

ORIGINAL RESEARCH ARTICLE

Research on the introduction strategy of smart consumption concept in the construction of ecological city

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ABSTRACT

In recent years, eco city construction has become rampant at home and abroad. Some ecological technologies that are committed to reducing energy use are also improving, but the consumption behavior that drives the extensive use of energy is ignored. This paper studies the consumption problems in urban development, summarizes the four development paths of “time balance”, “channel optimization”, “resource sharing” and “streamlining consumption” combined with the concept of “smart consumption”, and further discusses the introduction strategy of the concept of “smart consumption” in the construction of ecological cities.

Keywords: ecological city; smart consumption; development strategy; sustainable

1. Introduction

At present, China is in a period of rapid urbanization, and this trend is expected to continue in the next 20 years. At the same time, after three hundred years of high-speed industrial civilization development, the world is facing great pressure from climate change, resources, and the environment. The extended urban development model has made it difficult to meet the development needs of the new situation, and the urban development model is facing the choice of transformation^[1]. Ecological city construction came into being. Ecocity not only reflects the desire of human beings to seek their own development, but most importantly, it reflects human beings' richer understanding of the relationship between man and nature^[2]. However, nowadays, the

concept of eco city construction at home and abroad pays more attention to the application of ecological technology to improve the external environment of the city, while little is known about the root cause of environmental pollution: people's uncontrolled consumption. At present, there are many studies on the relationship between consumption and environmental protection, while research on the combination of consumption and ecocity construction is still in the blank stage. Through the interpretation of the relationship between consumption and environmental protection, it is recognized that excessive consumption is directly related to environmental pollution. Combined with the concept connotation and development path of “smart consumption”, this paper puts forward the development strategy of ecological urban

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construction from the perspective of “smart consumption” from the perspective of government and social institutions and guides the improvement of people’s consumption behavior through “government guidance, market operation, and public participation.” Realize the smart consumption mode, reduce environmental pollution, and provide a decision-making basis and theoretical support for the construction of ecological cities.

2. Smart consumption

2.1. Interpretation of the relationship between consumption and environment

Against the background of rampant discussion on environmental issues, many energy-saving technologies and environmental protection materials came into being and became the love of urban builders^[3]. They strive to improve environmental problems by reducing carbon dioxide emissions. Most studies also attribute today’s environmental problems to excessive carbon dioxide emissions. However, when people focus on the options for ecological energy, the consumption behavior that drives the extensive use of energy is ignored by most people. Any article that people need for daily consumption and urban construction, from production to post-use treatment, requires the use of energy, which will inevitably cause certain pollution in the urban environment. Therefore, if we only solve the environmental problems from the perspective of improving the energy structure, the result can only be to treat the symptoms rather than the root cause, and treating “pollution” from the “consumption” terminal is the core of environmental protection.

2.2. Connotation of smart consumption

Since the consumption problem is the root of energy depletion and environmental pollution, environmental protection and energy conservation can not simply rely on the application of technical means and the use of alternative energy. The manufacturing end must be changed from the consumption end, and the concept of “smart consumption” came into being. At present, there is relatively little research on smart consumption concepts at home and abroad, and it is not perfect. Qing defined “carpooling” as “smart consumption”, and believed that smart transportation modes should be considered from the environmental cost, social benefits and people’s overall interests, rather than simple road, vehicle and time limits^[4]. Jiang believes that smart consumption should be planned consumption, and its specific steps are divided into four steps: making a plan, making a list, making a budget and making an inventory^[5]. Liao put forward in his book Meeting a Good City that the core idea of smart consumption is to reduce unnecessary consumption and reduce the manufacturing end from the consumption end, which will have a positive impact on the urban environment and energy^[6]. Based on the existing research, this paper combines the smart consumption concept with environmental protection, and believes that we can start from the four development paths of time balance, channel optimization, resource sharing and consumption simplification, promote “public participation” through “government guidance and market operation,” guide people to achieve the smart and rationalization of consumption mode, eliminate the occurrence of uncontrolled consumption, and reduce environmental pollution (see **Table 1**).

