



ECOLOGIC MATERIALS USED IN FURNITURE DESIGN

Emine YÜKSEL^{1*}

¹Interior Architecture and Environment Design Fine Arts Faculty, Kirikkale University, Turkey
emine.yuksel@kku.edu.tr

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*Corresponding author

Abstract

As like in all design branches, ecological materials used in furniture design are becoming very important. This is because of the fact that, natural resources are limited, whereas human wants are unlimited in our world. For this reason, designs made of ecological materials are becoming very interesting nowadays. The common characteristics of these designs comprise the most environment friendly, sustainable, the least distorting effect on environment and the most economical usage. The most important characteristics of these ecological materials are that they are renewable, recyclable, free from addicted materials, and least distortive effect on environment. The application of these materials provides both simplicity and figuration. In addition to these using ecological materials gives shapes to the furniture and usage. This paper covers those materials used in furniture design and the applications, undertaken by the furniture-producing firms in Turkey. As a research method, firstly I classify various ecological materials used as an input in the production process. Secondly, some researches undertaken in the ecological design field will be analyzed. Lastly, activities of the firms producing furniture made of ecological materials. In the conclusion section a general evaluation will be made.

Keywords: Ecological Materials, Furniture, Design

MOBİLYA TASARIMINDA KULLANILAN EKOLOJİK MALZEMELER

Özet

Son yıllarda tüm tasarım dallarında olduğu gibi, mobilya tasarımında kullanılan ekolojik malzemelerle yapılan tasarımlar önem kazanmaktadır. Bunun nedeni, dünyamızda ki doğal kaynakların sınırlı, buna karşın insan ihtiyaçlarının sınırsız olmasından kaynaklanmaktadır. Bu nedenle, ekolojik malzemeden yapılan tasarımlar günümüzde oldukça ilgi çekmektedir. Bu tasarımların ortak özellikleri arasında çevre dostu, sürdürülebilir, çevre üzerinde en az zarar veren etkiye sahip olması ve en ekonomik kullanımlı olmaları vardır. Ekolojik malzemelerin diğer özellikleri ise yenilenebilir, geri dönüşümlü, katkı maddesi içermemesi ve çevre üzerinde en az bozucu etkisinin olmamasıdır. Bu malzemelerin kullanılması hem yeni biçimlendirme olanaklarını hem de kullanım kolaylığını sağlamamaktadır. Bu makale mobilya tasarımında kullanılan ekolojik malzeme ile Türkiye’de mobilya üreten firmaların uygulamalarını kapsamaktadır. Araştırma yöntemi olarak, önce üretim sürecinde kullanılan çeşitli ekolojik malzemeler sınıflandırılmaktadır. İkinci olarak, ekolojik tasarım konusunda yapılan araştırmalar analiz edilecektir. Son olarak ise, ekolojik malzemeden mobilya üreten firmaların aktiviteleri ele alınmaktadır. Sonuç bölümünde ise genel bir değerlendirme yapılacaktır.

Anahtar Kelimeler: Ekolojik Malzeme, Mobilya, Tasarım

1 Introduction

In this study, the ecological materials used in furniture will be mentioned. Those factors contributing to the environmental problems such as global warming, lack of resources, energy problem, pollution, population; resulted in the environmental-friendly design approach has occurred. When we search for the solutions for environmental problems, it can be seen that they started at the beginning of the century, which is being more popular in our world. In today's world, this can be gathered under the title of 'ecological design' and the materials, which are used for designing, is called ecological materials. The approach of ecological design foresees the use of naturally harmless materials' to meet the conscious consumption motivations of and considers the improvement of new materials instead of using harmful chemicals in furniture production. Additionally, today; materials, which encounter the needs of the consumption of the society must be easily recycled. Related to this topic, in Nathan Stegal's article about designing philosophy, it has been stated that the plan for controlling the source wholly and extensively is more complicated and it

requires some analyzing in terms of how different materials are toxic in their process of production, how the materials are obtained and it requires some other topics which have different arguments within themselves. "Ecological design philosophy's basis is certain: to turn each material of a product into a circle or to turn a closed-circle into a technological one; the designers should carry out their own design from birth to birth" [1].

