The Influence of Older Age Groups to Sustainable Product Design Research of Urban Public Facilities

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Abstract. Through summarize the status quo of public facilities design to older age groups in China and a variety of factors what influence on them, the essay, from different perspective, is designed to put forward basic principle to sustainable design of public facilities for the aged in the city, and thus further promote and popularize the necessity of sustainable design applications in the future design of public facilities for elderly people.

1. Introduction
Under the progress of social development and the promulgation of social security as well as various policies at home, the concern pertinent older age group has been raising increasingly. In such a trend, public systematic services to this group have also become a focus people pay more attention to, especially the importance of equalization and rationalization of urban public facilities distribution to those old people who live in the city. With the promotion of government public service function and its social management ability, public facilities design and its spatial planning in first-tier cities have been exerting guided and exemplary effect to ones in second and third-tier cities. Compared with developed countries, however, there is significant difference in the construction of public facilities for older age groups and its systematic perfection at home, of which the applied effectiveness of public infrastructure and product iteration problem have became some obstacles needed to be solved that currently influence on urban sustainable development. By systematic research and analysis, it is difficult not to find out these root causes that design concept of public facilities product fails to keep pace with the times, the function of facilities product cannot satisfy old people’s physiological and psychological requirements, and neglect the relationship of public facilities in between human, environment and nature. Therefore, to research and think the problems is a reality which must be resolved and faced to urban sustainable development in the future.

2. Product design and sustainable design of public facilities

2.1 Formatting the title Public facilities product design
Public facilities product is various type of service-oriented and public one offering to citizens, the function of which is designed to meet users’ requirement, make life easier and serve the public. With rapid development of urbanization at home, public facilities product plays an increasingly important part in city image and window to foreign countries, so it is incumbent responsibility and obligation, for every designer, that reasonably grasp the design of public facilities product for urban sustainable
development in the future. Generally speaking, good public service product design must cater to different user group’s demand (particularly for some special social groups, such as elder people, children and disabled people, etc), and take spatial environment, natural landscape and other regional features as the basis of the background, at which it can not only concordantly coexist with people when product integrate into natural ecology environment, but also deliver design concept full of historical cultural atmosphere and humanistic concern to every target audience when urban charm has been improved constantly.

2.2. Public facilities sustainable design
In the development phase of modern urban planning and design, sustainable design, extended from the concept of sustainable development, has become a something new in public's awareness. On the whole, people’s correct choice for the modern way of life is driven by the idea of sustainable development, which could mean that it not simply is the product of human’s reflection to environmental and ecological damage, but is the recurrence of ethnic and responsibility in the entire society--- of which old people have been a key group concerned mostly with by it, as people can see, in today's society, public facilities product has already been an essential part of daily life in elderly people [1]. In general, public service product designed with ergonomics and fitting for older age groups can make the elderly people’s life more convenient and secure, and sustainable public facilities product made by the combination of regional characteristic and local scenery can maximally reduce environmental pollution caused by products, which is not only helpful to product iterative refinement but to the reduction of resource and energy consumption [2]. In the current times, new design pattern of sustainability is built on the basis of human-environment-nature common for sustainable development. With the elevation of awareness in public to natural resource and ecological environment, it is better able to enhance old men’s living quality in the city, make them to follow the development trend of social and environmental sustainability, and improve their living environment in the cities when sustainable public facilities product in accordance with aged group’s needs to product safety and portability. Therefore, it is the only way in further promoting urban planning and the explorative direction in transforming sustainable development of new cities in China future that settle down to research the design system of public facilities product with sustainable concept.

3. Sustainable design factors of public facilities product for older age groups
Public facilities product involves with the very broad content ranges and influential factors, on account of it is a type of public one facing and serving for social mass. Given that, in the construction of theoretical system of public facilities product based on the design concept of sustainability, both variable factors in design processes and old users’ physiological and psychological requirements have to be taken into consideration for the sake of its perfection. This section, from the beginning of regional characters, will make further discussion--- by the combination of local natural environment and humanism elements, and the integration of peculiarities in sustainable design including safety, portability, identifiability and cost-effective (Figure 1)--- that how to ameliorate the influence of public facilities in mass.

Figure 1. Diagram between public facilities and sustainable design
3.1. Regional factors in the design of public facilities product

The influence in regional culture is mainly from people’s customs in daily life and their inherent cognitive thinking, but diverse characteristic in regional culture is primarily from different geographical positions. As for essence, regional characteristics is the epitome of regional culture, the reason of which its influence was formed in the long run of historical years and the accumulation of every generation, its profound cultural connotation and historic value exert inestimable effect in this day as well. From the viewpoint of aesthetic theory, it is prevailing trend to public facilities product design of modern city that integrate regional characteristic into sustainable design conception of product. For urban development, on the one hand, this type of product combined traditional elements with modern principle can not merely show S&T strength advancing with the times in modern urban public service, but present historical implication in urban for public consciousness through specific-image product design; for target audiences in cities, on the other hand, it is not difficult incorporating this comprehensive public product into their daily life as its design philosophy comes from regionally cultural character; for aged people, in particularly, public facilities product characterized by local culture tends to make the resonance with their psychological perception. As a whole, the design pattern with recognizability is better for the identifying operation of products in older age groups when it closed the distance between products and old users, of course, which is also the reason why it is easier for old men in the use of them. Simultaneously, this type of public product, when it showed the city charm for foreign countries, could convey urban historical flavor, humane concerns and the concept of humanization design, and thus further accelerate sustainable development of the city. “Columbus Circle”, for example, that is the dominant landmark and tourist attraction in Manhattan of New York City. As shown in the figure 2, on the basis of local people's adoration for sport and light, designer made the construction of a circular building by the design concept of concentric circle, which not only made it become central area of the city, but evolve into “center of the universe” in people’s inner feelings.

