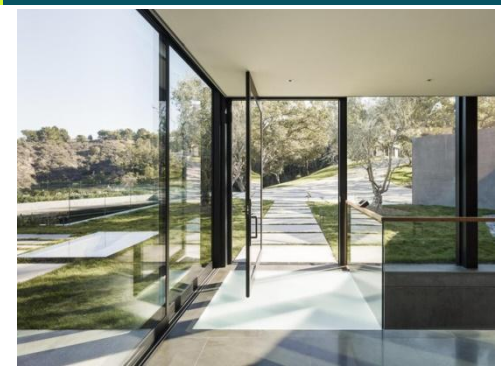

Figure 3.Oak Pass Main House in Beverly Hills, by Walker Workshop

It is a proven fact that, all living beings need to be physically close to daylight and the outside world as well as the natural light entering the place has physically and psychologically positive effects on humans. With the use of glass as a building material and removal of the borders with the concept of transparency in the places, has brought the overlapping incident of the volumes [8].

Figure 4.Usakligil House, Istanbul,Turkey, by Ahmet Alatas, 2006.

With the oil crisis that erupted in the 1970s, energy conservation in the architecture came to the agenda, and material and details began to be worked on in this direction. In order to reduce the heat permeability of glass units, some work has been carried out. The thermal conductivity of the glass units used in the building shell is as low as possible, which is important in reducing energy losses and providing thermal comfort. The development of low emission glass technology has helped to minimize heat loss and provide user comfort. Low emission glass reduces heat losses in colder months by reflecting energy to the interiors. However, low emission glass coatings should be used with solar control glasses, so that this mechanism does not cause undesirable heat gains to the interior during warmer months. Thermal insulation in the glass unit which provides solar control and low emission performance, reduces CO2 emissions with energy conservation by alleviating the cooling load. [9]

3.2. Glass and Technical Features as Architectural Material

Glass is an inorganic melting product cooled to a solid state without crystallization. Glass can be composed of many chemical compounds such as silicon oxides, germanium, boron, phosphorus and arsenic. In general, the main component of glass is silicon dioxide [10]. Since glass is a transparent material, it is the most important feature that spreads its usage in buildings. Light transparency and thus transparency are a result of the supercooling process. The fact that it is not in a crystal structure allows the light rays to pass through the glass without breaking.Heat transmittance of glass is an important factor in terms of heat loss and has a negative effect on heating costs. However, the heat loss can be reduced with some coatings applied to the glass. Convection can be controlled with some additives to be added to the glass dough.There are a variety of parameters to make evaluations of the light, transmission and thermal properties of the glass. Reflection, absorption and transmission values are used to determine the ray transmission value of the glass. The absorbed radiation is converted into heat, which is then diffused through the surface of the glass by means of heat, radiation or heat. Main physical parameters used in evaluation of light transmittance and heat gain / loss; Light transmittance (T), total solar energy conductivity (g-factor) and heat conductivity coefficient (U value).In terms of hardness and durability of glass, it is important to have high levels of silicon dioxide. However, in this case, the fragility of the glass also increases. The glass structure is not capable of meeting plastic deformations; But it can exhibit elastic deformation up to the point of stress which will cause sudden breakage. The theoretical tensile strength of the glass is 104 N / mm2. Experiments have shown, however, An effective tensile strength up to 30-80 N / mm2. When the glass is subjected to tensile stress for longer, it can be expected to show a resistance of 7 N / mm2. This decrease in strength is caused by the presence of micro-cracks and peaks and valleys on the surface of the glass because the glass is not a perfectly uniform material. This low tensile strength of the glass can be increased up to 120 N / mm2 by some thermal and chemical processes. The heat treatment means that the glass is heated to

6850 ° C and suddenly exposed to cold air flow. This is some kind of forecasting process. In the case of glass breakage produced by this method, sharp pieces cannot be separated. This is why it is called a security glass [10-13].

3.3. Glass as a sustainable material

The glass material is manufactured from natural materials and the waste of the glass is fully recyclable. The production of the glass releases air-polluting compounds and need high heating energy. In order to prevent and/or reduce the effects, it is necessary to use recycled glass which benefits in two ways. The first one is, using recycled glass use to make glass reduces the requirement for raw materials and avoids disposing of what would otherwise be a waste material. The second one is saving furnace energy (10 percent cullet use saves 3 percent furnace energy) and leads to reductions in CO_2 emissions. Also, in the production plant, actions are taken in order to reduce the release of the air-polluting compounds like nitrogen oxides, sulphur dioxide and particulates. Finally, the waste heat in the production can be recovered which can save energy, reducing CO_2 emission and improve the overall efficiency of the float process [14].Nowadays, glass has been used in many different places with the development of technology and it has been determined that it responds to user needs and has become indispensable of our life by crystallizing the inner and outer concepts. In terms of solar control, the properties of the glass vary depending on the value of radiation (radiation) conductivity. The radiation conductivity value can be changed by applying the coating layers obtained from some precious metals and / or metal oxides onto the glass. Such coatings directly affect the rate and intensity of radiation conductivity. [15]With the glass material being used in large quantities in constructions and facades, solar control and light permeability must be controlled. While natural light enters the glass with the glass, protection against climatic changes is provided. An effective solar control can be achieved through the use of reflective coatings. It is possible to achieve the desired comfort conditions for indoor environments by adaptation to continuously changing conditions by means of variable light transmittance technologies such as photochromic, electrochromic and thermochroic glasses [16].Increasing the reflectance properties reduces the transmittance value. Reflective coatings can be applied to transparent glass, and ceramic coatings can be applied to glass surface. [17] As the use of glass material increases, this usage should be guided economically. Transparent and opaque surfaces of structures are of great importance in terms of energy gain and loss. By means of energy efficiency, the glass has been altered to a material which can control the radiation effect of the sun with its extreme brightness, transform it into a material that can control how much light enters into the structure, and control the heat and the noise by the innovations in technology. Local sourcing of material means less energy consumed for transporting the material [18].The glass is 100% recyclable. The glass material can be recycled many times without detracting with good quality and clarity. Recycling also helps to conserve natural resources. Recyclable glass material, both by conserving resources and using less energy, contributes to the sustainability to glass material.

Table 1. The Sustainability performance of the glass material

	Low	Medium	High
Pre-Building Phase: Manufacture			
Waste Reduction		√	
Pollution Prevention		√	
Recycled Content			√
Use of Natural Materials			√
Building Phase: Use			
Reduction in Construction Waste			√
Energy Efficiency			√
Water Treatment/Conservation		√	
Use of Non-Toxic or Less-Toxic Materials			√
Renewable Energy Systems			√
Longer Life		√	
Post-Building Phase: Disposal			
Reusability			√
Recyclability			√
Biodegradability		√	

4. CONCLUSION

As a result of this study, which is aiming to analyse glass as a sustainable material in architectural and interior design, it is seen that glass has considerable advantages in the stages of production, use and disposal. The greatest advantage of the production phase is the use of natural materials and the recyclable content. In the usage phase of the glass, it stands out with its advantages in terms of Energy Efficiency, Use of Non-Toxic or Less-Toxic Materials, Renewable Energy Systems and Longer Life. Moreover, the recyclability contributes indirectly to reusability of the material after use.As a matter of fact, the technological developments make this material an increasingly attractive material for designers. One of the factors that makes the glass more widely used in the buildings is the advantage that the glass provides for creating variable conditions and light games throughout the day in the interiors. In this context, the glass is out of being of a simple material that covers the window opening. Low emission coatings and photochromic, electrochromic and thermochromics glasses enable to reach desired performance and to meet variable needs. In

this way, it easier to provide environmental controls in the interiors.As a consequence, glass is one of the best building materials that redraws the boundaries of inner-outer separation without interrupting our connection with the outside world. The use of glass allows us to benefit on one side from natural light while on the other side it can provide the desired transparency. In addition, heat transfer and heat control can be performed through the glass to provide the necessary interior comfort conditions.In terms of sustainability, heating and illumination energy efficiency, transparency that provides communication with nature and life outside, being locally supplied, ability to be recycled many times without problems and many other factors brings glass material in an important place in our lives in order to contribute to convey the nature to the next generations.

ACKNOWLEDGEMENT

This study is granted from unpublished Msc Thesis titled as "The Use of Glass Material in Shopping Centers and Effects on Interior Design" completed in Mimar Sinan University Institute of Science, Interior Design Programme, Istanbul, July 2001.

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19 - 23 April 2017, Sarajevo

A Hydrological Drought Analysis on a River Basin in Turkey

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Abstract

In the study presented, a hydrological drought investigation was carried out for the period 2016-2050 in Acisu sub-basin of Gediz Basin in Turkey. In this context, a pessimistic climate scenario 'RCP 8.5' is utilized for the future term predictions. In this scenario, precipitation and temperature predictions were produced by using the downscaling method applied to 12 general circulation models. These predictions have been converted into streamflows by means of a conceptual rainfall-runoff model which was calibrated for the study area. Following these procedures, standardized runoff indices (SRI) were calculated from streamflows generated under the past and RCP8.5 scenarios and drought categories corresponding to the calculated indices were determined. When the results are examined, it is predicted that the efficiency of wet periods will decrease in 2016-2050 period while a significant increase in the efficiency of moderate dry and severe dry periods is expected.