Related to this topic, Smaranda Bica, Liliana Roşiu and Radu Radoslav clarified the borders of an ecological material in their study named as 'What Characteristics Define Ecological Building Materials'. In that study, "firstly ecological material has been defined and what characteristics of ecological materials should have been stated. In its conclusion part it was stated as: 'New ideas for ecological materials are emerging at a high rate. The topic of this paper was focused on one single traditional, local, available, inexpensive, healthy material. But this very old material can be used in new, innovative forms' [2].

On the other hand, Zhang Qiumei, Zhang Weimei and Wang Gongming discussed about the ecological materials used in furniture design in their 'Ecological Design and Material

Election for Furniture under the Philosophy of Green Manufacturing'. In this study, it has been concluded as: The ecological design for furniture products of green manufacturing examine the whole life cycle of the products from the view of sustainable development. The basis for furniture green manufacturing, the green materials is selected in line with a completely new idea and thinking compared to the traditional one. The rebuilt design for green-made furniture will help to realize ecology and sustainable development, especially for the lowest life-cycle cost of furniture material, and an effective method for circular economy in the furniture industry [3].

Zhao Jie and Zhang Zhong-feng defined the strategies of the materials according to ecological design philosophy in their study 'Analysis of Furniture Design Strategy Based on Ecological Aesthetics Conception'. In its conclusion part, they stated as: its aim is to enhance the ecological property and aesthetic value of furniture. First of all the selection of material should meet the original ecological material, as well as let viewers and users experience the beauty of nature, respect the intrinsic value of nature, and can reflect profoundly. Secondly, furniture modeling not only is a simple use of natural elements, but furniture functionality and appearance make the person generate spiritual resonance of ecological protection. Furthermore, furniture cultural function and spiritual function while own the basic using function [4].

H. Umut Karılı has classified how furniture should be like in terms of ecological basis as 'simple, functional, stretchy and long-lasting' in his article named 'Ecological Approach in Furniture Design.' In the conclusion part, he described it as 'the aim of ecological furniture design is to use sources, materials and energy the least, affect the environment from the beginning of its production to its end the least, to produce materials which need easy and simple care [5].

In the second part of the following study, the methods and the procedure are explained. In the third part, the materials that are used in furniture design and ecological materials' description is classified. The companies in other countries and in our country that produce ecological materials are compared in the fourth part. In the conclusion part, the study's general assessment is given place.

1.1 Ecological Material

The term, 'Ecology', has been described as 'a branch of science which observes the relations between each other and the environment together or separately in Big Turkish Dictionary [6]. According to another description, it is described as 'An eco-materials is one that has a minimal impact on environment but offers maximum performance for required design task. Eco-materials are easily reintroduced into cycles. Eco-materials from the biosphere are recycled by nature and Eco-materials from the techno sphere are recycled by nature and Eco-materials from the techno sphere are recycled by man-made processes' [7].

The most notable feature of an ecological material is being easily recycled. The expectation of showing good performances of the ecological materials is not a possible improvement yet. The reason of this is that they are just at the stage of improving. Another feature of these materials is that they can contribute to the conscious of consumption, as they are the reporters of the designs, which look for new way of shaping.

Ecological design is a new design process in material and design field. The roots are based on some wood-like materials which was used at the beginning of the century to take the real wood's place as well as the use of recycled plastics and paper that were looking for solution in terms of a new way of designing and

different kind of material usage. At the beginning of 1990s, it continued its growth as a sustainable approach. Because of the negative effects of the materials on people and environment, the new materials had to be produced. The ecological material and improved producing techniques had to be used for the solution. In our world, the role of the ecological design has become more important. The ecological materials are mostly used one that produce solution for the environmental problems.

The common features of these materials are being recycling, renewed, and produced with a little energy, having least additive materials. The designs, which were made with an idea of improved different materials at the beginning of the century led to new searches for materials', producing place and new improvements in shaping techniques. The general features of ecological materials can be ordered as:

- Harmless for human health and comfort
- Generated with the least energy
- Being easily recycled and renewed
- To be economical
- Without radioactive material [8].

