

DESTROYED BUILDINGS IN CONSEQUENCE OF THE TERROR IN TURKIYE AND THE WAR IN SYRIA IN THE LAST 5 YEARS AND THE POSSIBILITIES OF RECYCLING THEM AS CONSTRUCTION WASTES

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Abstract

The most effective way to protect the environment and preventing it from pollution is saving the nonrenewable natural resources. It is possible to reduce both outputs and the cost of the contaminations by recycling. The debris usually ensue from the fire and earthquake disasters, wars, amendments and the decisions of the authorities about the urban transformation projects. The war in Syria and terror in Turkey environment, is the major reason for the building destroys in the last 5 years. In this fieldwork have been searched; the dimension of the ruined buildings as consequences of the war and terror that have broken out after 2011 in Syria and near Turkiye and the issues about what can be done for construction waste management.

Key words: recycling, construction waste management, textiles

Introduction

Due to Worldbank report globally, 54% of the population lives in urban areas today. This trend is expected to continue. More than 80% of global GDP generated in cities. Urbanization can contribute to sustainable growth if managed well by increasing productivity, allowing innovation and new ideas to emerge. However, the speed and scale of urbanization brings challenges, including meeting accelerated demand for affordable housing, well-connected transport systems and other infrastructure, basic services as well as jobs, particularly for the nearly 1 billion urban poor who live in informal settlements to be near opportunities. As cities develop, their exposure to climate and disaster risk also increases. Almost half a billion urban residents live in coastal areas, increasing their vulnerability to storm surges and sea level rise (<http://www.worldbank.org/en/topic/urbandevelopment/overview#1>).

The annual generation of construction waste takes big areas in both developed and developing countries. The environmental impacts caused by disposal of this waste stream are cause of soil pollution, air pollution, water pollution, etc. That's why is very important to develop strategies for managing construction waste in countries like Turkey and Syria. One solution is the green building concept which is becoming more and more popular with the public; hence the building developers are eager to obtain green building certifications to increase the added value of buildings.

A study was done about green building rating system (GBRS), which is a tool for evaluating whether a particular building is green or not, and corresponding rank is given according to the detailed assessment requirements (Wu et al, 2016). This study examines five selected GBRS's worldwide and proposes a comparative analysis, attempting to give a better understanding of measures that assist in improving construction waste management. The research findings reveal that of the five rating systems studied, the highest relative significance index of waste management is given to Evaluation Standard for Green Building, while the lowest belongs to Green Building Index. In relation to the 3Rs principle (reduce, reuse and recycle), Evaluation Standard for Green Building and Green Globes focus more on the reduce principle, while the other three systems propose waste management measures that largely based on the reuse and recycle principles.

Building materials

Materials which mostly are used in building industry are: cement, sand, wood, steel, perlite, gypsum plaster, stone, ceramic, marble, glass, technical textiles, plastic and brick. After disasters this kind of materials can be collected mostly together and is very difficult to separate them on one type. Wooden, steel, plastic and big stone particles can be separated from building waste but cement, gypsum and bricks are difficult to separate because they are found stucked and mixed together.

Despite of cement, sand, steel and brick are main materials for building, the textile goods have been used in building for years. They are frequently used in the places like airports, stadiums, fitness centers, fairs and showrooms, arsenals and industrial stores. Some building examples with technical textiles are shown in Picture 1, Picture 2 and Picture 3. There are many advantages of using these materials in buildings. A sheath of fabric is about 1/30 of the weight of brick, steel or concrete (Can, 2008). While some textiles use water vapor permeable membrane to protect the walls against humidity, nonwoven fabrics and glazings are majorly used for the roofing. Fibers and textiles have important roles in isolation of buildings and equipment as well. Fiberglasses are being used instead of asbestos fibers now. (Ucar, S., 2006)



Picture 1. Finland international airport (Can, 2008).



Picture 2. San Diego Culture Centre (Can, 2008).