Keywords: ***RCP8.5, downscaling, SRI.***

1. INTRODUCTION

Drought is a common hazard on a global scale and it has dramatic impacts to the society. Recent studies in the literature reveal that the frequency and severity of drought increase as a result of uncertainties in the climate and climate change (Sheffield ve Wood, 2008). In addition, the rapid increase in the world population will increase water demand in many regions and consequently it will be required to work on drought management and water resources planning issues. Drought monitoring, the examination of different drought types and at this stage, the use of appropriate indicators are the most important steps in drought management (Trambauer et al., 2014). Meteorological, agricultural and hydrological drought indices are widely utilized to characterize different types of droughts. The most commonly used indices are the Standardized Precipitation Index (SPI) (McKee et al., 1993) and the Palmer Drought Severity Index (PDSI) (Palmer, 1965). The Palmer Drought Severity Index (PDSI) requires precipitation, soil moisture and temperature data while only precipitation data are required in the calculations of Standardized Precipitation Index (SPI). In this regard, the PDSI is more laborious in terms of the number of variables and its computation cost while SPI is considered as a less complex method in comparison to PDSI in terms of its calculation and interpretion. The SPI can be calculated for different time scales by summing the precipitation series in the relevant time period. The 12-month time scale was used in this study and analyzes were performed through annual SPI. SPI can also be associated with agricultural and hydrological drought as it uses precipitation which is the basic component of the hydrological cycle. Since the drought can not be expressed only by precipitation deficiencies, this method has limitations due to the fact that it depends on only precipitation data. Considering the hydrological cycle, drought does not depend on only the deficiency in precipitation, but also the decrease in surface and subsurface flows. When the relevant literature is researched, it is obtained that the drought indices are usually used to describe past droughts and to monitor current droughts. However, in addition to climate change and scenario-based climate projections being used in water resources planning studies, application of the drought index methods on hydrological variables such as precipitation, temperature and streamflow, of which future term predictions are available, is important. In the study presented, an application was performed for Acisu subbasin of Gediz Basin in Turkey. First, for the related region, a pessimistic climate scenario, RCP8.5, was taken as a basis, and the downscaling method was used to produce projections of precipitation, temperature and evapotranspiration at station scale derived from 12 different climate models. Then streamflow simulation and hydrological drought analysis for 2016-2050 water years were carried out by using a hydrological model requiring these variables as inputs. At this stage, the approach taken by the SPI analysis is based. It was emphasized by researchers such as Shukla and Wood (2008) and Trambauer et al. (2014) that the method could be adapted to streamflows. Details of the approach referred to as the standardized runoff index (SRI) are presented in Section 2.

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2. STANDARDIZED RUNOFF INDEX (sri)

The SPI method, which is a reference to SRI analysis, is designed to determine reduction in multiple time measurements by McKee et al. (1993). The value of the SPI in a selected time period is obtained from quotient of the differential of precipitation (or streamflow) to the arithmetic mean and the standard deviation in the same time interval. However, a modification to the implementation of the method is suggested, since variables such as precipitation and streamflow correspond to Gamma distribution rather than normal distribution. The sequence of this process is summarized below:

- α and β parameters of Gamma distribution are predicted by methods of maximum likelihood or moments.
- Cumulative distribution function, G(x), of Gamma distribution is calculated.
- Since the gamma distribution function is not defined for x = 0, the cumulative distribution function is updated by joining q which is the occurance frequency of the non-precipitation / non-streamflow values (H(x)=q+(1-q)G(x)). In the study, it was considered that q=0 and H(x)=G(x) since annual streamflow values were utilized.
- Then, G (x) values are transformed to standard normal values (Z) with a mean of 0 with a variance of 1 with equations given in Equation 1 and Equation 2 (Abramowitz and Stegun, 1964).

$$Z = SRI = \begin{cases} -\left(t - \dfrac{c_0 + c_1 t + c_2 t^2}{1 + d_1 t + d_2 t^2 + d_3 t^3}\right) & 0 < H(x) \le 0.5 \\ +\left(t - \dfrac{c_0 + c_1 t + c_2 t^2}{1 + d_1 t + d_2 t^2 + d_3 t^3}\right) & 0.5 < H(x) \le 1 \end{cases} \quad (1)$$

$$t = \begin{cases} \sqrt{\ln\left(\dfrac{1}{H(x)^2}\right)} & 0 < H(x) \le 0.5 \\ \sqrt{\ln\left(\dfrac{1}{(1 - H(x))^2}\right)} & 0.5 < H(x) \le 1 \end{cases} \quad (2)$$

where c_0=2.515517; c_1=0.802853; c_2=0.010328; d_1=1.432788; d_2=0.189269; d_3=0.001308.

Drought definitions used in the method are given in Table 1 according to index values.

Table 1. Categories used in SPI/SRI methods

Index Value (Z)	State Category
≥ 2.0	Extremely wet (W1)
1.5 ≤ Z < 2.0	Severely wet (W2)
1.0 ≤ Z < 1.5	Moderate wet (W3)
0 ≤ Z < 1.0	Normal (N)
-1.0 ≤ Z < 0	Mild drought (D1)
-1.5 ≤ Z < -1.0	Moderate drought (D2)
-2.0 ≤ Z < -1.5	Severe drought (D3)
≤ -2.0	Extremely drought (D4)

3. STUDY AREA

The study has been carried out on Acisu sub-basin; one of sub-basins of Gediz Basin. Acisu creek is one of the major tributaries feeding Demirkopru Dam. The region has typical Mediterranean climate. Drainage area of study area is approximately 3272 km^2. Meteorological stations representing the area are Selendi, Usak, Gediz, Simav, Icikler, Kula, Fakili, Gure and Saphane stations. Although there are precipitation observation in all stations, monthly mean temperature is not observed at Icikler, Fakili and Saphane stations. Considering temperature values obtained from meteorological stations, potential evapotranspiration (EPOT) values were obtained by using Thornthwaite empirical equations. Average regional precipitation is computed by weighing of 9 precipitation observation stations with Thiessen polygon (Figure 1). The streamflow gauging station representing the sub-basin is a station with E05A023 number.

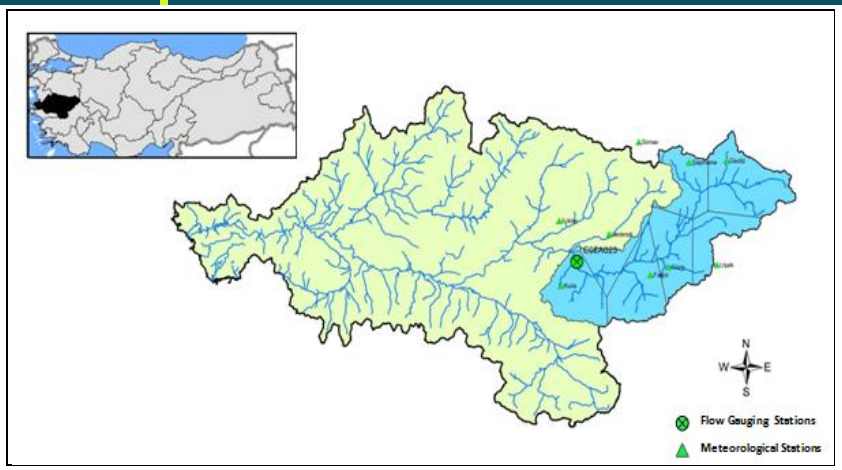

Figure 1. Location of Acisu sub-basin at Gediz Basin in Turkey

4. FUTURE TERM PROJECTIONS

In the study, twelve general circulation models (GCMs) were utilized to produce the future term projections (Table 2). The obtained GCM data consist of different atmospheric variables data and ERA-Interim reanalysis data and All Possible Regressions method (APREG) were utilized to have the best subset which represents the region climate with a less computational cost. Following the predictor selection application, it was deduced that prate (pr) and surface air temperature (air) variables were the best predictors for all of precipitation and temperature stations respectively. Since the utilized GCM data have coarse resolution at a global scale, a downscaling strategy was applied to downscale these GCM data with a coarse resolution to the station scale. To apply downscaling strategy, artificial neural networks (ANN) and least squares support vector machine (LSSVM) methods were employed. In the application of both methods, data which were utilized from ERA-Interim reanalysis data were used as inputs and the observed precipitation and temperature values were defined as desired values. The statistical performance criteria such as determination of coefficient (R^2), root mean square error (RMSE), Nash-Sutcliffe (NS) coefficient, proportion of root mean square error to standard deviation of observed data (RSR) and percent of bias (PBIAS) were used to measure the performance of both downscaling models. The details of these statistical performance criteria are given in Moriassi et al. (2007). Verification results of these models were evaluated to select which model results might be used for each meteorological station and the model results which show the best performance were utilized for the simulations.Knutti et al. (2010) recommended the combination of multi-GCM projections to decrease uncertainty which is originated from the use of single GCMs. Therefore, Bayesian Model Averaging (BMA) method which combines multi-models by weighing them was utilized in this study. By applying this method, a single projection (for each precipitation and temperature) was obtained by combining twelve climate models. Then, bias correction strategy which is based on quantile mapping was performed so that the simulations represent the regional climate characteristics as statistically significant. The details of BMA/bias correction strategy are given in Okkan and Kirdemir (2016a). Consequently, according to the projections for RCP8.5 climate scenario, a decrease of %17 for precipitation and an increase of 4.7 ^{o}C for temperature were foreseen for the future term 2015-2050 (Figure 2). By using Thornthwaite empirical equations, it is foreseen that the quantity of potential evapotranspiration (EPOT) might increase by %33 in the related region.

Table 2. Used GCMs in the study (Okkan and Kirdemir, 2016a)

GCM name	Institution	Modeling center	Resolution Latitude (^{o}) x Longitude (^{o})
BCC-CSM1	Beijing Climate Center, China Meteorological Administration, China	BCC	1.121 x 1.125
CCSM4	National Center for Atmospheric Research, USA	NCAR	0.942 x 1.25
CESM1(CAM5)	National Center for Atmospheric Research, USA	NCAR	0.942 x 1.25
CSIRO-Mk3.6	Commonwealth Scientific and Industrial Research Organisation, Australia	CSIRO-QCCCE	1.865 x 1.875
GFDL-CM3	Geophysical Fluid Dynamics Laboratory, USA	NOAA GFDL	2 x 2.5
GFDL-ESM2M	Geophysical Fluid Dynamics Laboratory, USA	NOAA GFDL	2.022 x 2.5
GISS-E2-H	NASA Goddard Institute for Space Studies, USA	NASA GISS	2 x 2.5
GISS-E2-R	NASA Goddard Institute for Space Studies, USA	NASA GISS	2 x 2.5
HadGEM2-ES	Met Office Hadley Centre, UK	MOHC	1.25 x 1.875
IPSL-CM5A-LR	Institut Pierre-Simon Laplace, France	IPSL	1.895 x 3.75
MIROC-ESM	Atmosphere and Ocean Research Institute, Japan	MIROC	2.791 x 2.813
MRI-CGCM3	Meteorological Research Institute, Japan	MRI	1.12 x 1.125

