A STUDY OF THE MARKET DEMAND OF MOBILE SMART HOUSE UNDER THE SMART CITY DEVELOPMENT BACKGROUND

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ABSTRACT

The smart city development is the tendency of China's urban development. The implementation of smart city provides a guiding direction for the development and integration of the whole industry. The double carbon policy of carbon emissions peak and carbon neutrality is the primary goals in China's energy transition and environmental protection in the coming decades. Mobile smart house can meet the needs of users in the mobile lifestyle, energy conservation, energy management, smart home and smart house, and support and promote the smart house policy and double carbon policy. Through the secondary data collection and literature analysis methods, the paper concludes that how mobile smart houses meet people's needs in energy and information and analyzes the kind of free life that mobile smart houses can help people achieve. The SWOT method is used to analyze the advantages and disadvantages of mobile smart house, to provide solutions for the development direction of the mobile smart housing products and for the aim of better meeting the market demand.

Keywords: Smart City, Mobile Smart House, Market Demand

1. INTRODUCTION

The trajectories of human development can be divided into two dimensions: "Energy" and "information". Ian Morris, a professor in Stanford University, proposes that "energy" is a measure of civilization. Some scholars point out that China's every major dynasty change, or turmoil all lead to a large number of people's death, after which a large amount of vacant lands would be available for farming, and the whole social conflict could be solved. Even in modern, urban residents are forced to leave the city and become destitute and homeless because of partial wars or natural disasters, resulting in a great many refugees and casualties. As the main form of human habitation, cities have very efficient the energy supply system already, but

still have some hidden dangers. When some force majeure occurs, cities cannot provide the necessary energy for residents, which reflects the significance of the mobile smart house as a part of the energy management of individuals and organizations. China's carbon emissions peak and carbon neutrality policies are major policies on the energy transition and management, which will affect the whole society and environment in China in a long term.

Another trajectory of human development is information; As human development creates and accumulates more and more energies, how to mobilize and organize these energies becomes an urgent issue to be solved. Information is the key to mobilizing and directing these energies. In terms of the competition of civilization, more energies can be deployed and keep dominant, apart from this, it is also necessary to have stronger organizational ability and communication ability, which depend on the transmission of information. In modern, technological revolution is usually connected with information, from telegraph, telephone, radio broadcast, television, radar, computer, Internet, mobile communication, to today's hit terms such as big data, cloud computing, artificial intelligence, block chain, quantum computing and quantum communication, are all related to information. Information, therefore, is another thread running through human history. As the main direction of urban planning in China, smart cities collect information at the micro level, analyze and process it at the macro level, and then influence the individual's behaviors and feelings, carrying out an overall management of urban operation from the perspective of information to improve the life standard of residents and enhance the efficiency of social operation.

China has actively confront the challenges of increasingly serious climate crisis, shortage of the clean energy and the overall improvement of social operation efficiency, and formulated a series of solutions and policies, including smart city and double carbon policies. Mobile smart houses pursue to provide a free-living state compatible with energy management and information collection management functions for people. It is an organic integration of smart cities and carbon emission peak and carbon neutrality, which has positive significance for promoting national planning and meeting people's needs.

2. LITERATURE REVIEW
2.1. CONCEPTS RELATED TO THE SMART CITY SYSTEM

Zhang (2015) (1) The smart city system is an urban system form that developed through well integrating the intelligence of emerging information technology and the wisdom of people in the urban context, with the aim to promote the overall optimization of urban development. (2) The smart city system includes elements five major subsystems such as strategic system, social system, economic system, supporting system and spatial system. From the perspective of its structure, the hierarchies of the smart city system is divided into three layers including the physical layer, the activity layer, and the strategic layer. (3) The system model of smart city describes the major component factors of a complete smart city system and expresses the connection and function mode of different factors according to certain construction forms, revealing the internal mechanism of the formation, operation, and development of smart city system.

2.2. CONCEPTS RELATED TO CARBON EMISSION PEAK AND CARBON NEUTRALITY

Wang (2022) In 2020, China proposed that it strives to reach carbon emissions peak before 2030 and realize carbon neutrality by 2060, at the 75th session of the UN General Assembly. This goal is proposed on the guidance of the long-term temperature control goal proposed in the Paris Agreement, to advocate green and low-carbon development and realize carbon emission transformation This goal's realization requires the cooperation and coordination of economy, energy, and technology in the whole society.