Some harmful materials used in furniture design can affect human health badly. The most harmful materials are stated below. When these kind of materials are breathed, they can occur some health problems such as asthma, allergy.

- Formaldehydes
- Solvents
- Wood preservatives
- The other additives and radioactive materials.

2 Materials and Methods

This article concerns about those ecological materials used in furniture design. Ecological materials are the common names of the recently developed materials. Due to their detrimental effect of the traditional materials used in furniture industry on the health, and limited amount of natural resources designer are seeking for developing new materials, most of which ecological. To be an ecological material, its main characteristics must be recycling. Since, ecological materials are produced from mixture of more than one object, their detrimental effect on human health need to be reduced as much as possible.

This paper includes those materials that comply with the sustainability approach of the furniture design, which are becoming very important nowadays. For this reason I give some examples of this type of materials that satisfy sustainability of the resources. I also consider those studies undertaken by related institutions, trade associations, and export and import firms dealing with furniture business, both in Turkey and member countries of the European Countries. I also included my observations on the International and national fair that I have participated.

2.1.1 Content of Research and Method Used

The content of the research is limited to the ecological materials used in furniture design with some examples. I firstly try to determine the materials used in production of the ecological furniture. Secondly, I try to define the ecological materials and those materials complying with the definition. Considering the fact that there are too many types of ecological materials, and possibility of their usage in many areas, I limit my study to cover those materials used mainly in furniture production. I also considered main characteristics of these materials that differ from others and the areas in which they are mostly used. In addition to these, the reason for the development of this type of material used in furniture production is explained and their

classification with respect to their group is made. The formation of ecological materials are explained through some examples. Lastly, furniture made from ecological materials are also included in my paper. Since furniture design is based on ecological materials is a new developing area in Turkey, I employed some research findings of related public institutions, who collected data on the subject matter. In doing so, written and electronic sources are used and observations on domestic and international fairs were also considered.

3 Findings

3.1 Ecological Materials Used in Furniture Design

In the process of furniture production too many types of materials such as wood and it's by products, plastics, glass and metals are used. However, in producing these materials those substance like melamine, formaldehyde, landform and resin have detrimental effects on human health. Whereas, ecological materials can be produced by the less energy consumption, and they are easily recyclable and environment friendly that satisfies the needs of today's society. Beside these, the period of recycling and renewability of ecological materials are shorter than other materials. However, as to sustainability of production of ecological materials are concern, the following conditions need to be met.

- A material must be produced as a substance,
- It should be recyclable,
- It must be renewable

And, ecological materials can be classified as wooden rooted, biological, timber fiber and plaque.

3.1.1 Wooden Rooted Materials

3.1.1.1 Timbers and Boards

Wood is an indispensable material in furniture design, because of its natural beauty. Those materials containing varnish and glue have some detrimental effect on human health, and they are banned in developed countries especially for the kid furniture. Taking measures like forbidding some materials, in order to protect the public interest, resulted in increasing demand for the wooden materials.

In production process of ecological materials bambu, palm tree, and wooden stocks are also preferred. However, these materials are subject to some surface improvements. Some other wooden materials such as oak, balsa and pine trees are also under consideration in producing ecological materials. Among them bambu is the one that can be easily put into production process. Ecological materials made of bambu are provided from Far East countries and China. These imported materials from the Eastern countries are very suitable to the garden furniture.



Figure 1: Furniture Samples made of wood and board

3.1.1.2 Bamboo and Rattan

Bamboo and Rattan are the materials extensively used in the production of ecological materials. We can outline the basic characteristics of the bamboo as follows;

- production of it is sustainable,
- it is an environment friendly material,
- it is the least heaviest material in the nature
- it is easily grown,
- it can be easily decomposed
- can be used in many ways
- cost of the production is the lowest
- it is renewable

Furniture made of bamboo can be used in interior and exterior spaces. It's long, thin and flexible characteristics enable the interior designers to give them many shapes.

Another kind of bamboo is rattan, which is also preferred to be used as an ecological material, owing to its easily knitting, firm, flexible, light and enduring characteristics.