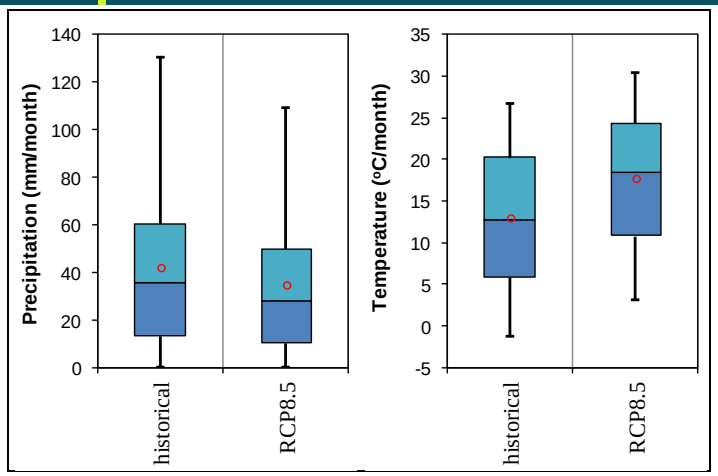

Figure 2. Foreseen changes for precipitation and temperature in 2015-2050 period

Since hydrological drought analysis were made by utilizing streamflow data, streamflow projections were derived with dynamic water budget model (DYN-WBM) developed by Zhang et al. (2008). To produce the future term projections, the data of precipitation and EPOT projections were used as inputs in the rainfall runoff model. According to the model results, a decrease of %47 is foreseen for the future term in the study area for RCP8.5 scenario. For the sake of brevity, the readers are referred to Okkan and Kirdemir (2016b) in which the detailed expressions and results of precipitation, temperature and streamflow projections are available for Acisu sub-basin of Gediz Basin in Turkey. Drought indices can be obtained for different time periods, but changes in the annual time scale are studied in the study. Prior to the calculation of SRI indices, distribution fit control was performed and it was determined that the annual flows fit the 2-parameter Gamma distribution. Gamma cumulative distribution functions were derived for past period scenario flows on the annual time scale and then these values are converted to standardized normal values (Figure 3). Similar procedure was applied to the RCP8.5 scenario and the historical period scenario parameters (α and β) relatively and the Z values of each year in the related period were calculated. The frequencies of the indices computed in the study for the related periods (1981-2005 water year for historical, 2016-2050 water year for RCP 8.5) were scaled to the total number of years, and the percentage of drought state for each period was determined for each category (Figure 4). When the historical and RCP 8.5 results of the N, D1 and D2 categories are compared, it is seen that the proportional events on the current period are close to each other. Although there are no severe drought and extreme drought events in the historical period, according to the RCP8.5 scenario, these two drought categories are effective in about 25% of the total period. While the sum of W1, W2 and W3 represents 24% of the total period in the historical period, the flow with the wet character does not have any periodic activity in the RCP8.5 scenario.

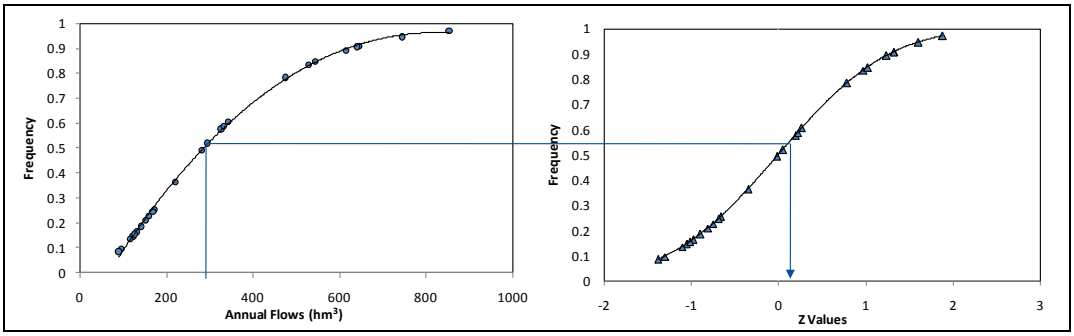

Figure 3. Conversion from Gamma cumulative distribution function to standardized normal values

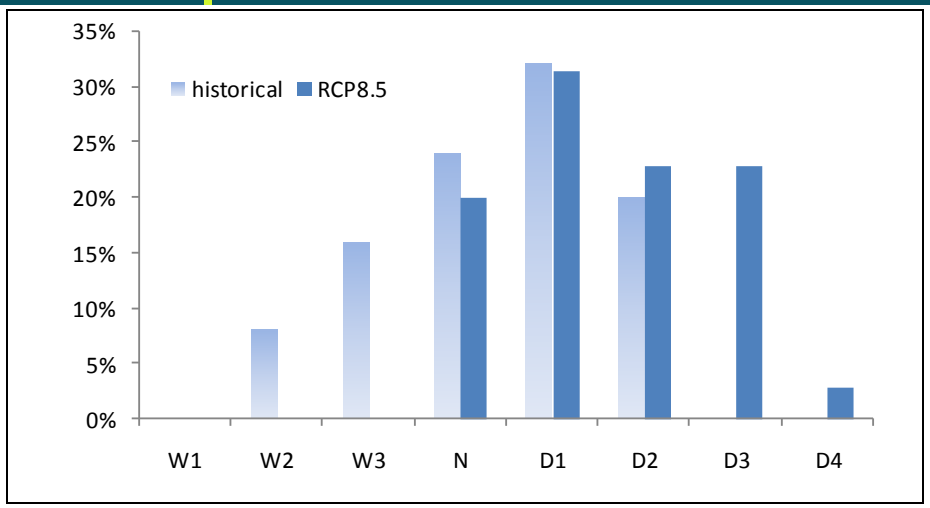

Figure 4. Change of calculated annual SRI values against time

5. CONCLUSIONS

In the study presented, hydrological drought projections for the future period of 2016-2050 were obtained for Acisu sub-basin of Gediz Basin in Turkey. Projections were derived by using 12 different climate models and RCP8.5 scenario. At this stage statistical downscaling method was utilized. The success of the downscaling models employed for the precipitation and temperature stations in the region was verified by statistical performance criteria. The biases on the combined BMA predictions obtained from 12 climate model simulations were reduced by bias correction. Bias-corrected precipitation and temperature projections (and EPOT derived from temperature data) are converted into streamflow projections using DYN-WBM. According to the results obtained in this study, a decrease in precipitation and an increase in temperature were foreseen in the future term 2015-2050. As a result of streamflow projection obtained by DYN-WBM, a decrease was foreseen for streamflows in the related period. With these negative impacts of climate change, it was predicted that the efficiency of severe drought and extreme drought events increase in comparison to the historical period. Moreover, in 2016-2050 period, it was foreseen that the inefficiency of wet periods might emerge. According to the evaluations, considering decreasing flows, growing population and water use needs in the future, alternative strategies may be needed to prevent potential deficits. Also, other drought indices such as meteorological and agricultural can be used to evaluate the possible drought events in the future.

ACKNOWLEDGMENTS

The research leading to this study is funded by the Scientific and Technological Research Council of Turkey (TUBITAK) under Grant No. 114Y716.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

Sustainable Water Resources Management in Turkey

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Abstract

Water resources are essential for satisfying basic human needs, alleviating health problems, promoting social and economic development in general and conserving ecosystems. The recent assessment reports have found that the world is on track to surpass the Millennium Development Goal for access to drinking water, but will fall short by one billion people for sanitation if current trends continue, according to figures of international organizations. The importance of sustainable water resources management in the context of socio-economic development should be recognized at the same time as the multiplicity of interests in utilizing water resources for water supply and sanitation, hydropower generation, agriculture, industry, urban development, fisheries, transportation and recreation. In this paper, sustainable water resources management evaluated for Turkey in respect to global criterias.

Keywords: Water resources, management, sustainability

1. INTRODUCTION

In the 21st century, water has economical, social, political and cultural value. The on-going rise of world population and the increasing needs have also an effect on the value of water. Water issues are multi-dimensional including economical, social, political and cultural aspects. The United Nations Millennium Declaration adopted the goal of reducing by half the proportion of people without access to safe drinking water by the 2015. An additional goal was set at the World Summit on Sustainable Development in Johannesburg to reduce by half the proportion of people without access to basic sanitation by 2015. In this respect, The 5th World Water Forum will be a platform convening a wide range of stakeholders and strengthening commitments towards the achievement of these goals. The main theme of the 5th World Water Forum is 'Bridging Divides for Water'. The theme implies not only the specific geographical location of Istanbul, but also the barriers between modern age and traditional water cultures, water uses between rich and poor and between developed and developing regions of the world. Water problems are region specific. However, there are several common solutions. We have prepared this country report in order to contribute to the understanding of the diversity and complexity of the issues on water management. As Turkey is a developing country, the water resources must be developed in an efficient way which optimizes water's benefits -more crop per drop-, while minimizing negative environmental impacts.

2. WATER RESOURCES IN TURKEY

There are 25 hydrological basins in Turkey. The rivers often have irregular regimes. Considering the average surface water run-off which is 186 billion m^3/year with the surface runoff of 7 billion m^3/year coming from neighboring countries, the total surface run-off within the country reaches to the amount of 193 billion m^3/year. On the other hand, the average amount of ground-water leakage is 41 billion m^3/year. However, not all the renewable water resources can be utilized because of economic and technical reasons. Exploitable portions of surface run-off including inflow from bordering countries, and groundwater are 98 and 14 billion m^3/year, respectively. Thus, the total of economically exploitable water resources potential amount to 112 billion m^3/year.The 25 hydrological basins in Turkey have a total surface water run-off of 193 billion m^3/year. 31% of the potential is constituted by the Euphrates (Firat) and the Tigris (Dicle) Rivers both of which have their sources in the eastern part of the country[1,2,8,11,12,13].

3. WATER MANAGEMENT IN TURKEY

Comprehensive water planning activities have been carried out in Turkey since the 1950s. These have led to the construction of structures on rivers to regulate the flow and to meet the energy and food requirements of a growing population while achieving socio-economic development goals. The main approach for the integrated water resources management is to manage them in a sustainable way in the basin scale. In this context, Turkey has taken great strides in sustainable water management. Turkey's water management policies are directed towards satisfying the increasing demand for domestic water supply, achieving food security, generation of energy, and conserving the environment in accordance with international standards.The integrated approach to water resources management provides a framework for linking policy dialogue, legislation, structural reforms and the use of economic instruments, technical interventions, environmental management and social concerns at a variety of levels. Legal and institutional frameworks are considered to be key determinants of successful water management. They are part and parcel of each other. It is clear that the more coherent they are, the better the solution we achieve. In Turkey, water-related activities are centrally planned. Water resources management is described in the five year development plans specifying the general principles and priorities of the implementation of medium and long term economic, technical, environmental, social and cultural policies.