Table 1. Theoretical connotation of smart consumption

Type	Smart consumption
Target	Reduce consumption and protect the environment
Object	Consumer individuals in cities
Specific objectives	Reasonable consumption
Development path	Time balance; channel optimization; resource sharing; streamline consumption
Development power	Government guidance, market operation, public participation
Follow a principle	Long term treatment shall be considered in product design; use local products; maximize the use of public goods; streamline unnecessary consumption

3. Smart consumption paths

3.1. Time balance-product design considers both current benefits and long-term treatment

The development of science and technology has had an impact on people's lives that cannot be ignored. Various products on the market are dazzling and attract people's attention. People's excessive consumption over and over again leads to the waste of resources. The treatment of products that are constantly replaced has become one of the main problems in environmental protection. The solution to this problem is related to environmental protection and all aspects of people's lives. Therefore, the principle of time balance should be considered in product design, not only considering the current use benefits of the product but also considering the treatment of the product after use so as to minimize secondary damage to the environment.

To solve the above problems, the book "From Cradle to Cradle" jointly published by American architect William McDonough and German chemist K. Bronger, puts forward the concept of a "from cradle to cradle" plan and a "service-oriented product". The "cradle to cradle" plan emphasizes that the "post death" treatment method should be considered during product production to solve the practice of "emphasizing economic benefits and neglecting environmental benefits" in product manufacturing. "Service-oriented commodity" refers to the service of the commodity rather than the commodity itself when the commodity is sold. For example, when the buyer buys the TV, he does not buy the entity of the TV, but the service, that is, the service life of the TV. After reaching the service life, the buyer can return the TV to the manufacturer, and the manufacturer can continue to sell the service or carry out a secondary design. In this way, manufacturers must consider the handling of goods when producing products, which is in line with the concept connotation of "from cradle to cradle"^[7].

3.2. Channel optimization-build a supply and demand network platform to promote the use of local products

With the deepening of global integration, the geographical distance between cities can no longer become an obstacle to the connection between cities. Chain supermarkets and imported products are everywhere in every corner of the city. While enjoying imported products, people are not aware of the huge pollution caused to the urban environment. When imported products arrive at their destination from their production place, the transportation cost and pollution to the urban environment are immeasurable.

Compared with the low price of imported products, local products have more advantages. First, in terms of commodity procurement, local products are easy to transport and cause less environmental pollution. Secondly, the popularization and use of local products also play a certain role in promoting local employment. Most local shops are operated spontaneously by local residents, which can meet the employment and living needs of some residents. In addition, the use of local products can also shape local characteristics. Small shops integrating cultural heritage and local memory are not only the carriers of regional cultural inheritance, but also the soul of maintaining local vitality. Therefore, we should optimize shopping channels, strengthen the construction of the supply and demand network, strive to buy, eat, and use local products, use local products as much as possible, and reduce environmental pollution and excessive loss of resources. The background of "Internet+" provides technical support for the construction of a supply and demand network. Product suppliers and demanders can obtain information online more quickly and conveniently, achieve barrier-free communication, realize the integration of the seller's market and the buyer's market, and improve the use efficiency of local products.

3.3. Resource sharing-strengthen government guidance to maximize resource benefits

As the object of people's consumption, the product is not selective to the subject, but the subject can choose to use the object according to their own needs, which is easy to cause a waste of object resources. For example, in terms of the choice of urban transportation tools, people mostly choose different transportation tools according to their own economic conditions, family structure, and other specific conditions. The strong subjective selectivity leads to the failure to maximize the efficiency of urban resources.

Emphasize resource sharing and strengthen government guidance to maximize resource benefits. While respecting the people-oriented choice, the government can improve market efficiency through reasonable planning, guide the transformation of people's lifestyles in a planned and purposeful way, maximize the use efficiency of public resources, and reduce environmental pollution. For example, in the design of the urban public bicycle system, the government can improve the efficiency of public bicycles by improving the parking location and charging mode, strengthening the seamless connection between public bicycles and other transportation modes in the setting of parking location, and using the charging mode together with other transportation cards. These ways can encourage people to transfer bicycles more conveniently and maximize the use of public products. The suggestion of "encouraging private car carpooling" was put forward at the working meeting of the Hangzhou municipal government in 2008, which encourages people with the same route to carpool to work, which can not only meet the needs of carpooling objects, but also increase the income of car owners, but also promote communication between different people in the city, which can greatly promote the protection of urban environment and the promotion of urban cultural connotation.

