

An Analysis of The Research and Application of Furniture Design Under The Concept of Sustainable Development

Mengya Pei

School of Humanities, Universiti Sains Malaysia, Penang, Malaysia.11800

Abstract: Socio-economic development means that a higher quality of life can be offered to people, and people are demanding more and more comfort and beauty from their living environment. The demand for furniture, a necessary practical item in people's lives, is increasing in line with the rapid growth of the social economy. However, the scale of the furniture industry is consuming our environmental costs.

This paper discusses and studies the importance of sustainable furniture design, the current situation of sustainable design and the methods and approaches of sustainable design to promote the development of sustainable design. It also aims to firstly summarise and analyse the current situation of sustainable furniture design at home and abroad in this paper, to clarify the practical significance of sustainable design and the necessity of conducting research on sustainable design. It also explores the ways to achieve sustainable furniture by analysing the links between the selection and use of environmentally friendly furniture materials, and furniture design under the concept of sustainability, and questionnaire surveys to understand the future trends of sustainable home design. Environmental problems in furniture production and manufacturing and the reasons for these problems are identified, and some ideas for greening furniture design and production are proposed.

Keywords: Furniture design; Modularity; Recycling; Sustainable design; Recycling

1. Ntroduction

Based on the analysis of domestic and international design case studies, the research questions, research objectives and research implications are presented, and the analysis is carried out in three research directions in conjunction with the research framework.

1.1 Background of the study

With the rapid development and change of society, environmental protection has become one of the most important issues in today's society, the furniture industry has been the evergreen tree in our lives, whether in our living environment or office environment are inseparable from the figure of furniture, so that furniture is a piece of industrial furniture products necessary in our lives, according to the 2017 China upholstery industry status and development trend analysis, China is the world's According to the analysis of the current situation and development trend of China's upholstery industry in 2017, China is one of the world's largest furniture producers and countries with consumer purchasing power with a large population, and the total amount of production and sales is still maintaining a steady growth, but this time also produced a series of problems, such as renovation and upgrading of old furniture after the abandonment and recycling treatment, and new furniture output brought about by the consumption of a large number of resources and so on.

Whether it is the sustainable development of the contemporary economy, the use of wood from the natural environment and the ecological environment in which furniture is made, or the sustainability of the lifestyle and ideology of contemporary society, we must consider how to achieve a sustainable development of furniture in the future. In addition to the fact that sustainable development and sustainable design have become globally recognised values, the question of how to achieve sustainability in modern furniture design for future lifestyles exists both at home and abroad.

1.2 Current status of domestic research

In her Master's thesis, 'Research on Sustainable Design of Typical Furniture', Wang Meiyi studied sustainability in furniture design and manufacturing, pointing out sustainable strategies in wooden furniture manufacturing, i.e. reducing material usage, reducing shredding, reducing packaging, reducing energy consumption, reducing the choice of toxic resources, using renewable resources and extending life cycles, to provide design directions for sustainable design.

In her master's thesis, 'A study of six sustainable design methods based on the current situation in China', Liu Min argues that sustainable design is a design strategy and design attitude that achieves low environmental pollution and emissions from products through purposeful planning. It points out that sustainable design approaches should be tailored to the national context and be achieved through the reduction of material use, reduction of product space occupation, ease of transport and standardisation.

In his master's degree 'Green Design Application Research of Cabinet Furniture Based on Modularity', Zhong Hua analyses the construction of a green modular system from good dismantling performance and the choice of green materials for the modular system of cabinet furniture. It is argued that the design elements can be considered with the value analysis selection method and the reverse analysis method for sustainable design of modules.

1.3 Status of research abroad

In 1950 and 1960s, Gunnard Anderson's designs got the attention. In this designing type, industrial waste use conscious is seen. Especially, newspaper and coop table were used with extraordinary materials such as dust aluminium and fibreglass mixture. With the use of paper, Anderson created a new chair design that Weltstein strengthened the only structure. Andersen's this extraordinary design got people's attention but it wasn't very useful. The materials that were used revealed that paper materials were going to make a progress in industrial production.