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The institutional framework has three levels: decision-makers, the executive level and end users.The basic problems in water resources planning and management within the legal framework can be summarized as:

a) difficulties in implementation of existing laws: in Turkey, the enforcement and implementation of existing laws are difficult due such factors as: the presence of too many laws, rules and regulations that apply to the same problem; the presence of vaguely stated rules and regulations for which several interpretations may exist; most of the laws in the water resources area are so old that they cannot provide solutions to newly emerging problems. The problem is particularly significant in the case of environmental issues. The implementation of the Environmental Law is difficult due to lack of clear definition for environmental factors which are covered; giving priority to development over environmental protection; and failure to clarify the functional division of labor between relevant agencies and organizations. Furthermore, different water-related communities indicate that a "Water Law" does not exist in Turkey so that it is very difficult to define a set of regulations dealing with water resources management.

b) the need for revision and re-organization of the legal framework: the majority of water-related communities in Turkey indicate the need for amendment of existing laws and enactment of new laws so that an updated water policy can be developed. As noted earlier, most of the laws defining the constitution and responsibilities of water-related institutions are old. In particular, the old laws do not meet the demands of today's water resources problems. For example, the Village Law is already out of date and does not work; but it is still in effect.

c) poor definition of water rights: in Turkey, water is considered a public good, and surface water is a public good which everyone can use subject to the rights of prior uses. Surface water use is normally free of any obligation to obtain prior authorization. The Civil Law defines water as part of the land owned. Furthermore, there is no registration system for water rights or water use. This system is generally unable to solve conflicts with claimed prior rights, and this is leading to serious problems of over allocation in some basins.

d) difficulties in resources allocation: the inadequacy of legislation concerning the allocation, use and management of water resources which are scarce causes the waste of natural and economic resources. In essence, water rights and resource allocation are the two topics that need to be addressed by an updated "Water Law".

The institutional framework, that underlines water resources planning and management in Turkey, is characterized by the following features in cases of both water allocation and water quality/environmental issues:
a) the diffuse character of rights, authority and responsibilities of institutions: there is a large confusion and overlapping of rights, authority and responsibilities of the actors involved in water planning. The responsibilities and rights of institutions are not defined precisely in their constitutional laws, in the sense that similar responsibilities and functions may possibly be defined for different actors. This situation leads to an institutional gap in the form of overlapping of rights and responsibilities of actors.
b) difficulties in intersectoral transfers: the current institutional system does not allow for flexibility particularly in water allocation, which is actually necessary in view of changing priorities and constraints in river basins.
c) lack of cooperation and coordination among actors: this significant problem leads to losses in labor, time and money or to a general lack of efficiency in water resources development. This situation, in a way, results from the legal framework for planning and management. The laws that define the rights, authority and responsibilities of the actors are pretty old, and they need to be updated to identify precisely the role of each actor. Such a revision of laws is necessary to minimize both the overlapping of activities and the possible disagreements among actors. Once these conditions are settled, it will be much easier to establish coordination and cooperation among the institutions. In terms of water allocation, the problem is simpler than it is in the case of water quality. DSI has de facto control of all water resources in the country; it is the only institution to judge on water allocation although its constitutional law does not clearly and precisely state this responsibility. Thus, DSI's role in water allocation is tacitly understood, and this is not a very comfortable situation even for DSI. With respect to groundwater, there is no problem since Law 167 definitely states that DSI is responsible for the development and protection of groundwater resources. In the area of water quality and environmental issues, the problem of lack of coordination among actors is worse since, here there are definitely too many actors involved. DSI is inevitably involved in environmental problems but it does take on the responsibility and the right to regulate water quality; that is, it does not have the authority to take legal action under its current structure. It can only report violations or polluters to local governors. The only definite way in which DSI is involved in basin scale water quality is to monitor the quality of surface and groundwaters in the basin. The Ministry of Environment is given the basic rights and responsibilities to regulate water quality; but it is up to provincial governors to take action and process fines, in which case both the Ministry of Interior and the Ministry of Finance are also included in the process. In short, institutions should cooperate and coordinate to solve both water allocation and water quality problems. A reasonable solution to this problem would probably to establish cooperation on basin level and develop basin authorities. However, Turkey is not yet ready for establishment of basin authorities in terms of legal and institutional constraints. Even if institutions could come together and share responsibilities, there will still be the question of "who will pay?".

d) specific characteristics of main actors: the Ministry of Environment, founded to design basic policies on the environment to ensure coordination between related institutions, is far from fulfilling these functions, partially due to the fact its is a rather new institution. The provincial organizations of the Ministry have not been fully functional due to lack of technical equipment. On the other hand, DSI is acting on various grounds and, in a way, is performing the impossible because it is difficult for a single institution to plan, implement, regulate and monitor at the same time. DSI has always been the most important institution in Turkey for planning and management of water resources. Thus, it faces now the greatest challenge as water resources management becomes more complex. It faces the dilemma of wanting to maintain its control and authority over all elements of water management, while at the same time facing difficulties in dealing with new areas of interest in which it has little or no traditional expertise. DSI faces more and stronger criticism and competition from outside than before. Part of the criticism comes because newer entrants into the water management arena are impatient for change and view DSI as conservative and relatively inflexible. They have observed negative impacts in their areas of interest and tend to blame DSI for failing to manage water resources to meet each of these specific interests. Part of the competition comes from sister institutions that are eager to grow and strengthen at the expense of DSI, although they may or may not have any better capacity to undertake the existing and new tasks than DSI. For example, NGOs have recently started to raise strong public awareness and hence strong pressure on all actors involved in basin management. Similarly, they are also putting pressure on DSI from time to time although there is no formal relationship between NGOs and DSI. Local governments are also important in basin planning and management. Law 2560 in Turkey assigns responsibilities to metropolitan municipalities to allocate water for domestic and industrial water uses. Turkey has adopted, for the medium term, the global tendency to demand the improvement of the scope of responsibilities of local governments. All these new institutions are looking for a share in DSI's traditional competence in water resources planning and management. On the other hand, it may be interesting to note here that different institutions have different perspectives in evaluating the same problems. For example, the Ministry of Environment envisages basin management essentially as "water quality management"; whereas, DSI considers all elements in a basin, of which water quality is only a part[3,4,5,6,7,9,10,15,16,17,18].

4. INSTUTIONAL FRAMEWORK

In Turkey, there are a number of central and local organizations and agencies active in the water sector:DSI is attached to the Ministry of Energy and Natural Resources. DSI's main responsibilities cover the issues of observation, field investigation, master plan, pre-feasibility, feasibility, design, construction and management for irrigation, hydraulic energy generation, domestic water supply (for cities with a population of more than 100,000), flood control. Development, management and conservation of groundwater resources are also exclusively under the responsibility of DSI. It is also the major agency that is responsible for water allocation. DSI's total and investment budgets for 2000 fiscal year amounted to USD 1.6 and 1.1 billion which constitute almost 2.4% of the National Consolidated Budget and over 30% of the National Investment Budget in 2000 respectively. By the end of 2002, DSI completed the construction of 203 large dams and over 368 small dams and developed 2.7 million hectares of irrigation schemes.Optimal planning and rational management of water resources calls, first of all, for adequate and reliable data concerning, among others, quantity and quality of water depending on time and space as well as other meteorological variables that are of significant impact on both water supply and demand. In parallel with the effectual and practical procedures of water resource development projects and operation of facilities built in this respect, DSI carries out, and is responsible for, the tasks associated with the observation and measurement of wide range of hydrometeorological and hydrological variables. The data are observed, measured and processed by DSI including primarily water levels of lakes and groundwater, stream-flow rates, sediment loads and water quality. DSI functions at regional scale through its 26 Regional Directorates established in each of the 26 basins of Turkey. General Directorate of Bank of Provinces: The basic functions of this agency are financing, insuring, and supporting of water supply and sewerage projects for municipalities..This bank was first founded in 1933 under the name of "Bank of Municipalities" to render public work services to municipalities. The original idea was to secure the funds that municipalities needed for their services. This institution was restructured in 1945 and renamed as "Bank of Provinces" with the following duties:

- To extend loans or allocate funds to local governments, upon their request, for the construction of water supply, sewage networks, and treatment facilities.
- To extend services to local governments in the form of maps, plans, projects, surveys, and studies related to the above stated facilities, and to assign other parties to construct infrastructure and other facilities for local governments.
- To exercise control over and supervise those works carried out with funds extended by the bank.
- To sell or lease materials, supplies and equipment to local governments.
- To get insurances for materials, supplies, goods, moveable property and real estate owned by local governments.
- To conduct banking operations related to all above stated services.

Following the completion of work, the Bank transfers the facility concerned to the Municipality, which is then responsible for its operation and maintenance. Since 1983, the Bank has extended its services to all local governments irrespective of their population as long as it is authorized by these governments. This is valid for sewage services as well. Currently, it is in agenda of concerned circles to include solid waste management in the domain of the Bank.The KHGM was established in 1985 with the reorganization of YSE (Road, Water and Electricity Services) and the General Directorate of Land, Water and Settlement Affairs. According to Law No. 3202, tasks related to the water sector are as follows:

1) To ensure the protection, efficient utilization and development of land and water resources in line with principles and policies described in development plans and programs, and to extend services to farmers in this context.
2) To identify main principles and rules and carry out work in relation to the construction, repair, maintenance and operation of roads as well as water, electricity, and sanitation facilities of villages and settlements attached to villages.
3) To provide drinking and domestic water to villages, their attached settlements, and military garrisons.

