

SUSTAINABLE DESIGN BASED ON USER RESEARCH IN LOW-CARBON CONTEXT

Ouyang Bo He Yun (corresponding author),
(South China University of Technology, Guangzhou, China)

To make the design more suitable for user needs, and promote the development of low-carbon society, a design approach for housewares products is proposed based on user study in low-carbon context. From perspective of rethinking contradiction and opportunity of sustainable design, it is adopted cases study in user lifestyle, user behavior and user experience to discuss the importance of use research in understanding user needs in low-carbon context and conducting low-carbon concept by design. It is indicated that by conducting user research, low-carbon design can break through experimental ideas to real combination of design, industry and eco-culture.

KEY WORDS: low-carbon; user research; sustainable design; user lifestyle; user behavior; user experience

Low-carbon has become a global hot topic today. Low-carbon means lower greenhouse gas (carbon dioxide) emission. To decreasing environment damage that comes from greenhouse gas, new concepts such as low-carbon technology, low-carbon economic pattern, low-carbon society, low-carbon city have come out, and creating a low-carbon sustainable future is the general trend. Macroscopically speaking, the practice of low-carbon idea involves production, life and social economic and so on. It is system engineering^[1]. Design as part of this, cannot solve all problems, but in great extend to influent ecosystem and lifestyle. In this circumstance, rethinking sustainable design is even more important.

When look over sustainable design research in the past several years, most of them focus on objects and system. The one of main reasons why the idealistic sustainable lifestyle is difficult to come realization is because there is missing part between people and sustainable system. Objects (products) are created for people's daily life, and they are highly connective with lifestyle and value. From angle of user study to discuss sustainable design, is a way to make up the missing part between idea and realization.

1.the contradiction of sustainable design and new chance of design in low-carbon context

Although low-carbon is relatively a new concept, its ultimate aim that to realize a sustainable development future has been a one of the most important topics in near half century. Begin 1980s, from green design, eco design to sustainable design, design theory and practice always try to study how design push sustainable society forward. But some criticism point out: sustainable design is still a theoretical contemplation, and it is difficult to become a connective bond with design, industry and culture in business practice^[2]

This criticism reflects a truth, that sustainable design was difficult to make a positive influence to the society in the past decade. One of the main reasons is either green design or eco design are focusing on idealistic objects or system, emphasizing decreasing materials consumption and emission, but ignoring users and consumers' willing. Even if with consideration about human, it is not based on user behavior or user cognition. More likely it is from idealism sustainable result to conduct people's lifestyle. These "designed" dream lifestyle and products are hardly matched what people wants in commercial society. Design is a constantly process of dialogue with people. The idealism world that planned by designer's side is not necessarily suitable with people expectation and hardly accepts by consumers. From this point of view, lots of sustainable design cannot match the request of pursuing quality life in this age high mass consumption. In the meanwhile, cannot combine with successful business mode, these sustainable designs frequently become experiments result in the museum or exhibition and cannot replace traditional design to the market.

However, with the idea of sustainable development become more and more familiar with people, the new chance for design will follow. First the chance comes from the transformer of lifestyle. A group of people is willing to embrace eco protection and low-carbon lifestyle. They are known as "LOHAS"- lifestyle of health and sustainability. These people have 20%-30% proportion of adult in developed countries and also keep increasing in china. These eco supporters have certain social influence, and can make more people pay attention to environment protection. Notice that different with former eco supporters who had low consumption lifestyle, the LOHAS hope to combine eco-friendly with high quality life together^[3]. They have strong consuming capacity; do not reject consumption, but very care about eco, quality, and culture messages that come with the products. Design is just an appropriate approach to connect eco, quality and culture together.

Second, the new chance of design is come from the rapid evolution of technology. Materials revolution, diversity and intelligent manufacturing engineering, more and more implementations can help sustainable design from ideas to real products. New technology brings design diversity appearance and emotions that surpass the old low-quality images of sustainable design, and really step into people's life.

Last but not least, booming Internet industry brings multiple business modes. In the new business mode, invisible service replaces traditional mass production become core value in business. Service design bonds more tightness with business success than before. The essence of service design is user center orientation, and discover user needs to drive service develop.

In summary, based on user-center research and integrated lifestyle, technology revolution, new business mode, will be the foundation and starting point of new sustainable design (chart 1). Low-carbon design is no only just pursuit low consumption, but also provides a new chance to make the user's consumption need to fit the sustainable development, and emphasis high quality life with low-carbon design that connect design, industry and eco culture together.