![Figure 2. Columbus Circle in Manhattan](image)

3.2. Human factors in the design of public facilities product

Human has always been actor and undertaker in social activities, and their requirement has always been the basic element in system of them, because of this objective reality, audience’s demand has become the entry point of practical problem that need to be solved primarily by designers in the process of design for public facilities product. In line of steady development of today’s society, aging level in China has increasingly been aggravating. As is statistic, gross population at home has grown beyond 1.36 billion, of which there are about 210 million ones over 60 years old, and who are 15.44 percent of its total population. By all accounts nothing could be more convincing than figures, thus, older age group could once again be back on the table of holistic urban development with the growth of the authentic data, which means that to regard them as the main focus of public facilities product design is an important presentation to promote public service system more complete [3].

Older age group, as one of the important measure of social progress, has been playing significant role in urban development. Most often, they have their own specific demand and idea to public facilities product under the drive of their life and practical experience, so, for purpose of working out a public product corresponding to city image and receivers’ demand as well, it is extremely important to
collect and accept their opinion and thought. In a general way, requirement in older age group can be divided into physiological one and psychological one. As they grow older, old men’s bodily various system functions have gradually been declining, and this senile limitation also makes them generate some psychological barriers in use of cumbersome and complicate products. Based on the actual situation, it is necessary thing during product design that, according to local characteristics, designers should make the investigation of physical condition in older age group and the solicitation for proposal in them to public service products, which could transform old people’s role in public service system from product user to participant in preliminary design of the product [4]. From the point of view, to make human as one of standard in social public, on one hand, could better improve practical efficiency, reduce resource wastes and fulfill the ideas of sustainable development; on the other hand, for older age group, this concept could give full play of positive effect on the recognition of self ability and the construction of mental quality in them, simultaneously, their own social value in urban development would also be more and more prominent with its guide.

3.3. Natural environmental factors in the design of public facilities product

The relationship model between human and environment has long been the topic which is being researched and discussed in academic community. As part of nature, human is closely associated with natural environment in term of subsistence as they originated and evolved from here [5]. Since ancient times, human progress has been achieved at the price of consuming natural resources, hence, whatever economic development or social advancement in today, they have been ascribed to the scope of resources over consumption and ecological destruction. As can be seen, the imbalance relationship between human and environment cannot possibly be swept under the carpet for good. On the contrary, its drawbacks must have stood out with time providing, and human have also become the ultimate responsibility undertakers in consequence caused by unpredictably natural disaster. Therefore, to rationally plan the public service system and guide the connection between human, environment and ecological pace in city are the key breakthrough for improving the relationship model between human and environment.

Figure 3. Terra grass arm chair

As the media of the harmony between man and environment, public facilities product has to be designed in the consideration of natural environmental factors. From the point of view of essence, natural environment is the foundation of urban construction, and mutualism between both sides is the goal of urban comprehensive development. Given that, in order to create a harmony in public facilities product and natural environment, it is imperative that, in the light of natural environment characteristics at different place, combine design material with nature and draw on local resources at
the prerequisite of maintaining the existing landscape. Furthermore, the public facilities product endowed with urban natural characters is not only helpful to accelerate the regenerative cycle of city ecosystem and strengthen citizens’ environmental awareness, but to lead receivers to build up right view of nature and ecological value in their use of product to some extent. In a word, only keeping men and environment in public system in equal and interactive development pattern, will entire ecosystem develop stably and sustainability. “Terra grass arm chair”, for example, designed by Nucleo is an efficient product that can perfectly blend in natural environment. As shown in the figure 3, the arm chair was constructed with cardboards, filled with soil and decorated with vegetation seeds, moreover, its own evolution, in the drive of specific design principle, would be going on in comply with natural rhythm.

3.4. Emotional factors in the design of public facilities product

“Emotion”, as an emotion-dominated inner consciousness in human, can transmit perceptive effect to the surrounding people and environment in the form of behavioral language and body language, in the same way, corresponding things can exert certain influence upon human emotion as well. In a sense, it is very necessary in the design of sustainable product that research the changing process of mental emotion in elderly people, because their vulnerable inner state and stereotypical mind-set have very strong side effect on their cognition to products with age. However, in view of the existing emotional demand in old men, shape, structure, color and other visual factors should also be applied into the design of public product for catering for their need in product safety consciousness, at which older age group’s initiative would be stimulated in use of public product, and their emotional needs would be extended with new design principle as well.

4. Concluding remarks

With the development of cities and the improvement of people's living standard, there has been profound changing in people’s living habits, ways of thinking and behavioral consciousness. When people pursue the product function on materials, its spiritual one cannot also be ignored categorically, for which, in satisfying the people’s (especially older age group) needs of work, leisure and recreation, the communication of emotional spirit and the inheritance of historical connotation are given too much importance in sustainable design of public facilities. So, only integrating into local feature in city, does public product designed with sustainable concept develop continuously in their local area. All in all, to make the construction of sustainable design meeting modern demand, in ways of discovering region cultural connotation and natural ecological characteristics in urban, must have made public facilities product with sustainability to really promote the sustainable development of urbanization.

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