4) To supply irrigation water to farms either from the existing water reservoirs constructed by the state or from other available sources.
5) To construct, improve, expand and operate irrigation facilities for areas whose irrigation water need does not exceed 500 liters per second.
KHGM, like DSI, functions at regional scale through its regional directorates. Urban water and sewage administrations in metropolitan municipalities are in charge of such works as constructing, operating, and maintaining water supply and treatment facilities, and are responsible for networks of industrial establishments within the boundaries of metropolitan municipalities.Ministry of Forestry protects mountainous and upper basins as the origin of streams, and the development of projects to protect such areas (i.e. utilization and protection of in-forest streams, lakes and reservoirs; afforestation; rangeland rehabilitation; erosion control, etc.).The Ministry conducts studies and surveys on problematic basins and areas as identified by DSI and other organizations and identifies relevant measures to control erosion. Projects that emerge as a result of these studies and surveys are then conveyed to other organizations and agencies that are legally authorized to introduce land and water protection measures.Turkey has 20.2 million hectares of forested land and 52,000 hectares of this total consists of in-forest streams, lakes, and water reservoirs. At present, there are 4,223 such water basins or catchments in forests. It is among the duties of the Ministry of Forestry to protect and develop such places, use them for tourism and sports purposes, promote water products and hatching, establish necessary facilities and premises; to reforest areas surrounding water resources and rehabilitate rangelands adjacent to these resources and to support the social-economic development of forest villagers.Issues related to land and soil conservation in farmlands within forests fall in the domain of the GDRS. It is the duty of the DSI to take measures to prevent gully erosion and ensure stabilization in this respect.In case periodic assessments made in active dams reveal a level of sedimentation beyond what was initially envisaged, efforts are made, in cooperation with other related organizations and agencies, to asses the level of erosion in the surroundings of the facility concerned and measures are taken to prevent it.The Ministry of Forestry has been merged with the Ministry of Environment in 2003 by Law No. 4856 and the new institution is now called the Ministry of Environment and Forestry. Monitoring-Supervising OrganizationsThere are a number of monitoring-supervising organizations performing under various legislative arrangements. Among them, the most important ones include MoE, which is directly related to activities in the water sector, the MoH, and DPT in charge of guiding investments at the macro level.Ministry of Environment, (MoE) 1991 The Ministry undertakes the basic tasks of protecting and rehabilitating the environment. It is among these tasks to introduce appropriate arrangements to prevent pollution in water resources and exercise control over related issues. Other duties of the Ministry include ensuring sanitation in receiving environments and discharging according to the Regulation on Controlling Water Pollution issued in 1988 under the Environmental Law No. 2872, implementing the Regulation on EIA and carrying out required coordination with regard to these issues. MoE has been merged with the Ministry of Forestry in 2003 by Law No. 4856 and the new institution is now called the Ministry of Environment and Forestry. At regional scales, the Ministry performs through its Provincial Directorates.Ministry of Health, 1936 Under Law No. 3017, the duty of ensuring sanitation in drinking water is given to the MOH. Moreover, Law No.1593 on General Hygiene assigns the Ministry the mandate to ensure public health. In 1984, the service domain of the Directorate of Environmental Health functioning under the Ministry was expanded. Water quality controls; physical, chemical and micro-biological analyses of water; assessment of chlorine; issuing licenses and permits for water use are all in the domain of this Directorate.Ministry of Agriculture and Rural Affairs According to Law No. 1380 on Water Products, this Ministry has the authority to control water resources where water products are produced along with discharges made to such waters. More specifically, the General Directorate for Protection and Control under the Ministry is in charge of conducting relevant controls in this area.Local GovernmentsThe Municipal Law of 1930 assigns 76 specific powers and duties to municipalities. This can be divided into service provision and regulatory powers. According to this law; a municipal administration can be established in localities of more than 2,000 inhabitants with a referendum. The major services which municipalities provide are:

- Water Supply & Sanitation
- Sewerage System & Maintenance
- Refuse Collection & Disposal
- Fire Protection
- Construction of Social Housing
- Social Facilities
- Rural Health Centers
- Road and Public Square

The regulatory duties of the municipalities are:

- Urban/Town planning and development
- Environmental Health and Pollution control
- Traffic Management
- Conservation of natural areas and historical sites

In spite of the municipalities having extensive duties stated by law, in practice the duties to which they give priority are mainly:

- Providing water supplies and sanitation
- Opening new roads which are urgently needed

- Building and maintaining sewerage systems

Due to rapid growth since 1960, many municipalities in Turkey are negatively affected by the growth of illegal housing areas, insufficiency in land market and infrastructure services such as water supply, sewage system, solid waste, and essential services including road and parks.Big cities in Turkey are governed by Metropolitan Municipalities, which have established their own specific regulations for water management. Although these regulations give them the authority to plan and implement water resources projects (like water supply dams), they still cannot perform these functions without the support of DSI so that, in practice, DSI does the planning and implementation and municipalities run the O&M functions. Non Governmental OrganizationsEnvironmental protection activities and public consciousness about the scarcity of water resources mostly seen in the last decade have led to the development of many NGOs operating at the national and regional level in the field of the environment in Turkey. The main national NGOs are actively involved in many water and environmental problems in order to create public awareness and to encourage public participation. They propose efficient solutions and act as pressure groups in the decision-making process.The 1996 UN Habitat II Conference started the main Turkish NGO movement and it was a turning point for civil society initiatives in Turkey. Fifteen thousand people from 165 countries attended the Conference. It was the first civil society initiative in Turkey that convened NGOs, the business community, and community-based organizations on the same platform. The devastating earthquakes of August 17, 1999 and November 12, 1999 in Turkey also reinforced the consciousness of civil society and changed the understanding of civil initiatives. The citizens who united in the rebuilding after the earthquakes have maintained their cooperative and constructive civic spirit. In recent years, there has been an increase in the number of NGOs such as foundations, associations, and citizens' initiatives engaged in subjects such as science, technology, research, democracy, environmental protection, etc. The main national NGOs of Turkey representing civil society in the environmental and water resources field are described below:The Society for the Protection of Nature (DHKD), was founded in 1975. The society works for the conservation of biological diversity and natural resources, encourages sustainable use of natural resources, increases public awareness of nature conservation, carries out projects aimed at protecting significant and threatened ecosystems and lobbies official institutions and agencies in support of these goals. It has 12,000 supporting members. The Society is an associate member of the World Wide Fund for Nature (WWF), Bird Life Partner of Turkey.The Environment and Culture Agencies Cooperation Association (CEKUL) aims to create a society that cooperates with associations that are sensitive to the environment and culture and have an understanding of ethics and an ideal of living in a clean environment. In addition, it aims at restoring the social and ecological balance that has been disrupted by natural disasters and accidents.The Environment Foundation of Turkey (TCV) was established in 1978. The Foundation promotes the environment through research, publication of books, newsletters, brochures and other information media, and creates public awareness. The TCV has been a member of the UNEP National Committee since May 1992.The Turkish Foundation for Combating Soil Erosion for Reforestation and Protection of Natural Habitats (TEMA) was founded in 1992. The chief aim of the foundation is to raise public awareness of several environmental issues posing great danger to Turkey's future. Land erosion, deforestation, loss of farmland productivity, and threats to biodiversity are their main concerns. TEMA develops and carries out model projects in rural development, rangeland rehabilitation, and reforestation. TEMA currently has 50,000 members and 288 volunteer representatives throughout the country.TEMA was established in 1992 with strong business community support. It currently has about 50,000 members and in 1997 operated on a budget of US$ 2 million. TEMA publishes a monthly bulletin on environmental issues and every two-years publishes an Environmental Profile of Turkey, which is now also available in English. It enjoys good contacts with the Ministry of Environment and Forestry and has been instrumental in shaping the new national environmental laws and regulations. It is the most influential of the national environmental NGOs[1,2,3,9,10,18,19,20,21,22,23,24].

5. CONCLUSION

Water is main element for water resources management. Major water resources agencies in Turkey, who make the decisions, have been and are still pretty slow in adapting DSS tools in actual water management practices. Since cooperation between research institutions and these agencies is rather weak, it has not been possible to convey research results to practice. Only very recently has there been the recognition of the significance of DSS tools by decision makers and governmental water agencies. Interestingly enough, within the last 2-3 years, these agencies have started to favor DSS tools; yet, they fail to use DSS effectively and sufficiently in decision-making since there is a strong need for capacity building and personnel training. Data availability is yet another factor that hinders proper use of DSS tools. Accordingly, the case remains that there has been practically no substantial application of DSS in decision-making in real world problems. The situation can be clearly observed, where major problems stem from lack of proper management practices. It is believed that the efficient use of DSS tools by the decision making agencies and provision of participatory management practices are required to alleviate the growing problems of the all basins in Turkey.

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ICSD
INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT
19 - 23 April 2017, Sarajevo

A Discussion on The Quantification Methodologies and Their Applicability in Turkey for Construction and Demolition Waste (C&D)

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Abstract

There is an increasing awareness about waste issues all over the world in parallel with the raising environmental consciousness. Different management strategies have been generated by the researchers according to the different waste types. Various studies reveal that construction industry constitutes an important part of environmental impacts and waste generation which increase day by day due to production of a large number of building construction. Construction and demolition (C&D) waste, as a component of Industrial Waste, is one of the most currently studied waste types in literature, and their quantification is a prerequisite for the implementation of successful waste management strategies. In accordance with the global conjuncture and also economic and social changes in Turkey, construction activities have accelerated especially in the last ten years. Thus, generating some waste management strategies for C&D waste has become necessary. There are, however, some difficulties to designate these strategies because of the lack of data related to the quantity of C&D waste. In literature, there are various methodologies at regional and project levels conducted by different researchers on quantifying C&D waste. This paper firstly presents an overview on the description of waste and waste types, waste quantification methodologies in literature and the current development about C&D waste in Turkey. And then it discusses the quantification methodologies and their applicability in Turkey.

Keywords: ***C&D Waste, Waste Quantification, Waste Management***

1. INTRODUCTION

As resource intensive industry, construction industry imposes great stress on the limited natural resources and generates great amount of Construction and Demolition (C&D) waste in most of the cities in both developed and developing countries and regions. Managing C&Dwaste in a sustainable way is a big issue for most of developing countries or even some developed countries [1]. As a developing country there are some obstacles causing managerial problems about waste in Turkey such as the lack of data related to the quantity of C&D waste. In accordance with the global conjuncture and also economic and social changes in Turkey, construction activities have accelerated especially in the last ten years. Thus, generating some waste management strategies for C&D waste has become necessary.The selection of appropriate quantification methodology is very important in order to set an effective waste management plan [2, 3]. Number of publications about this issue has increased recently (Fig. 1). This paper firstly presents an overview on the description of waste and waste types, waste quantification methodologies in literature and the current development about C&D waste in Turkey. And then it discusses the quantification methodologies and their applicability in Turkey.