2.3. CONCEPTS RELATED TO THE MOBILE SMART HOUSE

Mobile intelligent house aims to meet the people's needs in pursuing houses for a free life. It is mainly featured with "motility" of movement and patchwork, "habitability" represented by the passive energy saving and self-sufficient energy and to energy, communications, and "smartness" represented by its intelligent management system integrated through energy, communications, and smart home services. Present mobile smart houses' appearance is designed according to the specifications of container, which is convenient for transportation. Their size is also very convenient, whether for land transportation by sea or for stack and combination. They can achieve needs in different situations combining with different functions. And such houses with this specification are larger than mobile homes such as RV, the layout design of the house can be customized and modified according to the user's preferences, more suitable for long-term use, and they will not make people feel narrow like in RV of small inner space. Containers are used mostly because the space is big enough, which can achieve a high standard of energy saving, clean air, humidity control, quiet and comfort, are equipped with power generation, storage, communications, and intelligence management system to provide adequate space. This lays a foundation for mobile smart houses to meet people's needs at both energy and information levels. Due to the impact of the COVID-19 epidemic, people's living, study, work, and consumption conditions have changed, and increasingly more people look forward to an unconstrained lifestyle. Mobile smart housing products are in urgent need of innovation to meet the ever-increasing market demand.

2.4. MOBILE SMART HOUSE AND DOUBLE CARBON POLICY

The passive energy saving system used in the mobile smart houses can comfort with the energy-saving principle of the double carbon policy. The mobile smart houses can generate electricity by wind and constitute a power management system to increase the supply of green energy, following the double carbon principle. Mobile smart houses can help people have enough energy and realize energy freedom and follow the goals of dual-carbon policy to achieve clean energy and reduce carbon at the same time.

2.5. MOBILE SMART HOUSES AND SMART CITIES

Smart mobile houses themselves are featured with customizable products, and the natural characteristics of intelligent management of energy, information, home, and equipment, being able to collect, manage, transmit, and analyze data and systematically control the energies and electrical appliances, as a miniature version

of a smart city. Smart mobile houses meet people's needs in the information management, provide intelligent solutions, and greatly expand the layout of smart cities, becoming the outpost stations of smart cities.

2.6. CONCEPTS RELATE TO THE MARKET DEMAND

Market demand analysis is to estimate the market size and the potential demand of products. Influential factors of the market demand analysis include: 1. Price. 2. Preference 3. Income 4. Related commodity prices 5. Expectations. Major trend: Key global tendency of relevant industries (products and services). Market demand: Provides information about the consumer's needs and issues affected by the market environment. Market size: Provide statistics on the amount of potential customers. Market opportunity: What businesses (products and services) can be done to meet the market.

2.7. RESEARCH METHOD

This study mainly adopts the secondary data collection method to study the status quo of the mobile smart house and analyzes the advantages and disadvantages of the mobile smart housing market through SWOT analysis, with the specific research methods as follows: 1. Secondary data collection method. The main research of this paper is to study the development direction of mobile smart houses in recent years by reading the research literature of mobile smart houses and the statistical data of major research institutions, so as to obtain first-hand information of mobile smart houses and seek new development direction of mobile smart houses market on this basis. 2. SWOT analysis model is mainly used to understand the problems faced by the mobile smart housing market and countermeasures.

3. RESULT
3.1. EXTERNAL ENVIRONMENT OF MOBILE SMART HOUSES

China spares no effort to realize the "aspiration of the people to live a better life", strengthen to promote the environmental protection, energy saving, energy transformation and the development of the smart cities and smart government, which is China's goals led by the communist party of China, therefore, relevant industries and industries will obtain support from the Chinese government through implementing policies or providing funds or talents; China strives to develop the real economy and lower interest rates to facilitate loans and financing for micro, small and medium-sized enterprises. All industries are making innovative development, especially in smart manufacturing, 3D printing, energy conservation and environmental protection, clean energy, artificial intelligence, big data, and smart cities, which are in line with the policy direction. Relevant restrictive laws and regulations are standardized, which is conducive to the control of product quality, technological innovation, and industry development; As the COVID-19 epidemic is continuing, Chinese people's lifestyles have changed, that is the online learning and work have become popular, which has laid a foundation for more people to realize outdoor life. From 2019 to 2021, the market of outdoor goods and services has expanded dramatically, and more and more people enjoy outdoor travel and life. Huang (2014) With the development of fast-changing science and technology, technologies such as pilotless driving, large die-casting, new batteries, digital twins, and intelligent factories have made rapid progress. It is expected that there will be a large range of L4 pilotless environment in China in 2026, making people's travel