3.4. Streamline consumption-advocate rational consumption and reduce unnecessary consumption items

With the improvement of economic levels, people's material lives have been greatly enriched. The advent of the era of e-commerce meets people's diversified shopping needs, but a wide range of shopping advertisements also confuse our eyes and make us buy many non-essential goods. Such goods may soon be shelved. The more we buy, the more non necessities we buy and the more garbage we produce.

Extravagant and wasteful consumption habits drive more industrial manufacturing and produce more consumer waste. Both the industrial manufacturing process and waste treatment process will inevitably pollute the environment, which can not be improved through the application of industrial technology. There is only one solution to this problem, which is to strengthen publicity and education, advocate rational consumption, make people aware of the relationship between consumption and environmental protection, and understand the harm that excessive consumption may cause to the environment so that people can take the initiative to streamline non-essential consumption projects and reduce the manufacturing end from the consumption end. Television, the Internet, newspapers, and billboards can become places to publicize and simplify consumption. Advertisements with the concept of environmental protection consumption can replace traditional shopping advertisements, so as to make the concept of environmental protection consumption deeply rooted in the hearts of the people and make them realize the shrewdness of consumption.

4. Introduction strategy of smart consumption concept in eco city construction

The construction of an ecological city involves not only the use of ecological technology but also the ecology of people's life philosophy and lifestyle^[8]. Therefore, the concept of "smart consumption" is

introduced into the construction of an ecological city, which guides the construction activities and system construction of the city, guides the ecology of people's consumption modes, and better realizes the environmental and social benefits of ecological cities.

4.1. Formulate a sound product “production treatment” system to reduce environmental pollution

The ecocity system is an imperfect ecosystem in essence, which is fully illustrated by the history of human urban development and the emergence of various urban problems^[9]. Therefore, in the construction of an ecological city, we should not only realize the ecology of the city from external forces such as ecological technology but also build a complete production and consumption system to realize the “smart consumption” of the whole city. The construction of this system can be realized through “government guidance and market operation.” The government guides the production, consumption and treatment processes of various products in the city through certain technical specifications, and defines the recycling subject and recycling indicators after product abandonment in detail. The improvement of market mechanisms can encourage manufacturers to actively and reasonably optimize the design of their products and reduce environmental pollution.

At the level of urban management, formulate product recycling specifications in detail and define the main body of waste treatment. Its main framework can be roughly divided into two types: (1) Classified treatment system, which classifies various products in the city and belongs to different groups and departments for recycling and treatment. This method has the responsibility of people and can ensure the efficiency and quality of waste treatment. (2) Production responsibility system, that is, the manufacturer has the responsibility to deal with the products produced by itself. When the buyer's products are used and scrapped, they can be returned to the manufacturer for recycling. The manufacturer can reuse the products or decompose them without pollution according to the specifications (see **Figure 1**). Compared with the first method, this method uses more market mechanisms to promote manufacturers' optimization of product production attributes. When manufacturers need to be responsible for product processing, they will be more willing to study from the design level to maximize market benefits. In the construction of an ecological city, waste treatment should adhere to the principle of combining a classified treatment system with a production responsibility system, and the products in the city should be divided into recycling products and consumer products.