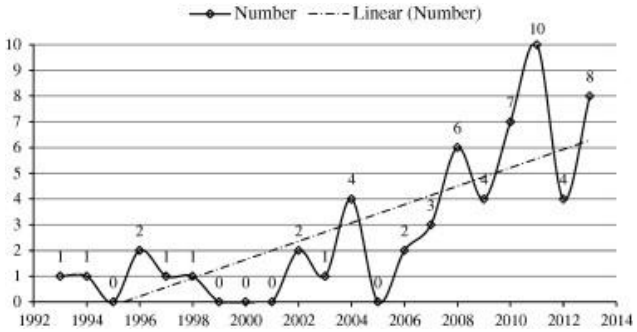

Figure 15. Trend of research interest on C&D waste quantification [2]

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2. WASTE AND WASTE TYPES

Waste is defined as 'any substance or object which the holder discards or intends or is required to discard' by European Union. Waste is a result from any consumption and production process, which is needed to be managed to reduce its amount, to avoid pollution, and public health problems and other environmental impacts. Waste is generated at all stages of human activities from the acquisition of raw materials, processing of raw materials into intermediate and to the final products, to the consumption of final products, etc. Waste generation is related to economic activities and flow of materials in a society. Waste may depend on different factors such as; time, location, income level, personal preferences etc. The character and quantity of waste generated in a region reflect the living standard and lifestyle of the region's inhabitants, but also of the abundance and type of the region's natural resources so there is generated different amounts and types of wastes by different countries and urban places. The modern society is characterized with great consumption rates of natural resources and generation high quantity of waste [4, 5, 6, 7]. Waste can be classified according to various features such as source, nature, physical properties, mechanical properties, chemical and elemental properties, biological / biodegradable and combustible properties. Physical properties cover waste density, moisture, content and calorific value. Chemical and elemental properties include carbon-nitrogen ratio, pH, chemical composition, presence of heavy metals, other hazardous and nonhazardous features. Combustion properties are related to heat of waste and its calorific value. Biological and biodegradable features are about microorganism cultures being in waste and how these cultures utilize waste materials to survive [8].

According their source, solid waste can be classified [8];

- Municipal Solid Waste (covers commercial and service waste)
- Industrial waste (includes a number of activities, like light and heavy manufacturing, construction and demolition activities etc.
- Medical waste
- Other wastes(not considered as municipal, industrial, or medical waste)

2.1 Construction and Demolition (C&D) Waste

C&D waste is generated regularly in urban areas during construction of new buildings, demolition of old structures and roadways, and maintenance of existing buildings [6]. Although there is no common description of C&D waste, there are a number of definitions done by different researchers and organizations, which are similar to each other. C&D waste was defined by Kofoworola and Gheewala [10] as the waste which arises from construction, renovation, and demolition activities [9]. Skoyles and Skoyles [11] classified building construction waste in two groups as the structure waste and the finishing waste [12]. According to EPA, C&D waste is "the materials consisting the debris generated during the construction, renovation, and demolition of buildings, roads, and bridges". EPA also describes C&D waste as bulky, heavy materials which include concrete, wood (from buildings), asphalt (from roads and roofing shingles), gypsum (the main component of drywall), metals, bricks, glass, plastics, salvaged building components (doors, windows, and plumbing fixtures), and trees, stumps, earth, and rock from clearing sites [13]. Pichtel describes C&D waste as the waste material which is produced during construction, renovation, or demolition of residential and non-residential buildings, roads and bridges. It also includes tree stumps, rocks, and soil which is created during Land-clearing activities [14]. Ministry of Industry Canada defines as "waste materials from the construction and demolition of roads, bridges and buildings such as wood, gypsum and metal." According to Hong Kong Environmental Protection Department, construction waste is "any substance, matter or thing which is generated as a result of construction work and abandoned whether or not it has been processed or stockpiled before being abandoned" [1]. During construction, renovation, and demolition activities, different types of wastes are generated according to their composition containing inert materials such as cement, bricks, asphalt, wood, metals (Table 1). During construction, demolition or renovation activities, wastes contaminated with hazardous materials such as asbestos can also be produced. Generally there is produced cleaner materials during construction activities than does demolition. The European Waste Catalogue (EWC) provides a comprehensive classification of C&D waste according to its compositions [6, 14].

Table 1. Typical Construction and Demolition Debris Constituents [15]

INGREDIENTS OF CONSTRUCTION AND DEMOLITION		
Primary Inert Fractions	**High Organic Based Fractions**	**Range of Composite Materials (may require special handling)**
Asphalt Brick Cinder block Concrete with rebar/wire mesh Concrete without steel reinforcing Masonite/slate Tile-ceramic Glass Dirt/earth Plastic sheet film Plastic pipe Porcelain, including bathroom fixtures Metal-ferrous Metal-nonferrous Electrical wiring Insulation-fiberglass Plastic buckets/containers	Ceiling tiles Corrugated shipping containers Insulation-treated cellulose Insulation-sheathing Pallets/spools/reels Pressboard/chipboard Roofing materials (e.g., roofing felt, asphalt shingles) Dimensional lumber & shapes (clean) Plywood, particleboard, oriented strandboard, etc.	Carpeting Carpet padding Gypsum wallboard (mainly gypsum with paper backing) Electrical fixtures (metal, light tubes/bulbs, ballasts) Electrical switches Rubber hosing/conduits Tires (some with wheels) Painted wood Pressure treated wood Wood composites

3. CONSTRUCTION AND DEMOLITION (C&D) WASTE QUANTIFICATION METHODOLOGIES

There are various methodologies on C&D waste Quantification used by different researchers. These methodologies were summarized into six major categories by Wu et al. They are Site Visit (SV), Generation Rate Calculation (GRC), Lifetime Analysis (LA), Classification System Accumulation (CSA), Variables Modeling (VM) and other methodologies. According to Wu et al., in SV methodology, Construction and Demolition sites are visited to collect realistic waste generation data and there are two main approaches as direct and indirect measurements. In direct measurement, the waste produced on sites is weightened or its volume is calculated. Indirect measurements are more practical than direct measurements because they require less amount of time and labor [2]. As direct measurement, Lau et al. [16], made an assumption according to the storage type of C&D waste. For example stockpiled waste was supposed as rectangular based pyramid, and its volume was calculated using the formula of the volume of rectangular based pyramid. As an example of indirect measurement, Kartam et al. [17] and Poon et al. [18] used truck load records to find the volume of C&D waste [2].GRC Methodology can be applied to estimate C&D waste generated in construction, demolition and renovation processes. It can be also implemented both regional and project level. In this methodology, the waste generation rate for a particular activity unit (such as kg/m^2, and m^3/m^2) is obtained. McBean and Fortin [19] used this methodology in their research to estimate regional C&D waste quantity from 1983 to 1990 in Waterloo in this research. The average C&D waste generation per capita was calculated and C&D waste generation amount was extrapolated by multiplying this amount by the population number [2].Yost and Halstead [20] made field observations of several construction projects to obtain waste generation rate of gypsum on site. They weighed the wasted gypsum on sites and collected the total area of the buildings. Total mass of the wasted gypsum were divided by total construction area to determine waste generation rate (kg/m^2). By examining 72 new construction project data, financial value per square metre ($/m2) was found. The wasted gypsum per financial value (kg/$) was calculated using financial value per square metre ($/m2). Lastly, when the financial value of new construction projects was known, it became possible to derive the wasted gypsum generation (kg) by timing generation rate per financial value (kg/$) [2]. Franklin Associates [15] and Bergsdal et al. [21] are the other researchers using GRC Methodology. According to Masudi et al., in Franklin Associates's study, to calculate total waste generation of the year (tons/year), total area (sqft) is multiplied by the average waste generation (lb/sqft) which were obtained from the empirical data (waste sampling) [22]. According to Wu et al., LA methodology is based on mass balance and usually used to quantify demolition waste. It is supposed that the constructed buildings will be demolished at the end of life cycle and become demolition waste. So it is accepted that the waste amount that will occur after the demolition process will be equal mass of the constructed structure. This method is applied in two ways as Building lifetime analysis and Material lifetime analysis. Building lifetime analysis was introduced by Poon [23]. In his research, Poon [23] were categorized the buildings into four groups according to their ages, which were named pre-war to 1945, 1946–1955, 1956–1960 and 1961–1965. Some scenarios were created defining the demolition percentage of each group. According to the most realistic scenario, after finding the generated waste volume per unit of building area and the material mass per unit of volume, demolition waste amount was calculated by GRC methodology. Cochran and Townsend [24] used construction material consumption in the whole country and construction material waste factors to quantify solid waste generated as a result of construction activities [2].According to Wu et al., CSA method is a widely used methodology which is developed based on GRC. It uses a classification system which enables to quantify different kind of materials. The outputs from this methodology supply more effective data to develop more proper management strategies due to the fact that each kind of waste material has different characteristic and requires a different handling. Classification system can be set up by using existing

systems such as regional project budget system or the European Waste List. For example Solis-Guzman et al. [25] established a classificationsystem depending on a Spanish project budget system which was organized in chapters and sub-chapters.In this methodology, the waste amount for the chapters and subchapters can be quantified by using SV and GRC. And after determining waste quantities for all items, total waste can be found by accumulating those all items [2].According to Wu et al., in VM methodology, there are a large number of variables in C&D waste generation such as economic indicators, construction areas, on-site working condition, etc. In this methodology, C&D waste generation is predicted by modeling which helps understanding the interrelationship between the variables and provides more systematic information to make decision. Wimalasena et al. [26] determined five categories of factors to estimate the waste generation for a construction activity. These are activity specific factors, labor and equipment related factors, material and storage related factors, site condition and weather related factors, and company policies. For quantifying the variables and establishing the correlations, it is suggested to make detailed site observations [2].In literature, there are also different methodologies or approaches for C&D waste quantification. For instance, C&D waste was estimated as a fixed percentage of the purchased materials by Hao et al. [27]. They assumed the waste generation rate as 10%. As a result, the total amount of construction waste could be easily calculated as 10% of the purchased quantities [2].