The Reasons of Building Demolition and Situation in Turkiye and Cyria

Among the major reasons for demolishing buildings with the furniture and the other goods inside and become destroyed; natural disasters like fires and earthquakes, bombing as a consequence of the wars and terroristic actions, destruction of the buildings that has a weak infrastructure endurance by the authorities can be regarded as evidences.

For instance, in the past, urban problems were solved with solutions like the planning of new urban sites. However, the limited new sites likely to be opened for settlement, the consumption of these sites as they were opened for settlement, and the problems experienced as regards the need for new settlement areas to develop in the city brought to the agenda the requirement of providing the city with the existing depressions again through planned

interventions, in other words, urban transformation (Karadağ and Mirioglu, 2011).

In our region divisional, social protests and armed conflicts have been living from the year of 2010 within the Arab Spring. Refugee rush started to Turkey after the defection demand of Syrians who run away from the conflicts on April 2011 from our contiguous frontier country Syria.

In speech of The Ministry of Interior, President of Migration Administration Atilla Toros says that 2.255.299 recorded Syrians are in Turkey as of January 2016

(<http://www.posta.com.tr/turkiye/HaberDetay/Iste-Turkiye-deki-son-kayitli-Suriyeli-sayisi-Ocak-2016-.htm?ArticleID=321871>).



Picture 3 Denizli Synthetic Ace Pist

Republic OF Turkey Prime Minister's The Disaster and Emergency Management Authority (AFAD) conducted a questionnaire study with the aim of learning the refugees profiles at the year of 2013. In the survey according to the questionnaire that was conducted about the Syrian refugees' houses in their country, Syria, it is stated that people who live in temporary sheltering places, in 1420 houses, %32.8 out of 7.860 people said their houses completely damaged/demolished; %17.1 said mostly damaged. People who live in 1.160 houses out of the temporary sheltering places, %28.7 out of 7.320 said their houses completely damaged/demolished, %14.9 said mostly damaged. It can be inferred if it is estimated that "completely damaged/demolished" and

“mostly damaged” houses are not appropriate for living in; approximately half of the people’ who live in shelters (%49.9) and %43.6 of refugees’ who live out of the shelters houses in Syria are completely demolished or mostly damaged thus the houses became uninhabitable. (2)

According to the report of Republic OF Turkey Prime Minister’s The Disaster and Emergency Management Authority (AFAD) Refugees who live in the shelter places, per dwelling house the number of the people is 5.6, the refugees who live out of the shelter places per dwelling house number of people is 8.6. Thus it can be taught that per dwelling house the Syrian refugee number is 7 in average. In the light of these inputs when the number of people is taught 7 per dwelling house, there is a need of the dwelling house for 2 million 255 thousands 299 recorded Syrian refugees approximately 322.186. In accordance with the inputs of AFAD’s questionnaire if the Syrian refugees’, who live in Turkey, damaged or demolished houses number is accepted approximately %46, it can be calculated as $322.186 * 0.46 = 148.205$ dwelling house number. According to TV Chanel’s news for last 5 years more than 10 million cyrian people left Cyria and refuge to nearest country like Jordan, Turkiye and to EU . That means that damaged buildings in Cyria can be over million.

The terror in South East Turkiye in last year causes not only thousands of people to left their homes and emigrate to nearest cities but to damage or destroy houses which number is not yet known.

Recycling and Management of Construction Wastes

Although resolving the wastes in their own sources and bringing the recyclable ones to the economy underlies the waste management politics in our country resolving and recycling activities is at a low ebb.

With the increment of the recycled wastes in the production inputs, economic activities influence over the natural sources and the influence of the wastes over the environment reduces. (Kactioğlu and Sengul, 2010).

Resolving the wastes after the buildings demolish for many reason is very important to reduce the environmental pollution and for contribution to economy.