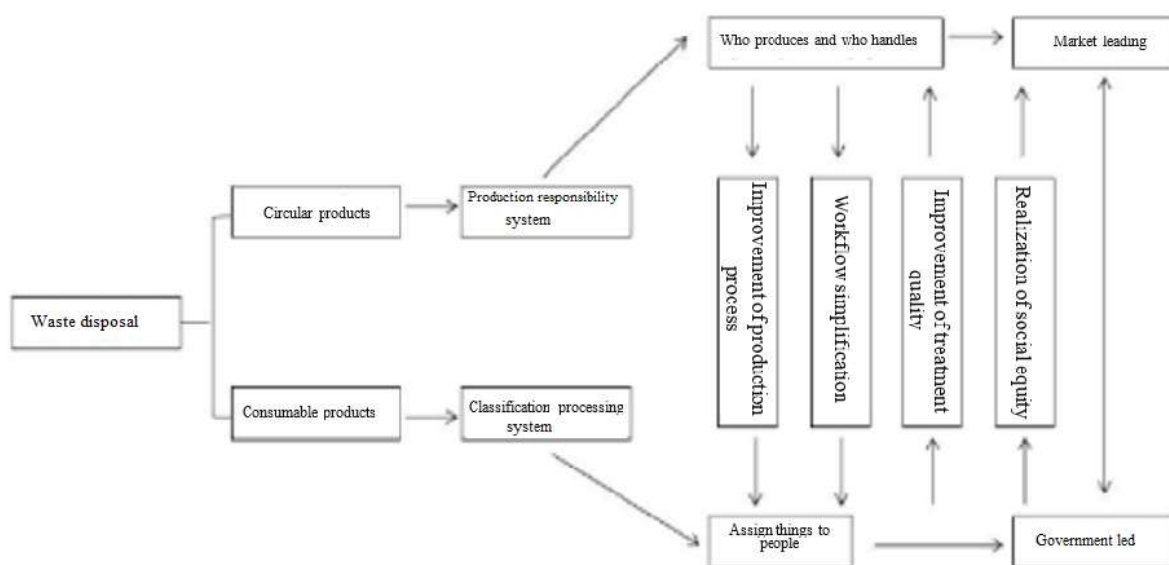


Figure 1. Waste treatment mechanism.

Recycling products refer to products that can be recycled through secondary development after use, such as TV sets, mobile phones, etc. Consumer products are consumer products that cannot be reused, such as batteries, garbage bags, etc. Recycling products should follow the treatment principle of the production responsibility system and take the market mechanism as guidance to realize the green environmental protection of products from design to treatment. Consumable products should adhere to the treatment criteria of a classified treatment system to realize high quality and high efficiency in product treatment.

In addition, with reference to the green building certification mark, cities can also formulate a set of certification standards for products and set different levels. Products with different qualifications can be rewarded with different levels of government patents or funds, so as to encourage enterprises to pay more attention to environmental benefits than economic benefits in the commodity R&D stage.

4.2. Build a perfect “city community” two-level food supply system and optimize the urban supply and demand environment

Since ancient times, rural areas have been the food supply areas of cities, and the objective geographical distance between urban and rural areas will inevitably lead to environmental pollution in the process of grain transportation. Therefore, this problem should be considered in the planning of an ecological city, so as to realize the self-sufficiency of the city to a certain extent, reduce transportation as much as possible, and realize environmental sustainability.

An ecological city should plan a “city community” two-level food production system so that urban residents can eat safe, green and pollution-free food to meet people’s basic living needs (**Figure 2**). At the urban level, grain is planted in combination with parks, squares and street green spaces in the city. The specific method is that the government department is responsible for the early cultivated land and soil loosening work, and the grain planting

area in the city is divided into large blocks with different kinds of planting. Each large block can be divided into several small blocks. Urban residents can choose the block as their own “vegetable garden” by claiming, and the government can also set up a science and education area in a certain area, educate children to recognize the fun of planting from an early age. At the community level, both public land and private land can be used to grow food. In community planning, community gardens, orchards and greenhouses that can be used for a long time should be designed to achieve sustainable development and gradually become popular. Individuals and families can grow food through roof gardens, front gardens, and greenhouses food production can also realize the recycling of waste in the process, use organic waste as fertilizer, and improve the planting capacity of soil^[10].

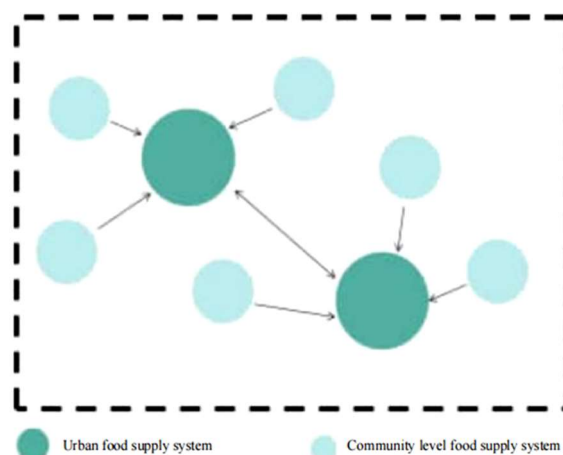


Figure 2. Schematic diagram of urban food supply system.