4. C&D WASTE IN TURKEY

There is no statistical data about C&D waste quantity in Turkey, but it is believed that current construction activities which put great impose on C&D waste generation may give an idea about C&D waste in Turkey.There are generally two main current types of building production which can be interpreted as the main sources of C&D waste generation in Turkey. The first type is new constructions caused by economic activities and population growth which creates a new building demand. Especially in the last decades, construction activities have accelerated and construction industry became the main engine of the whole economic activities in Turkey. According to Turkish Statistical Institute's building permit statistics, 36 187 021 m^2 new construction were built up in 2002 and this number has increased to 202 321 341 floor area (m^2) by 2016 [28]. The second type of building production is existing buildings which need to be demolished due to the unsatisfactory seismic performance which triggers urban renewal projects. According to Regulation of "Specification for Buildings to be built in Seismic Zones" published on March 6, 2007 in Official Gazette, numbered 26454 [29], Turkey is located in a high seismicity region (Figure 2). 66% of Turkey's land is in the first and second level earthquake zone and great amount of the population lives in this risky area which reflects nearly 71% of the population of the country [30]. These zones will create a large amount of C&D waste during the renewals. According to Republic of Turkey Ministry of Environment and Urbanization, it is estimated that there are about 19 million buildings in Turkey, and except 5 million of these buildings, which were constructed after the year 2000, the remaining 14 million houses should be examined in terms of seismic performance. It is also estimated that approximately 40% of the existing building stock's seismic performance is not satisfactory and has completed life time [31]. Considering the existing building stock's situation, it can be declared a great amount of the building stock must be transformed by urban renewal projects immediately due to high earthquake risk [30]. Thus, all these renovation and transformation activities including modifications are expected to increase C&D waste generation [32]. In parallel with this increase, setting effective waste management strategies has become more prominent day by day for Turkey. In Turkey, there was no regulation about C&D waste management until 2002. C&D wastes were disposed to various places in the city without any permission. To prevent this uncontrolled disposal, "Directive of Excavated Soil and Construction Debris Control" has been put into action by the cooperation of Istanbul Governorship and General Directorate of ISKI onFebruary 8, 2002, and C&D wastes were managed according to the provisions of this directive until March 18, 2004 [32, 34].Finally, "Regulation on the Control of Excavation, Construction and Demolition Wastes" which was prepared by the Republic of Turkey Ministry of Environment and Urbanization was published on March 18, 2004 in the Official Gazette, numbered 25406. Currently, C&D waste management activities are carried out in accordance with this regulation [35].

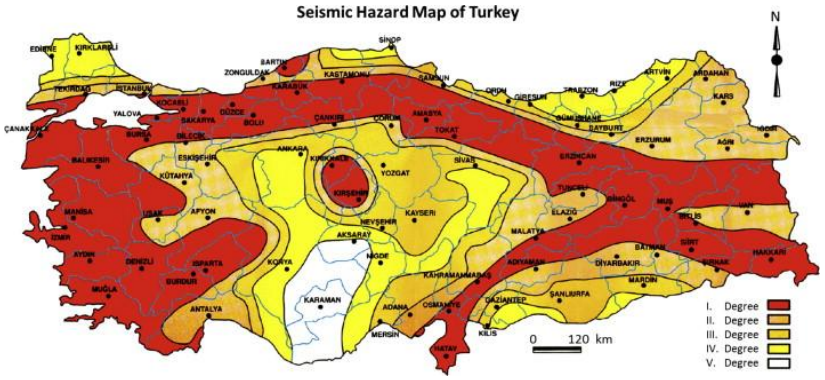

Figure 2. Seismic Hazard Map of Turkey [33]

The Regulation includes some obligatory general rules, technical and administrative details which should be adhered to primarily regarding the reduction of, along with the collection, temporary storage, moving, recycling, using and disposal of excavation, construction and demolition wastes [36]. According to regulation, C&D waste is classified in three groups as construction waste, excavation waste and demolition waste. Excavation Waste is defined as "Soil formed as a result of excavations and the other

activities carried out during the preparation stage of the site before construction." Construction Waste is defined as "Wastes generated during the construction of residential buildings, structures, bridges, roads, infrastructures and superstructures". Demolition Waste is defined as "Wastes generated during the repair, modification, renovation, demolition of residential buildings, structures, bridges, roads, infrastructures and superstructures or as a result of natural disaster" [35]. There are defined responsibilities and authorization in the Regulation as well. According to Arslan et al., the Regulation mentions that Metropolitan Municipalities are responsible to prepare plans for excavation, C&D waste management and similar actions. The municipalities are also responsible to operate all the recycling and storage areas. Site activities related with all kind of waste are controlled and managed by local government. Transportation and collection of C&D waste can be managed by private [32]. For instance, Istanbul Environmental Management, Industry and Trade Corporation(ISTAC) which was established as a municipal corporation in 1994 in Istanbul is a company focusing on waste management, recycling, and other facilities. According to ISTAC, million tons of excavation wastes are monthly generated in Istanbul with the effect of urban transformation activities [37].

5. CONCLUSION

In this paper, waste and waste types were first defined, and then a general overview on waste quantification methodologies in literature and developments about C&D waste in Turkey were presented. This review showed that C&D waste, as a component of Industrial Waste, is one of the most currently studied waste types in literature. Considering new constructions caused by construction-based economical activities and population growth and existing buildings which need to be demolished due to the unsatisfactory seismic performance, it can be foreseen that the amount of C&D waste in Turkey will continue to increase significantly. For this reason, generating successful waste management strategies will be more prominent day by day for Turkey. However, lack of data for C&D waste emerges as a major obstacle in the generation of sustainable management strategies. Therefore, quantifying C&D wastes should be the first action in order to apply these strategies, which requires to develop new approaches according to different variables needed for Turkey. Based on the literature review, some of the methodologies aforementioned, such as Site Visit, Generation Rate Calculation, Lifetime Analysis, Classification System Accumulation, Variables Modeling, or the others, can be applied for Turkey, but the advantages and disadvantages of these methodologies should be carefully taken into account to determine the appropriate one. It is believed that there is no best option for C&D waste quantification for Turkey. They should be analyzed and improved depending on different variables such as economic factors, on-site conditions, etc. In addition, developing new suggestions to improve existing Regulation and encouraging more research in C&D waste management area will contribute to lack of data.

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19 - 23 April 2017, Sarajevo

Sustainable Urban Development: A Case Study of Izmir

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Abstract

City population of Turkey has rapidly increased since 1950 due to immigration from country to town. This rapid urbanization is still continuing today. So, nowadays urban population rate is reached 90% of total population in Turkey. Because of rapid urbanization, cities have many problems such as squatter dwellings, noise, pollution, traffic and parking problem, and insufficient greenery and play areas. All these problems were discussed with regard to sustainability of cities. In this paper, Izmir which is the third biggest city of Turkey was evaluated in terms of sustainable urban development, and some proposals for Konak, which is the center town of Izmir, were made.

Keywords: Sustainability, Turkey, Izmir

1. INTRODUCTION

"Sustainable Development" has been mentioned in The United Nations Conference on the Human Environment which was held in Stockholm, Sweden in June of 1972, on first international level. And it was focused on capacity of environment, usage of sources, connected social-economic development with environment. [1]. But, the meaning of sustainable development in present-day is generally accepted definition from the Brundtland Report (Our Common Future) which was published from the World Commission on Environment and Development in 1987. As a report "sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" [2].As it is known, sustainable development has focused on preventing environmental problems due to economic and technologic development and protecting ecosystem and it is not new phenomenon. But, sustainable urban development is a relatively new phenomenon. Item 15 of Istanbul Declaration on Human Settlements (Habitat II) is referred "As we move into the twenty-first century, we offer a positive vision of sustainable human settlements, a sense of hope for our common future and an exhortation to join a truly worthwhile and engaging challenge, that of building together a world where everyone can live in a safe home with the promise of a decent life of dignity, good health, safety, happiness and hope". So, Summit of Habitat II is emphasized to importance of settlements which is enabling sustainable living. This concern is emerged sustainable urban development [3].There is no accepted definition of sustainable urbanization in the literature. For instance, Geenhuisan and Nijkamp (2009) defined "sustainable city is a city which is synchronized social-economic advantages with fears of environment and energy for due to sustainability alteration. Erturk (1996) defined as "sustainable city is better answer to human needs than present cities and it is not to prevent city systems which are created for needs of subsequent generations". Sustainability is related with city in Sustainable City 2000 (Rio de Janeiro) as "city land and area are continuing to serve for human needs, but when it has been done, doesn't limit to choices of present and subsequent generations and doesn't negative affect to city and it's around. As we said before, is not single definition of sustainable urban development, but we see all definition are mentioned social equality, sustainable economy and environment. In Turkey urban population had increased slowly up to 1950. After this date, urban population has rapidly increased due to immigration from the rural area to the urban area especially as a consequence of transformation of the rural areas in Turkey. This rapid urbanization is continuing at the present time [7]. While urban population rate of Turkey was 25% in 1950 it increased 53% in 1985. So, over half of Turkey's population have started to live in urban areas. As it is seen, urban population rate is reached 65% in 2000 and 70,5% in 2007 [8]. In 2016 urban population rate of Turkey was 92%. This high ratio is related to not only increase of urban population but also related to changing the number of 6360 law in Turkey. However, we can say today most of Turkish population is living in cities. Consequence of this rapid urbanization, cities have many problems such as dwellings, noise, pollution, traffic and parking problems, insufficient greenery and play areas in Turkey. Because of these negative conditions, the term of sustainable cities was became a significate current issue and discussed. In The Livable Places, Sustainable Environment section of The Tenth Development Plan was mentioned "problems of excessive and low quality growth, housing, traffic, security, infrastructure, social cohesion and environment in cities of Turkey maintain their importance". On the other hand, it was emphasized "one of the most important aspects of livable space phenomenon is the preservation of environmental quality, the adoption of a socio-economic and spatial development approach without compromising future generations' welfare and well-being". Also, the plan was mentioned to the conservation policies of environment "environmental sensitivity will increase with implementation such as reduce waste and emission in cities, energy, water and source productivity, recycle, to prevent noise and visual pollution and use eco-materials". In this paper, Izmir which is the third biggest city of Turkey is evaluated by sustainable urban development and some proposal for Konak which is the center town of Izmir.

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2. LOCATION OF RESEARCH AREA

Izmir is located on Aegean Sea, west part of Turkey. It is surrounded Madra Mountain in the north, Kusadasi Gulf in the south, Aegean Sea in the west and Aydin and Manisa provinces in the east. At the begging of settlement, Izmir was established east part of the Izmir gulf then was sprawled Kadifekale. At the end of 19th century the city was covered all of the gulf (Figure 1). Izmir has been attractive for settlement due to its appropriate geographic conditions like climate, fertile hinterland and harbor. So we can see first settlement in Izmir in the Neolithic to 6500 BC [10]. Consequences, Izmir has been consistently growing due to its geographic conditions. But this situation of Izmir brings to excessive population rate, squatter dwellings, pollution, traffic and parking problems etc.