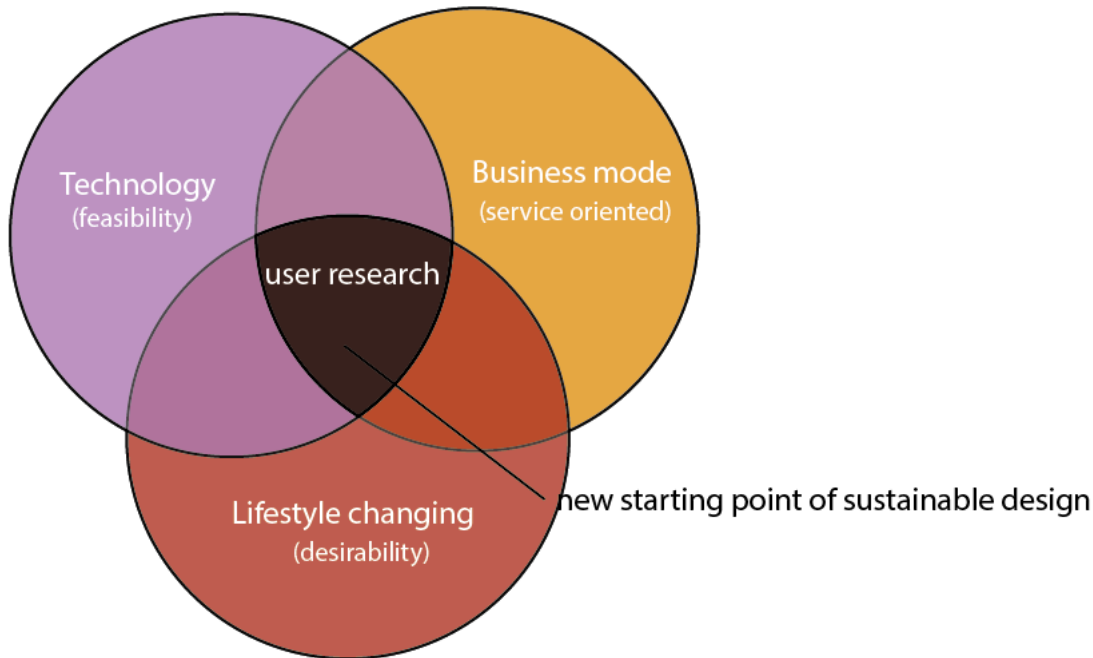


Fig.1 new chance for sustainable design

2. Appliance of user research in sustainable design

The aim of user research is to better understanding users, define product to design products that can match customer's need and improve user experience. Compare to other products, household products are very close to people's life. These products reflect people's favors, hobby, emotion and life attitude ^[4]. How to make products not only customer they want, but also eco-friendly? Understanding users and empathy based on user research is very important. This paper is going to adopt cases study in user lifestyle, user behavior and user experience to discuss the importance of use research in understanding user needs in low-carbon context and conducting sustainable concept by design

2.1 sustainable design based on user lifestyle

Lifestyle is a sophistic idea. It is known as a mode people spending time and money. It also reflects every individual's activity, interest and opinion ^[5]. Lifestyle study can help product definition to conduct guides that design should follow.

Take look at the example of LOHAS. This lifestyle is described as: follow interest with personal health, eco system and public activities; eager to real, reliable and meaningful products; pursuit quality life. Based on understanding LOHAS, design should more focus on quality and eco value representation. For LOHAS, they value the sustainable design ideas, but in the meantime design must has glamour charming of aesthetic and feeling. If aeeco-friendly design product is rugged, it cannot expect customer to buy it just because of eco

responsibility. So when designers pay attention to the eco problems, they need to try to think about relevant culture, emotion and aesthetic issues. For example, using discard or regenerative materials to design a new product is a typical way according the sustainable principle, but understanding materials, carefully choosing materials and consciously using it is need more concern than just simple materials replacement. In early days saving-oriented design just use discard items, old components to put the pieces together. It is obviously does not meet the requirement of LOHAS. Briefly speaking, the combination of the materials meaning and over whole expression is very important.

A successful case is a German furniture brand SCHUBLADEN (figure 1). German designer FranziskaWodicka uses collecting old drawers with new furniture frame to design a serials popular modern, practical and retro product. These cautiously choose wood drawers indicate the imprint of age, pass the spirit of traditional craftsmen. The combination of old parts and new parts, the delicate details make the products have new aesthetic quality, and in the meantime, in somehow accomplish the sustainable aim. This case also tell us there is a trend need to be concerned, that is in recently people have more interest in the origin of objects, such as more attention to local culture, and more attention to the story behind the product. In the other hand people show more rationality toward low-carbon products. They have more understanding about regenerating wood resources, and willing to use nature materials, focus more on product life cycle instead of thinking nondurable but eco-friendly products as a low-carbon product.



Fig.1 Schubladen furniture

2.2 sustainable design based on user behavior

Household products are highly connected with people's living in home. Through studying living environment, living requirements and user journey of how they use household objects, can provide solid evidence for designers to design. From sustainable angle of view people need to cut down materials and energy consumption and emission. In order to do that designer should not only think how to choose and use materials, but also think

about the process and activities when people use these products.

From product and itself, user behavior study could help the product to meet user's true habits and requirements and avoid early abolish it just because of undesirability. In real life most of people have experiences of impulsive shopping, especially attracting by some small creative products. However, once they come back to life, they will find most of them are not suitable in some way, and these products usually will be dumped or put aside. So household product design should not just come from a moment idea, but need truly understanding inner meaning of innovation and go through the shallow creative emotion design to real customer insight. In the end, use reasonable design to make people love it and extend product lifetime.