In addition, the establishment of a supply and demand network platform is also particularly critical, where buyers and sellers can publish information on the platform or obtain the information they need (**Figure 3**). In the early stages of the project, the market-oriented mechanism is weak and may require the local government to guide the establishment. After reaching a certain scale, it can be handed over to social organizations for management and operation, forming a network system of “government guidance, market operation, and public participation” to realize the integration of product production and sales.

4.3. Establish a convenient use system of urban public goods to promote the sharing of social resources

Urban public goods have a special definition in such a specific space as the city. Specifically, it is an indispensable product for urban survival and development that has the characteristics of general public goods within the city and is enjoyed by all citizens^[11]. The use of urban public goods can promote the maximization of urban resource benefits and reduce environmental pollution. In the construction of an ecological city, we should

strengthen the design of urban public goods, establish a convenient use system for urban public goods, improve the convenience of public goods through reasonable design, and then promote people's use of urban public goods. The public goods closely related to the construction of an ecological city in the city are mainly the urban public transport system. Therefore, the establishment of a perfect public transport system plays an indispensable role in promoting environmental improvement and realizing ecological harmony.

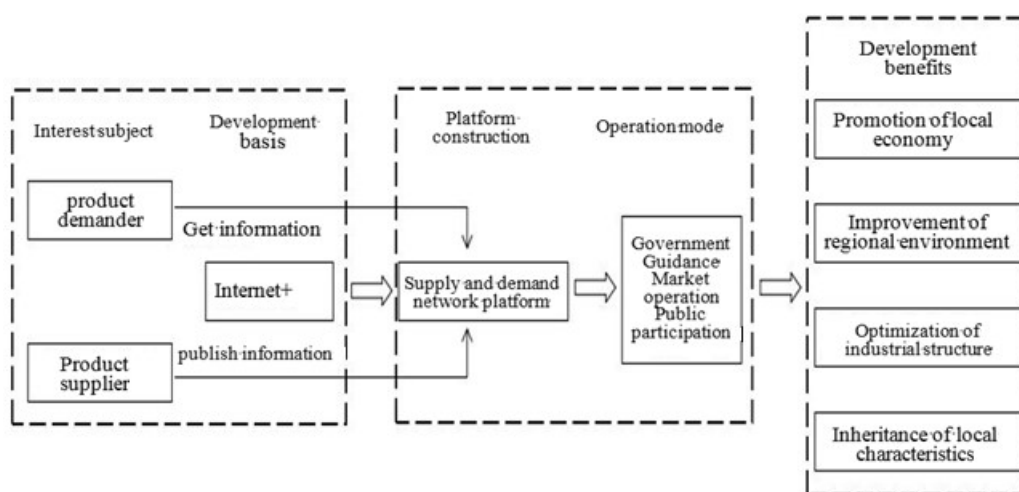


Figure 3. Construction of product supply and demand network platform.

The basic condition for establishing a sound public transport use system is to form a reasonable public transport structure, build a transport system based on the public rental system, rely on the carpooling system under the “Internet +” mode, and combine rail transit, bus, bicycle, and taxi. First of all, we should strengthen the connection between different modes of transportation, reasonably set the location and distance of stations, optimize the transfer environment of different means of transportation, optimize parking facilities, and maximize the utilization rate of public transport. Secondly, considering the needs of different people in the city, the urban public rental system can be improved in combination with the urban spatial layout, and rental points can be set in large communities, urban centers, and important urban nodes to facilitate people's use. Unlike the traditional rental system, it is not consumed according to time, but charged according to the driving distance of the

car. Residents can use it in the form of “monthly card”, “annual card”, etc. Even residential areas can promote the use of public rental systems in combination with their own conditions in planning and design. For example, in residential areas urban areas, or prosperous areas, there is a good living facility environment in their pedestrian area. During planning, there can be no or only a few parking lots, and public rental points can be set nearby, so as to guide people to reduce the use of cars in planning and design, so as to achieve the purpose of environmental protection. In addition, the improvement of the carpooling system under the “Internet +” system can optimize the urban traffic structure, realize semi-public ownership of private cars, reduce environmental pollution, promote the traffic of different people, and promote the improvement of urban cultural connotation (see Figure 4).