1.4 Problem statement

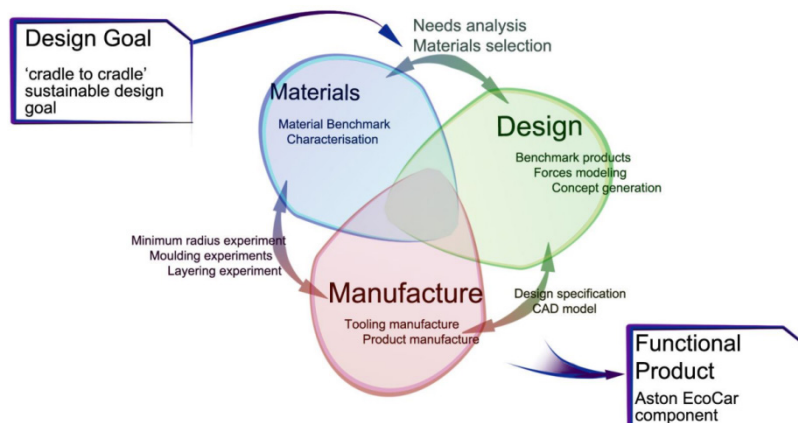
As environmental awareness increases, more and more people are looking at the use of sustainable furniture. The use of sustainable furniture is becoming increasingly popular in furniture applications as they not only reduce production costs, but also help to reduce the negative impact on the environment.

Unstable material quality: Wang YH. (2020). In the article "Study on the Optimisation of Recycled Plastic Production and Management", it is suggested that recycled plastic materials may come from different sources and are of unstable quality. This may lead to differences in the strength, durability and weather resistance of the materials, making the chairs produced to perform differently in use.

Application Design Difficulties: According to Timeshare. (2022). A Study on the Application of Environmentally Friendly Materials in Furniture Design, it is stated that recycled plastics may be inconsistent in shape and size, which may pose difficulties for furniture designers and manufacturers, making the design and production process more complex.

While there are more sustainable furniture products abroad, there are few furniture designers in China who use this idea for furniture design, and there is less research on the subject. This study will use literature research, case studies and other methods to explore in depth the significance of sustainable furniture development. It will explain the potential value of new materials (e.g. biodegradable materials) in furniture design, the feasibility of modular design in furniture recycling and reuse, and the future trend of sustainable furniture and its acceptance by the public through questionnaires.

1.5 Research framework



Divided into 3 directions according to the general framework of sustainable development, as the research ideas and directions of this paper. The three steps of material, design and manufacture are used as the framework of this paper through the general context of sustainable development, and this is used as an entry point to extend the discussion and analysis of furniture design in terms of materials, design methods and manufacturing acceptance.

2. Purpose of the study

The aim of the study is to explore the potential and feasibility of environmentally friendly materials in furniture design in a comprehensive manner, to propose ways to improve production processes for environmental friendliness and efficiency, and to explore the practical application of modular design in furniture recycling and reuse in order to promote the development of sustainable furniture design. The aim is to promote the development of sustainable furniture design and manufacturing to meet the demand for comfort, aesthetics and environmental friendliness, while reducing environmental costs and driving the furniture industry towards sustainable development.

2.1 Research significance

From the perspective of sustainable design research: to propose design elements that influence sustainable design during the product life cycle, to provide a design index system theory for the sustainable design of modern furniture products, to provide a theoretical basis for the study of sustainable design methods and to provide a model for the application and evaluation of sustainable methods. For consumers, the implementation of the sustainable design concept will create a more ecological and healthy living condition that is beneficial to both body and mind, reduce costs and lead to a shift towards a more frugal lifestyle, thus enabling society to develop towards sustainable design. For social benefits, sustainable design can reduce the impact of furniture products on the environment, avoid the pursuit of one-sided economic interests to the detriment of future sustainable design possibilities, reduce uncontrolled resource consumption, thus meeting the sustainable use of resources and environment and promoting the harmonious development of society.

3. The development of a sustainable furniture design concept

Sustainable development has gradually become a major global issue and the concept of ‘green design’, the prototype of ‘sustainable design’, emerged in the USA in the 1980s and 1990s. Since then, designers have been concerned with the consumption, recycling and reuse of materials and resources, and key words such as low carbon, environmental, green and energy have become important indicators for analysing the excellence of design work. A comprehensive understanding of the concept of ‘sustainable design’, as proposed by the author, does not suggest ecological protection, but rather encompasses ‘green’, ‘ecological’ and other basic concepts. The concept of sustainable design is not about protecting the ecological environment, but rather encompasses some basic concepts such as “green” and “ecology”, integrating the design requirements of various disciplines such as ecology, economics and culture, and establishing a new, fundamental concept that can achieve sustainable development. In this context, the concept of ‘sustainable design’ is proposed as a new concept, which is compatible with the basic concepts of ‘green design’, ‘planning’ and ‘design’. “The basic concept is compatible with ‘green design’ and ‘design’, by expanding from the current ‘chemical’ to the ‘non-physical product design’ sector. By maintaining a balance between economic, environmental and social aspects, all of these elements must be analysed as part of sustainable development. The concept of sustainable development has now permeated and developed in all sectors of society, from sustainable economic models to social lifestyles, and the concept of recycling has taken root in people’s minds.