3.1.2 Fibres

3.1.2.1 Tapes

There are many types of wooden materials used in the production of furniture designs and furniture products. Since wooden materials very expensive, the use of tapes in furniture production would be very economical. The tapes of the wooden timbers are cut in strips, and they are united in culvilinear forms. As an substitute to wooden materials these tapes are preferred in forming the surfaces of the furniture.



Figure 2: Furniture Samples made of tape wood Materials

3.1.3 Composite Materials

Composite materials are made of the mixture of byproducts of the recycling woods, plastics and metals. The mixture of byproducts of these materials are stirred with resin. The composite materials can be easily given preferred shape to the furniture.



Figure 3: Furniture Samples made of composite wood and with old furniture pieces

3.1.4 Recycled Paper

Although the recycling of the paper in nature is very hard, however it could be easily recycled in industry. For this reason it is one of the most important material which is under consideration. The blocks of newspapers and cartons are mostly used in furniture production as a body of the furniture in recent years. Since its capacity to carry is very weak, they are reinforced through adherence in interlaced form. After implementing folding and twisting techniques, they can be given desired forms in producing ecological matters.



Figure 5: Furniture Samples made of Recycled Paper

3.1.4.1 Honeycomb

These materials were used firstly in internal and external spaces of the collections of Museum of Momo in New York.



Figure 6: Todd Macallen and Stephanie Forsyth for Molo 2003 Canada (retrived from:Barbeo S., Cozzo B.,2012p:92)

3.1.5 Bio Plants - Biopolymers

Biology rooted materials are the recycling ones, that originate from herbal fibres, animals and microorganisms. These materials are basically biological rooted and they are produced in bio composite or bio polymer forms. Biological materials are readily recycling and their examples include protein, cork, fibres, bamboo, ratten, hemp, wheat, straw, carrot fibres, mycelium, sugarcane, orange peel and latex. Furniture materials made of these biopolymers are being widely utilized.

3.1.5.1 Corks

Corks as a furniture material is obtained from the cork trees, who's debarked during the summertime. Corks are one of the carbon dioxide emission sources of nature. Corks are also preferred in furniture design, because they can be given any shape and they are renewable. Corks are very light as compared to alternative materials. Beside these, it has resistance to the water. With its sponge like tissue and environment friendly characteristics, they are widely used in furniture design. During the production of furniture, all cutting and moulding techniques can be easily applied to corks. On the other hand, during the shaping process, corks can be utilized as a plastic material and it can be given plaque forms that could enable the furniture designers to combine with different materials. Beside these, it is the least costly material utilized in furniture production.



Figure 7: Furniture Samples made of cork

3.1.5.2 Hemps

The term of hems covers the cocanuttree peels and carrot fibres. These materials can be easily mixed with polymers to get an ecological material. Since hems absorb the environmental pollution, they are also used in industry. Hems also reduces the carbon dioxide emissions. In the beginning of 20th century, these ecological materials were used in making the panels of car doors. To produce hems, peels of coconuts and carrot fibres are soaked in water, and then they are separated from their peels. Since, their fibres are too long, they are mostly used in industry.



Figure 8: Furniture made of Hemps material [16]

3.1.5.3 Starch

Made with the foam extracted from patato starch, not only is the chair completely biogradable but also, in theory, edible. As it solidifies, the string of starch create a grid sculpture that can withstand considerable weight. Roling, overlapping and refolding the material creates an organic, linear form, producing furniture pieces that are at once eccentric and sully sustainable.



Figure 8: Furniture Samples made of starch (retrived from:Barbeo S., Cozzo B.,2012p:95)

3.1.6 Other Materials

With its semi-transparent appearance and it' lightness characteristics, this type of materials are suitable for outdoor usage. The sinuous forms created by bending sheets of reticular steel ensure its sturdiness, which sets off the ethereal lightness of its design. The points of conjunction and contact with the floor are reinforced to ensure stability. .through the use of a single material, the design is both modern and sustainable.