4.4. Strengthen publicity and education and promote the transformation of people's consumption concept

In addition to the guidance of the government and social institutions, the change in consumer concept is particularly important. Strengthen publicity and education to make people aware of the

relationship between consumption and environmental protection, realize the transformation of people's consumption concept from uncontrolled consumption concept based on traditional economic conditions to smart consumption concept guided by environmental protection, and form the smart consumption mode.

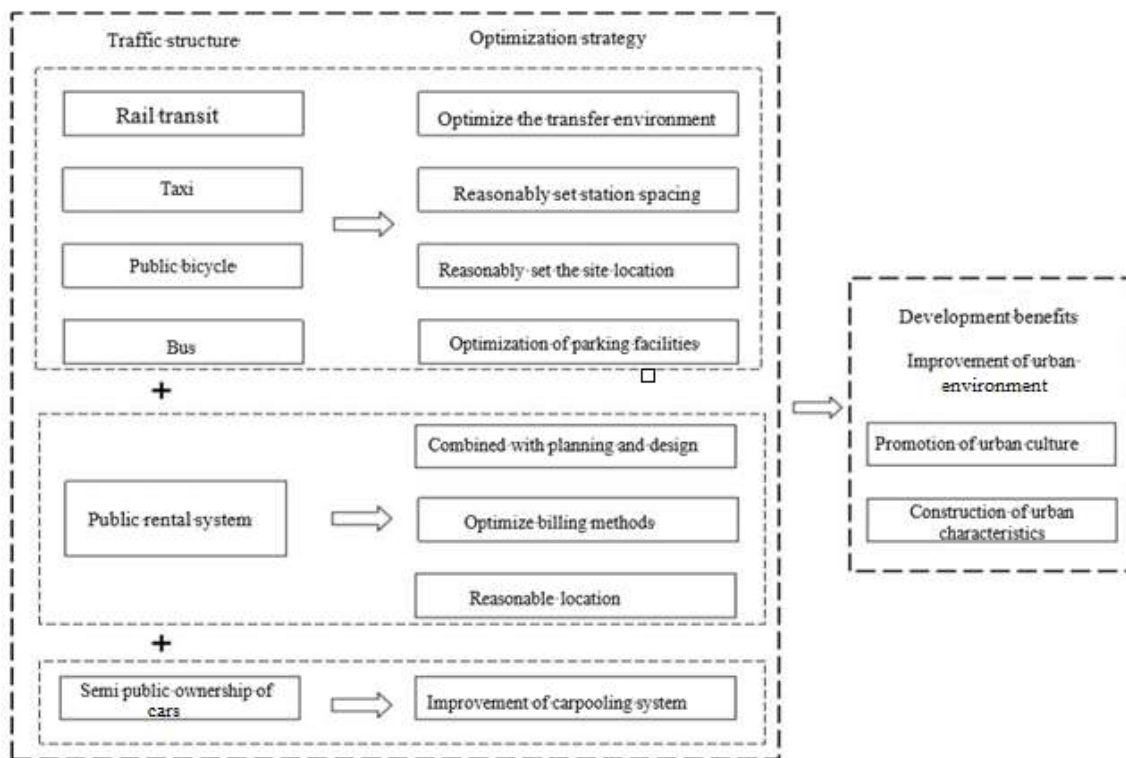


Figure 4. The public transport system of the ecological city.