and cargo transportation more convenient and safer with lower cost. Yu (2022) As the wide spread of 5G base stations and the satellite system represented by Beidou will provide more convenient satellite communication, the full coverage of network and communication will be realized in the future, and any place in China will receive 5G or satellite information and realize real-time communication. Digital technology will penetrate into every aspect from government governance and enterprise management to life, so that the mart government, smart city, and smart factory will be widely applied. Carbon trading and carbon accounts will be expanded from the state and large enterprises to micro, small and medium-sized enterprises, and individual users, therefore, that everyone makes efforts to reduce carbon and protect the environment will be a new common status.

3.2. INTERNAL ENVIRONMENT OF MOBILE SMART HOUSE INDUSTRY

Mobile smart houses have many competitive products, many of the building. Mobile smart houses have some difference from other mobile home in the mobile flexibility, diversity of combinations, insulation performance, sealing performance, air purification, humidity control, sound insulation performance, shading performance way, form of power generation and energy storage, energy management, water treatment, wireless communication, smart home, intelligent integration.

Table 1

Table 1							
S/N	Function category	Mobile smart house	Self-propelled car	Car-trailer	Container house	Prefabricated house	Mobile cabin
1	Mobile flexibility	OK	Very good	OK	General	Poor	General
2	Diversity of combinations	Very good	Poor	Poor	Very good	Very good	Poor
3	Thermal insulation properties	Very good	General	General	General	General	Poor
4	Sealing performance	Very good	General	General	General	General	Poor
5	Air purification	Very good	General	General	General	General	Poor
6	Humidity control	Very good	General	General	General	General	Poor
7	Sound-proof	Very good	General	General	General	General	Poor
8	Sunshade performance	Very good	OK	General	General	General	General
9	Generation forms	Wind-Solar photovoltaic generation	Wind-Solar photovoltaic generation	Wind-Solar photovoltaic generation	Wind-Solar photovoltaic generation	Wind-Solar photovoltaic generation	Wind-Solar photovoltaic generation
10	Energy storage form	Gravity, battery	Storage battery	Storage battery	Storage battery	Storage battery	Storage battery
11	Energy management	Very good	OK	OK	OK	OK	OK
12	Water treatment	Very good	OK	OK	OK	OK	OK
13	Wireless communication	Very good	OK	OK	OK	OK	OK

14	Intelligent home	Very good	OK	OK	OK	OK	General
15	Intelligent integration	Very good	General	General	Poor	Poor	Poor
16	Appearance design	Various	General	General	Few	General	General
17	Inner space	Various	General	General	OK	OK	General
18	Design life	Long-term	Long-term	Long-term	Medium term	Long-term	Short term
19	Supporting services	Various	General	General	Few	Few	Few
20	Price	High	High	Medium	Low	Medium	Low

Mobile smart housing industry concentration degree of competition is mainly in the RV products, prefabricated houses, container houses rare relative on scale, the capital and technical strength of RV enterprises are solid, enterprises of prefabricated house and container manufacturing increase dramatically because of the factors such as the increasing demands influenced by the COVID-19 epidemic, while the exportation of RV, container houses and prefabricated houses increase sharply. Because the mobile housing market is in the early stage of the industry's life, the quality of various products is uneven, most of the products can only meet the basic needs of users, leaving a huge innovation space for the products; The threshold of new companies and products is relatively low, but most of them are not large-scale enterprises and do not have large-scale capital investment. At present, the demand of mobile housing market is growing rapidly. The buyers do not have enough bargaining ability to communicate with the manufacturers with reliable brands, quality, and service.

3.3. ANALYSIS OF MARKET DEMANDS

Major trend: Together China's energy policy and the development of smart cities, with the relevant technological breakthroughs and sufficient relevant talents, makes mobile smart houses a good prospect. Market demand: Yang (2021) The global COVID-19 pandemic has also driven the upgrading demand for "commercial and public" contactless facilities, so that the portable "ready-made houses" become the need for urban construction. Increasingly more people expect to have a free life, causing the demand for mobile homes increasing. According to the August 2022 Cross-border index released by Alibaba's international website, mobile houses from China have become a global hot seller after the outbreak of COVID-19. Market size: Liu (2022) The mobile housing market has been further expanded, with the online transaction volume increasing by 117% since 2020, and the search volume of related keywords increasing by about eight times. In the next three years, one third of the main buildings in the overseas market will be prefabricated. The prefabrication will be widely applied in hospital, commercial, industrial, civil, and other fields.