Using the Building Wastes in Industry

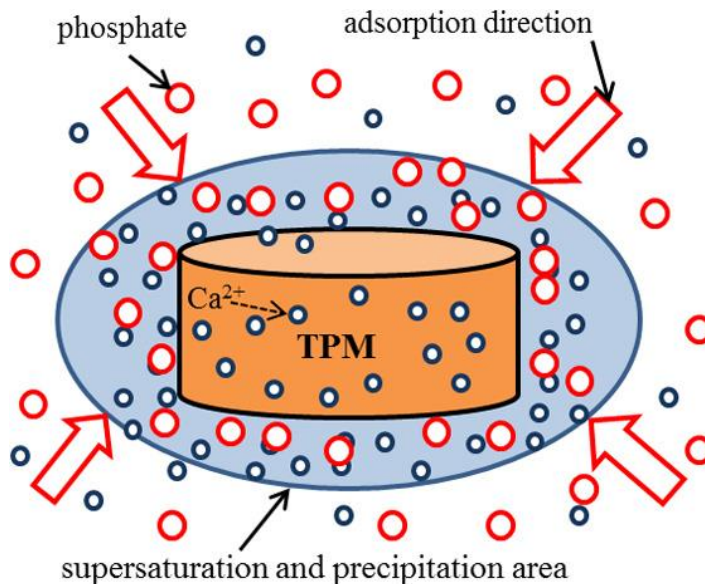
One of the waste materials that are obtained from the buildings is plastics. These are the materials which are used for the floor and for furniture and garments textiles are named like PET, PES.

Rebeiz and Fowler (1994) and their friends searched the flexibility feature of polyester reinforcement which is produced from the PET.

Hon and Buhion (1994) searched penetrability of PET and HDPE at variety admixture rate in composite materials. As a result they revealed that PET and HDPE are uniformed in composite, have penetrability as mechanical and are mouldable.

Masaiko (2005), confirmed that with recycling the PET bottle by mechanic recycle method it is possible to obtain 1 kg of PET dunnage out of 1.246 kg bundle of PET bottle and by chemical recycle method it is possible to obtain 1 kg PET polymer out of 1.133 kg of bundle of PET bottle. Thus the natural sources which are used for producing 1 kg of PET are not consumed and the packing wastes after usage are used so environmental pollution is not occurred.

A project of Prof. Veena Sahajwalla from the University of New South Wales in Australia revealed that plastics which expose carbon at a high degree can be used for enhancing the endurance of steel. It is hoped that there will be a huge reduction of plastic wastes after the project is implemented. (Anonim, 2007)



Sheme1. Production of phosphate recovered tablet precipitation material (TPM) developed from used white cement (Yang at all, 2016)

In laboratory examples are done different works to do new materials from solid building waste. In a study (Yang at all, 2016), phosphate was precipitated and recovered through a tablet precipitation material (TPM) which was developed from used white cement (see Sheme1). The development of TPM provided an alternative for the management of building waste. The

results showed that TPM could effectively recover phosphate from aqueous solution; the final precipitates were consisted of hydroxyapatite and brushite.

PET bottles are commonly used in beverage industry and can be reused after physical and chemical recycling processes. Usage areas of recycled PET have been developed rapidly. Although recycled PET is used in plastic industry, composite industry also provides usage alternatives of recycled PET. Textile is a suitable sector for recycling of some plastics made of polymers too. In this study, the recycling technologies and applications of waste PET bottles have been investigated and scientific works in this area have been summarized (Tayyar and Ustun, 2010).

Yulong Eco-Materials Limited, an eco-friendly building products and construction waste management company, announced that the Department of Transportation of Henan Province, China gave final approval for the Company's provincial technical code established to govern the use of recycled construction waste materials in the production of roadbed – a road's foundation. Mr. Yulong Zhu, Yulong's CEO, noted, that they have received positive feedback from all road and highway construction companies they are negotiating with, and believes that they can sell all of their current recycled waste inventory before 2016 fiscal year-end. They estimate that revenue generated from the sale of the recycled construction waste in fiscal 2016 will contribute more than \$ 5 million to their top line, in addition to revenue we are already generating from the hauling and recycling of construction waste (Business Wire , 2016).