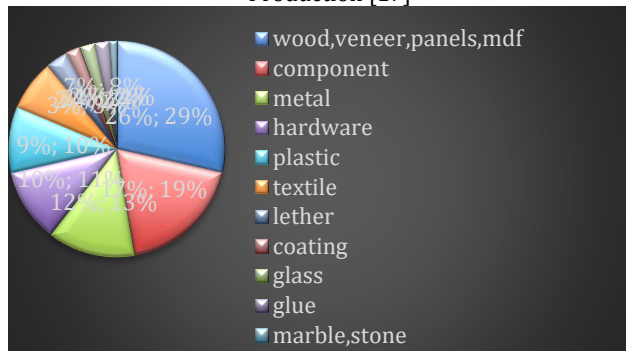
Figure 9 : Designed by Tomek Rygalik and Benjamin Hombuk for Moroso

4 The Usage of Ecologic Materials Turkish Furniture Producing Firms

As in developed countries, some measures are being taken to use the environment friendly materials in Turkey. These measures are twofold; to establish a new selling policy and to contribute to the approach of environment friendly design. For instance, Nurus firm takes a series of measures to use materials that are environmentally friendly designs. However, number of the studies in this field is very limited.

In furniture industry in Turkey, wooden materials and their byproducts, glass and plastics are mainly used in furniture production. A detailed information about the firms utilizing these materials are given in a publication titled "Discover Turkish Furniture" by Association of Turkish Furniture Producers in 2016. According to this publication natural materials are mostly used rather than the ecological materials. The following table show the usage of ecological materials in the member states of European Union.

Table 1: EU Countries and Turkish Republic Furniture Production [17]



5 Conclusions

This article concerns about the ecological materials to be used in furniture design. Although, it is hard to define the ecological materials, however I tried to classify the them. Utilization of these materials are compared to the traditional materials in order to explore the better production areas in Turkey. Although, the use of ecological materials in furniture design is not a new phenomenon, however examples of the ecological materials can be seen in some designers' designs in 1950s and 1960s. Effects of heavy increase in population and the energy crisis in 1970s and 1990s have been reflected to the furniture design and furniture production. For this reason, need for sustainable design approach must be promoted in line with the principles of ecological design and eco-friendly design. No matter how it is thought that it is a new understanding, furniture designers thought about the importance of

environment friendly materials before. Designers of the furniture's thought that environment friendly materials improves the quality of life and result in least exploitation of natural resources, since they are produced economically. They also thought that, sustainability of materials calls for recyclable and renewable characteristics. The aim of the furniture designers is to use more environment friendly materials that will not be harmful to the nature

To be functional and having aesthetic characteristics are the most important features of the furniture design. These features of furniture design call for producing materials to be produced at less production cost, to be sustainable and renewable. On the other hand, the interrelatedness of art, industry, and technology needs to be taken under considerations. In line with this developments, I support the idea of using environment friendly ecological materials to be used in Turkey.

I conclude that environment friendly materials serve the better use of limited natural resources and satisfy the need of consumer society of today. For this reason, this type of ecological materials need to be developed and their usage must be encouraged. It is unfortunate that, ecological materials are not widely used in Turkey as compared to Western developed countries. For this reason, some research institutions in this field should be established and furniture designers must be supported to develop new production techniques in ecological materials.

No matter how it is thought as a new perspective, designers before have considered environment friendly material design. Therefore, in terms of environment friendly; making the features better and using the sources economical had a great impact. The designs that are created by original works or unusual ways have supported our environment positively so; using recyclable materials will give us more positive results. In environment friendly designs, the aim is obvious. Using less energy, less material and less harmful to environment are the main targets. Compared to furniture design history, it's meaning for today and past are hard to express. However, the designers had the sense about this issue and they created samples. For design history, classical things that are valid for every era, alternatives, and unusual, primitive or attractive designs have all contributed to environment friendly design [9]. In furniture design, being functional and aesthetic were worthy. In fact, it was a synonym for utility, high quality and available cost. In today's world, mostly individual designs are noticeable. For this reason, art, industry and technology are integrated and ideas have stepped forward. In the recent years, environment friendly design gained significance. This study supports the environment friendly approach that is made with industrial waste, unusual forms, ready-made and recyclable designs. In our country where environment friendly destruction happens, we can come to this conclusion: our designers need to take the precautions for using environment friendly materials and they need to be encouraged.

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