4. SWOT ANALYSIS OF THE MOBILE SMART HOUSE
4.1. ADVANTAGES OF THE MOBILE SMART HOUSE

S1 provides high-quality product experience to meet the needs of users to pursue a free lifestyle all the time.

S2 provides mobile smart houses with better performance in the same price range.

S3 applies advanced technologies such as digital design (BIM), 3D printing, intelligent manufacturing, and intelligent logistics.

S4 creates an innovation platform to continue to research and develop new products and demands.

4.2. DISADVANTAGES OF THE MOBILE SMART HOUSE

W1 lacks professional accumulation, without mass production of the public-need products.

W2 has not yet formed the industrial cluster, and the coordination between supply chains is not smooth.

W3 has not perfect management system and has not been properly integrated and utilized internal and external resources.

W4 is not well known, with no influence.

4.3. THE OPPORTUNITY OF MOBILE SMART HOMES

O1 obtains great policy support under a good external situation.

O2 is expanding its market for meeting the domestic and international demand.

O3 continues to improve the related technologies, enabling more product function to be expanded and performance to be developed.

O4 has abundant talents, especially related professional talents.

O5 has sufficient funds, with various financing channels relatively smooth.

4.4. THE THREAT OF MOBILE SMART HOMES

T1's flow of people and goods, and various links including design, research and development, production and sales are affected by the ongoing COVID-19 pandemic.

T2 increases wages, with volatile raw material and foreign exchange prices, due to the global economic volatility.

T3's market is not standardized enough, without industry standard in the aspects of product quality and service.

T4's competitive products lack a unified interface, being difficult to meet the needs of users through close combination.

4.5. COUNTERMEASURE ANALYSIS OF MOBILE SMART HOUSE

SO, Countermeasures: S1+S2+O1+O2= Under the favourable situation of policy support and market expansion, using the advantage of cost performance to meet the needs of more people as far as possible; S3+S4+O3+O4+O5= Improving the innovation platform when the talents and capitals allow, and developing more innovative products, precipitation talent and technical advantages, with advanced technologies.

ST Countermeasures: S2+S2+T3+T4= Taking the advantage of product quality and price, and leading to develop common interface and standard, definition standard and users' demands, if there is no standard or common combined interface in the market; S3+S4+T1+T2= Creating online work programs and improving R&D and innovation efficiency using network technology, and reduce personnel and operating costs, when it is affected by COVID-19 epidemic and the fluctuation of wage and price;

WO Countermeasures: W1+W2+O3+O4+O5= Adjusting the talent and financing strategies, increasing the investment in R&D, production, and marketing, expanding the experience accumulated in production and promoting the efficient development of the industrial chain. W3+W4+O1+O2= Taking advantage of the environment and government policies and market expansion to coordinate the management system of internal and external resources, build the brand and expand its influence.

WT Countermeasures: Closely concerning users to help them solve problems is the significance of mobile smart houses' existence. The key resources should be invested in research and development as a matter of priority, production, and sales of high-quality products to meet the needs of users and increases in their own management, use of first principles, pursuit of meet the demand of end users, precipitation of enterprise core competitive advantage, and gradually achieve large-scale product scale, scale, service, and innovation.

5. SUMMARY

The market of mobile smart house is in its beginning stage, so that people may not understand their more needs for energy and information before understanding it, and the market still needs to be developed. However, China's policies and market have a positive impact on it, especially the smart cities and double carbon policies directly boost its development. In addition, the ongoing COVID-19 epidemic has stimulated people's needs for more environmental protective, smart and free products. This means that the mobile intelligent housing needs to grasp the opportunity, expanding market share, experience, and innovative products to meet demand and develop the internal management of enterprises, with the purpose of being ready to serve more people and save more energy for the society, providing people with more intelligent service, and contributing to the implement of double carbon policy and the development of smart cities.

6. SUGGESTIONS

It is an important mission of mobile smart houses to meet the needs of users and respond to the policies and environmental protection. Practitioners in the mobile smart house industry should take joint actions to develop industry collaboration mechanisms and product standards and discuss the cooperation framework and common product interface with the industry of competitive products. This is not only of great significance for the mobile housing industry to form product quality standards and cooperation framework, expand the market together and meet the needs of users, but also beneficial to meet the policy orientation and the general trend of energy conservation and environmental protection. It is our common benefit.

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