3.1 Sustainable design furniture examples

In the 1950s, Pantone made a revolutionary breakthrough in modern furniture design with a Pantone chair made from reinforced plastic, and plastic furniture became widely produced and used. Plastic furniture is colourful, compact, light, easy to shape, easy to maintain, adaptable and affordable, so it occupies an important place in the furniture market. This is why designing and manufacturing furniture from recycled plastic is a great way to reuse plastic. In recent years, IKEA’s home furnishing products have increasingly been designed with ‘sustainable design’ and ‘environmental protection’ in mind, resulting in a range of excellent products that are in line with the development of the ecological economy. Recently, a special material seat was launched, developed in collaboration with a Swedish design studio, made from a combination of recycled plastic waste and leftover wood, through an injection moulding process. Its structure is easily dismantled and its special textures and premium colour scheme are nothing less than other household products. The Norwegian architectural firm Snøhetta has designed a very eco-friendly chair, the S-1500, which is highlighted by the fact that it does not require any virgin materials and is made from leftover plastic and discarded steel and metal from local fisheries. The “Stacking Chair” design, the first all-plastic one-off moulded chair ever designed and manufactured, is so elegant and gently curved

that it can be admired simply as a sculpture in its own right. At the time, the chair was an instant hit, thanks to its functional comfort and the graceful, sculptural lines of its form.

3.2 Environmentally friendly materials - renewable resources

The principle of renewable resources requires that the product is selected from the initial period with the concept of sustainability as the entry point, using renewable natural materials such as bamboo, rattan and other highly rapid renewable resources. Avoiding the burden and constraint of using non-renewable materials also provides more spatial feasibility for the possible design of furniture forms. The previous profit-centred philosophy must be abandoned and green materials must be used in the production and manufacture of furniture. Green materials mean that all aspects of furniture can be maximised and environmental damage minimised. In addition to their high quality, environmentally friendly materials can also reduce their impact on the environment, thus achieving a harmonious coexistence between man and nature. Plastic furniture.

3.3 Recycling of unwanted furniture

Recycling and reuse of resources is the main objective of recycling design and there are generally two ways to recycle furniture: recycling of raw materials and reuse of components.

3.4 Recycling of raw materials and renewable materials

Some special parts of the material after the use of the functional state changes greatly, has opened the method of reuse, the need to use appropriate technology and methods to deal with recycling. For example, artificial board furniture in the product abandoned, most of the board pieces have been deformed to varying degrees, after the recovery can only be used as MDF and the raw material for the creation of flower board, but also the waste of old wood crushed into wood fiber, drying can be used to process the waste of old wood into efficient fuel and fertilizer, as energy and for forest regeneration.

3.5 Reuse of components

The recycled parts can be used as parts of other furniture. For example, table legs, chair legs, wardrobe side panels, solid wood panels and joinery furniture parts are usually not seriously damaged, after recycling by sanding, re-painting or re-veneering, that is, become a new part. Through some partial restoration, the value of the piece is restored. They can be reused. The loss of raw materials in the reworking process can be minimised. The reuse of modern furniture products is generally reflected in the reuse of used products and the reuse of furniture components.

3.6 Selection of materials

Avoiding or minimising the use of non-renewable and slowly renewable materials such as minerals, wood etc.

Avoid harmful emissions from the production or disposal of products and try to use green materials or materials that have a low impact on the environment and can be converted into usable raw materials.

Avoiding the use of materials that consume high levels of energy in the production process in order to reduce energy losses during the production phase.

Minimise the amount and type of materials used and reduce the use of expensive and rare materials to achieve savings in resource costs.

Use recyclable materials wherever possible to reduce energy losses in the redevelopment of materials and to facilitate the availability of raw materials for later products.

4. Conclusion

This paper discusses and studies the importance of sustainable furniture design, the current situation of sustainable design and the methods and approaches of sustainable design to promote the development of sustainable design. It also aims to firstly summarise and analyse the current situation of sustainable furniture design at home and abroad in this paper, to clarify the practical significance of sustainable design and the necessity of conducting research on sustainable design. It also explores the ways to achieve sustainable furniture by analysing the links between the selection and use of environmentally friendly furniture materials, and furniture design under the concept of sustainability, and questionnaire surveys to understand the future trends of sustainable home design. Environmental problems in furniture production and manufacturing and the reasons for these problems are identified, and some ideas for greening furniture design and production are proposed.

In summary, this thesis concludes that the application of sustainable design in furniture manufacturing is necessary and important to promote the sustainable development of the furniture industry, to meet people's needs for furniture, to reduce the negative impact on the environment and to facilitate the realisation of sustainable production and consumption patterns.

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