There is a typical case that design inspired by use behavior study: IKEA PS2014 serials storage products design (figure 2). Designer finds out usually when people use this kind of storage system they use only 3 surfaces of the product. So instead of traditional 5 surfaces products they use mental wire to replace 2 surfaces to cut down materials. In material choosing, they select bamboo texture papers to represent eco-friendly idea, and the open module design let users have the flexibility to recreate new product to satisfy the individual personality.



Fig.2 IKEA's storage furniture

The process that people use household product also relate to material, energy consumption and emission. For example, when people steam or stew food, cover the pot will save energy and decrease emission. However, through observing cook process, we can see most of people do not cover the pot. The reasons focus on two points: one is soup will overflowing if cover the pot; the second is food will be easily overcooked when cover the pot. Famous Japanese designer SoriYanagi's work piece hand pot solved this problem cleverly (figure 3). He breaks the round edge of traditional pot and redesign as an ear, so does the pot cover. The pot cover can precisely cover the pot. In the meanwhile, when user spins around the cover, steam can go through the gap between cover and pot to avoid overflowing and overcooking. This design perfectly explains how good understanding user behavior inspires design, and good design can effectively lead user activities.



Fig.3 Piece hand pot designed by SoriYanagi

In saving water design IKEA gives us another typical example. Through observation of cleaning tableware in kitchen, designer finds most of people will choose running water to wash them for its convenience and hygiene. But designer do not want to change human behavior. Through studying the relationship between water flow and pressure, a pressure compensation device is installed inside the faucet, and this device can mix water flow with air which can save at least 30% water without change any user behavior.

With intensive user behavior study, design can better understand users, and appropriately handle materials, styling and technology to realize sustainable design.

2.3 sustainable design based on user experience

Good user experience can establish emotional connection with users, and extend product life cycle. It also can build solid brand recognition and is good for propagating sustainable ideation.

User experience is not just happening after shopping products. Actually customer could have user experience before shopping. As we have seen, lifestyle study and user behavior study can help designer to create better use experience. But in this process, it is not involve users. However, with the development of Internet technology, user can directly participate in design process and design decision. The typical case is the online T-shirt website Threadless. This new business mode that collect user's ideas through internet platform is called crowdsourcing^[8]. As a new business mode, crowdsourcing has great potential. More products that meet the customer requirement will go to the market, which means it can avoid overstocking of product that cost huge waste. In

the meantime, service design can also create a good user experience. For example, lots of Furniture Company provides user friendly 3D design software to help customer simulate the scenario that product display in their house. It can lead customer experience the product before buying it to avoid impulsive shopping and wasting.

When customer possess the product, user experience is still very important. Psychologically, people will cherish meaningful products, especially the product carries emotional story. IKEA's DIY assembling strategy for customers is known as win-win strategy. DIY assembling by customer themselves obviously is a good cost control. On the other hand, customers have the first sense of participation experience, and the assembling process bring customers satisfaction and joy, make a unique story for the product^[9]. It tells us in household product design product should have flexible functions, save enough spaces for customer's individual interaction with product to have unique product experience^[10]. Such as allow users to creatively use the product as they want.

3 conclusions

Although sustainable design based on user research cannot perfectly solve the problems, it can make design more effectively. In the principle of sustainable development, user research help designer to design product people want, to extend household product life cycle, to broadcast eco-friendly value and to make positive influence to sustainable society.

Reference :

- [1] TONG Yun,SUNXin.Study of the General Design and the Low Carbon Design[J].Journal of Tianjin University(Social Sciences),2013,15(4):328-331.
- [2] CHEN Yu,WU Xiang-jun.Review of Sustainable Design[J].Packaging Journal, 2010,2(3): 17-20.
- [3] YANG Xiao-yan,HE Jiao-jiao. The Policy and Adjustment of German Sustainable Consumption [J]. Consumer Economics, 2015,31(1):41-45.
- [4] YIN Huan, GAO Chen-hui.Research on Emotional Design of Household Articles[J]. Packaging Engineering,2011,32(16):43-45.
- [5] CHEN Wen-pei.An Empirical Study on the Relationship among Consumer Lifestyle,Consumer Innovativeness and New Product Buying Behavior[J].Economic Management, 2011,33(2):94-101.
- [6] JuttaNachtwey, Judith Mair. Design Ecology[M].Tianjin University Press,2010.
- [7] FANG Hua.Sustainability of Added Value in German Designs[J]. Journal of Zhejiang Vocational Academy of Art,2015,13(1):96-101.

[8] XIA En-jun,ZHAOXuan-wei,LI Sen. Crowdsourcing Research:Statue and Prospect[J].Technology Economics, 2015,34(1):28-36.

[9] WANG An-xia,WEIXu.Discussion on Central Elements of IKEA Product's Packaging Design [J]. Packaging Engineering,2013,34(8):5-8.

[10] CHEN Yan,HU Wei-feng,LI Shi-guo. Exploration of Elastic Design Methods of Household Products for Urban Small Houses[J]. Packaging Engineering,2013,34(16):31-34.