Publicity and education mean that the guide disseminates information related to smart consumption through certain means to make people realize the importance and urgency of smart consumption so as to accept it psychologically and implement smart consumption in action. The purpose is to enable individuals and society to establish awareness of smart consumption and guide people to make appropriate responses to consumption phenomena^[12]. The publicity and education of smart concept in the construction of ecological city should start with three aspects: advertising, education and training, demonstration, and guidance. Advertising can use television, newspaper, network platform and various display boards as the publicity carriers to realize the universality of publicity activities. Education and training can be undertaken by communities,

enterprises, or governments, emphasizing the thoroughness of publicity activities; demonstration and guidance refer to the demonstration and driving role of stars and government officials, and pay attention to the pertinence of publicity activities. In addition, advertising, education, and training should grasp the mass, pioneer, and continuity of publicity activities, so that people can more clearly and thoroughly understand the connotation of smart consumption; the demonstration and guidance should adhere to authenticity. The idol must be his real-life state rather than a show, so that people can accept the smart consumption concept from psychology and action, and realize the environmental protection and rationalization of the consumption mode (see **Figure 5**).

5. Conclusions

Through the research on the concept connotation and development path of “smart consumption”, we can better combine it with the planning and construction of ecological city to build an ecologically sustainable consumption mode. It

also makes us understand that in the process of ecological city construction, in addition to the application of ecological technology, we should also consider the ecological sustainability of the whole city from the perspective of people’s consumption styles.

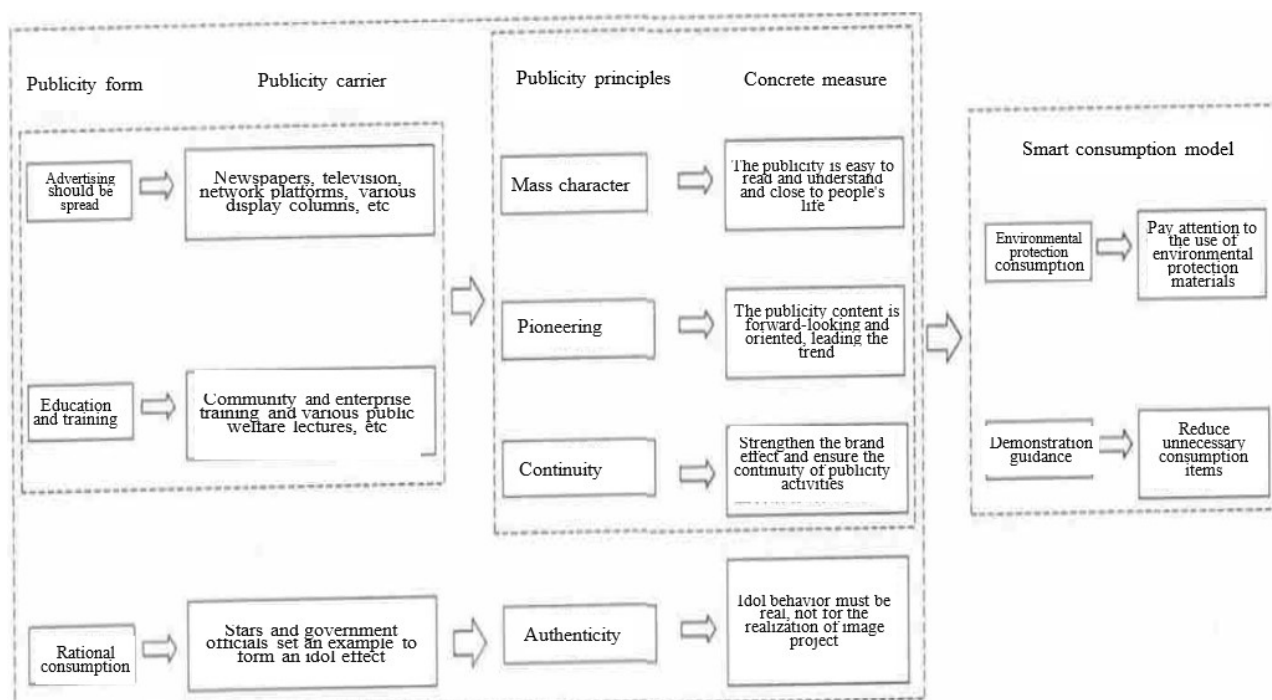


Figure 5. Publicity and education system of smart consumption concept.

Conflict of interest

The authors declare no conflict of interest.

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