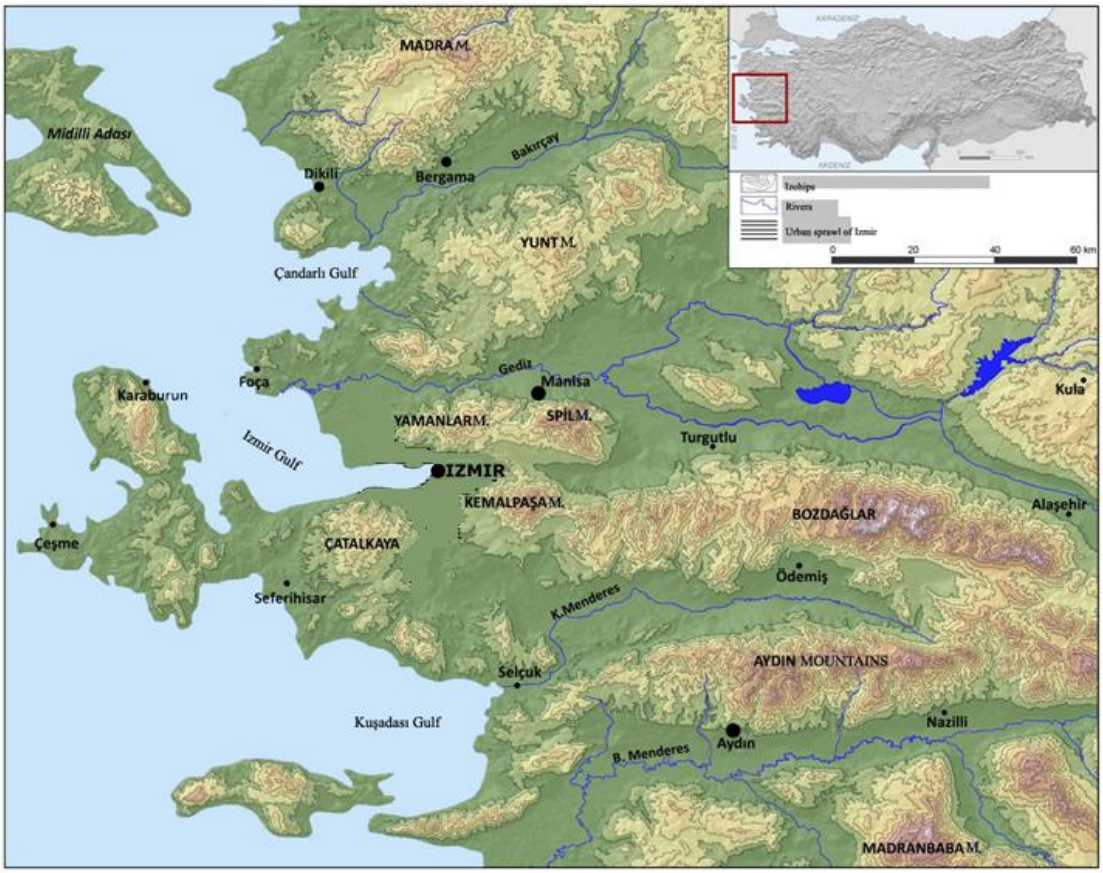

Figure 1. Location map of study area (It was changed from Sudas and Mutluer, 2013).

3. THE EFFECT OF URBANIZATION IN IZMIR

Green Paper which is one of the important document to determinant the European urban policy, is deal with three titles for environmental problems, such as;

1. Pollution; air, water, noise, soil, solid waste,
2. Degraded infrastructure; roads, buildings etc.
3. Degraded green area and natural life [11]. In this respect, unfortunately Izmir city has all of these problems.

In 1950th, Izmir has been attractive for immigration especially from east and southeast part of Turkey and started rapid urbanization. So, squattering process was beginning in Izmir. First squatter dwelling of Izmir was established north of Kadifekale (ancient Pagos mount) and west hill of Meles river valley due to its close situation to city and trade center. Unfortunately, squatter dwellings were increased an ongoing process. Thusly, squatters have been sprawled to Bayrakli, Samantepe, Ferahli, Istiklal, Bogazici, Gultepe neighborhoods with Ballikuyu and Gurcesme which are located on south hill of Meles river and Yesilyurt, Bozyaka, Altindag, Camdibi, Mersinli, Gumspala neighborhoods (Figure 2). After in 1960th Izmir city has been growth to Bornova, Narlidere, Guzelbahce, Karsiyaka, Buca and Cigli district and invaded fertile agricultural areas from houses and industrial plants on these part of city due to increasing population. Another problem of Izmir related to rapid and unplanned urbanization is air pollution. One of the main sources of air pollution of Izmir is Aliaga district. Aliaga which located on north part of Izmir has many heavy industrial plants such as refinery, iron steel plants, ship dismantling plants. So, air pollution moves from Aliaga to the city center with winds. In addition, air pollution originated from houses heating is increased especially in

winter time due to uses of poor coal. Besides, air pollution which comes from motor vehicles as important as to air pollution from industrial plants and houses. In recent years, motor vehicles were dramatically increased due to improve automotive industries, increase of population and income in Turkey. As of 2015, 1 198 279 motor vehicles are in Izmir and the number of vehicles increased by 6,11% compared to the previous year. Above %50 percent of vehicle is private car [12]. So, Izmir has heavy traffic and also parking problems. Consequences of heavy traffic, air pollution is reached to critical level also related to topographic and climate conditions of Izmir. Especially in winter and spring time inversion is occurred and increased air pollution in Izmir (Figure 3). Air pollution with related to heavy traffic in city center, 56-77% percentage of weekly emissions was from automobiles [13].
Urbanization is rapidly causing changes in societies. A large biodiversity loss is evidenced in cities due to their expansion. The threat is from both the disintegration of green spaces and changes in the natural areas and for these reasons ongoing urbanization can cause problems both within and outside cities. The current situation in many cities can be considered as a dichotomy between the expansion and the importance of green areas. Urban green spaces are vital for inhabitants. They provide many kinds of benefits such as recreation, different activities and aesthetic experiences. Furthermore, green areas are the only way for some people to experience nature in their day to day life.Children and often also parents with small children spend most of their time in the vicinity of their homes. Elderly people and people with impaired mobility are also dependent on their immediate environment [14]. Unfortunately, when we are examined of Izmir, we can see a little green space. For example, a ratio of 3,46 m^2 of green spaces per inhabitant. Despite, our construction law says it must be 10 m^2 per inhabitant at least.

Figure 2. A view of from squatters.

Figure 3. Especially in winter and spring time inversion is occurred and increased air pollution in Izmir.

4. URBAN DESIGN FOR SUSTAINABILITY

Council of Europe Conference of Ministers responsible for Spatial/Regional Planning held in Strasbourg, in 1994 was focused on four main issues related to urban and regional sustainability. These are;
1. Reduce energy consume and emission,
2. Reduce transformation of natural ecosystems or stop,
3. Reduce transformation of natural sources to the waste,
4. Creation of environmental awareness to the inhabitant [11]. So, in this section, we were discussed what we can do in Izmir for sustainable urban development.

In electricity consumption of Izmir, 8,7% of Turkey's total and 54,9% of Aegean Region, in 2012. Personal consumption were 4242 kWh which is higher than average of Turkey. Also, in 2012, industry has biggest ratio with 36%, respectively 34,5% of houses, 11,8% of business and 5% of public enterprise. In electricity generation of Izmir, the biggest ratio of gas (60,44%). However, Izmir has high potential of renewable energy such as solar, wind and geothermal. For example, Izmir has 8,17 hour/day average time for insolation. But, solar energy plants has only 0,19% of total electricity generation of Izmir. In Izmir, solar energy systems have been used to produce domestic hot water for many years. However, this is not a common situation ;in fact, amount of configuration of these systems tend to decrease because of popularity of usage of natural gas in recent years [15].Yet, global climate changing plans, nowadays, has become further to planning urban plan. In these plans, the emission of greenhouse gas of cities has the most priority. The first way of reducing the emission of greenhouse gas is increasing the usage of resource of renewable/clean energy to genarate energy. Within this context, in many parts of Izmir, having heat insulation and solar energy systems in started and planned urban transformation areas for desinging constructions is a good choice for beginnig. The more important is having systems which generate constructions own energy and having regulations related to this issue. Moreover, using lightings of parks and yards and using traffic lights manufactured with photovoltaic batteries are significant step to reduce the consumptions of energy in the cities and the emission of greenhouse gas regarding to generate this energy. The emission of greenhouse gas caused by the consumption of fuel and electricity in housing is 12.5% of the total emmission greenhouse gas in Izmir. In addition, adding this result with the proportion of the emmision caused by commercial building is become 20% of the total emission of construction sector, which is a high ratio [15]. Therefore, the efficiency applications of energy with respect to constructions of declining the emmision of greeenhouse gas have become more important. As is known, transportation is a significant fact of the emission of greenhouse gas. For instance, the proportion, which is equal to 19% of the total emission, of emission caused by transportation is the second biggest factor after the indusrty sector in Izmir. As it mentioned before, the amount of vehicle in Izmir is accelerating as time passes by. Therefore, the issues about air and noise pollution, traffic and parking in the city is accelerating, too. In this sense, the limitation of enterance of private vehicles in weekdays at a special time to

Konak which has heavy traffic due to being the center of the city and business, for instance, will be effective to reduce the issues related to heavy trafffic like regulations appied in many capital cities in Europe.The need for water in Izmir has been increased since the positive population growth. Sustainable stormater management in Izmir is a neccesity due to being one of regions which are affected by global warming and climate changes mostly and having less amount of water per capita which is equal to 483 m^3 in these days. Within the scope of sustainable stormwater management models solutions that commonly used in urban araeas: rain garden, permeable pavements, dry wells, grassed swales, infiltration trenchs, roof garden, rain barrels and cisterns [16]. So, we modeled rain and roof garden on the two areas for it can be an example (Figures 4, 5). These practices can be successful in diffrent places of Izmir. Hence, municipalities' being as a rol model and the support of municipality to people will be additive. As an important criteria of sustanibility such as collect to waste for recycle from their source. Most materials have a life cycle that is potentially near-circuler; that is, they can be reused, recycled, or repurposed in varius ways so that few of these resources are wasted after every human use [17]. Unfortunately, only a little proportion which is the 2,5% of domestic solid waste is recycled according to data off Izmir in 2011. However, the 35,65% of components of waste collected in 2011 have consisted of recyclable waste [15]. Therefore, operations related to recycling made by municipality and movements to raise awareness of people must be started (for example, the increment in the amount of recycle bins, the prepation of kind of information panels).

5. CONCLUTION

Izmir which is the third biggest city of Turkey have many problem related with rapid urbanization. But, fortunately it has got many potentials for sustainable development such as renewable energy sources. So, it needs only to encourage for usage its potentials and educate to inhabitant.

Figure 4. A sample for roof garden.

Figure 5. A sample for rain garden.

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