Conclusion

Many of the home textiles and garment textiles mix among the debris after the war based debris. Addition to the information above about the PET and PES, they can be also used in producing of textile materials like blankets and floor textiles after the resolving the materials (i.e. the cotton) in the recycle facilities.

The activities about the resolving the solid wastes in Turkey are run by the conglomerates which focus on the domestic wastes in the big cities. On the other hand there are long areas of the building wastes near big cities. It is possible to use them in sealant of the potholes which occur while modifications of sewer systems are in progress. For example on the work of infrastructure sewer system in Denizli they use rocks. It will be useful to evaluate this kind of possibilities in such situations for economy and reducing the waste areas by using building wastes. The furniture or the floor materials which can be found in the buildings might be converted into the raw materials used in the furniture industry and building insulation.

Because of continuing war situation in Cyria it is very difficult to suggest

solution for management of building wastes. The problems of this area can be solved with government projects and international supports for rebuilding of damaged cities and recycling construction wastes will continue to be problem for Cyria for non known period of time in the future.

References

Hon, D.N.S. and Buhion, C.J. 1994. Processability and compatibility of polyethylene terephthalate and highdensity polyethylene from post consumer wastes. *Journal of Thermoplastic Composite Materials*. V.7, p. 4.

Karadağ, A., Mirioğlu, G., 2011, Geographical Assessments On Urban Transformation Politics And Projects In Turkey: Case Of Izmir, *Aegean Geographical Journal*, 20/2, 41-57, Turkey

Masaiko, H., 2005, LCA as A Component of Configuration Engine for KIH.

Rebeiz, K.S. and Fowler, D.W. 1994. Flexural properties of reinforced polyester concrete made with recycled PET, *Journal of Reinforced Plastics and Composites*, V.13, p. 895

Tayyar, A.E., Ustun, S., 2010, Usage of Recycled PET , Pamukkale Üniversitesi, *Mühendislik Bilimleri Dergisi*, Cilt 16, Sayı 1, p. 53-62

Ucar, S., 2006, Teknik/Akıllı Tekstiller ve Tasarımda Kullanımları, Yüksek Lisans Tezi, Mimar Sinan Güzel Sanatlar Üniversitesi, Sosyal Bilimler Enstitüsü, Tekstil ve Moda Tasarımı Ana Sanat Dalı, Tekstil ve Moda Tasarımı Programı, s.168 – 184, İstanbul

Wu, Z., Shen, L., Yu, A. T.W., Zhang, X., 2016, A comparative analysis of waste management requirements between five green building rating systems for new residential buildings, *Journal of Cleaner Production*, Part 1, Vol. 112, p.895-902.

www.teknolojikarastirmalar.com

Can, O., 2008, Endüstride Kullanılan Teknik Tekstiller Üzerine Bir Arastırma, *Tekstil Teknolojileri Elektronik Dergisi*, (3) p.31 -43,

https://www.afad.gov.tr/Dokuman/TR/60-2013123015491-syrian-refugees-in-turkey-2013_baski_30.12.2013_tr.pdf

www.elsevier.com/locate/cej

Yang,S., Jin,P., Wang, X. , Zhang,Q., Che,X., 2016 Phosphate recovery through adsorption assisted precipitation using novel precipitation material developed from building waste: Behavior and mechanism, *Chemical Engineering Journal*, V.292, p.246–254,

<http://www.businesswire.com/news/home/20160107005648/en/>

Yulong Receives Final Approval of Technical Code by Henan Authorities for Using Recycled Construction Waste to Build Roadbed : Yulong Eco-Materials Limited, Business Wire (English), 07/01/2016

<http://www.worldbank.org/en/topic/urbandevelopment/overview#1>;
Last Updated: Apr 04, 2016

<http://www.posta.com.tr/turkiye/HaberDetay/Iste-Turkiye-deki-son-kayitli-Suriyeli-sayisi-Ocak-2016-.htm?ArticleID=321871>