

The Dilemma and Countermeasure of Technology Application of State-run Nursing Home Facing Smart Endowment

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Abstract—Smart endowment does not necessarily bring low cost and high efficiency to state-run nursing home. Based on the theory of "technology enactment framework", this paper analyses the following dilemmas in technology enactment of state-run nursing home: insufficient utilization of information technology, insufficient integration of information technology and organizational forms, insufficient matching institutional arrangements for optimizing the utilization of information technology, and insufficient evaluation of the application results of information technology. In view of the above difficulties, the corresponding countermeasures and suggestions are put forward: promoting the construction of the smart endowment system, promoting the reform of the organizational form of state-run nursing home, comprehensively investigating the degree of technical implementation, and strengthening the evaluation of the application results of information technology.

Keywords—smart endowment; state-run nursing home; technology enactment; dilemma; countermeasure

I. INTRODUCTION

Since the 20th century, China has entered the rapid development stage of population aging. According to the National Bureau of Statistics, 24.9 million people aged 60 years and above account for 17.3% of the total population by the end of 2017. With the acceleration of social aging in China, the demand for endowment services has increased dramatically. Traditional endowment model can not solve the outstanding problem of diversification of demand and structural imbalance of supply of endowment services. In 2017, Ministry of Industry and Information Technology, Ministry of Civil Affairs and National Health and Family Planning Commission issued the Plan of Action for the Development of Smart and Healthy Endowment Industry (2017-2020). It is pointed out that smart endowment based on information technology such as Internet of Things, cloud computing, big data and intelligent hardware can realize effective docking and optimize the allocation of resources among individuals, families, communities, institutions and health care for the aged, promote the smart upgrading of health care service for the aged, and improve the quality and efficiency of health care service for the aged. It can be seen

that the promotion of smart endowment can play a positive role in dealing with aging and improving the quality of endowment services. However, state-run nursing homes, which play a supporting role in China, are facing some difficulties in the promotion of smart endowment. Under the current endowment system framework, there are many challenges in the integration of traditional endowment methods and information technology. The new information technology not only does not bring low cost and high efficiency of endowment, but also brings some new problems in the integration of organizational resources and the application of technology. Professor Jane E. Fountain's "technology enactment" theoretical framework clarifies the relationship among information technology, organization and system, which can help to analyze the current situation and existing problems of the application of smart endowment technology. This paper intends to analyze the current dilemma in the implementation of smart endowment technology in state-run nursing home in China, in order to understand the key obstacles in the application process of the technology in state-run nursing homes, and puts forward countermeasures for the application of smart endowment technology in state-run nursing homes to improve the construction of relevant service networks, meet the diversified needs of endowment services, and promote the construction of a healthy China.

II. THE CONNOTATION OF SMART ENDOWMENT CONCEPT

The concept of smart endowment is based on the concept of "smart city". The British Life Trust Foundation first proposed "full smart old-aged system". That is to say, using advanced information technology means, the elderly at home are provided with material, interconnected and smart endowment services. The rudiment of the concept of "smart endowment" in domestic academia is "digital endowment" put forward in 2007. On this basis, the concepts of "information endowment", "scientific and technological endowment", "network endowment" and "smart endowment" gradually developed, and finally matured into "smart endowment" in 2013. Professor Zuo Meiyun believes that smart endowment uses modern technology such as

information technology to support the life services and management of the elderly in terms of living, security, health care, health rehabilitation, entertainment and leisure, learning and sharing, so as to realize the friendly, independent and personalized intelligent interaction between these technologies and the elderly. The purpose is to make the elderly happier, more dignified and valuable [3]. Zheng Shibao believes that the concept of smart endowment is to use information technology and intelligent technology to carry out all-round, online and offline, and comprehensive endowment service combining medical treatment with endowment [4]. Bai Mei and others put forward that smart endowment is a new modern endowment model which uses modern technology. Through various sensors, and combining with traditional family, community, institutions and other ways of providing for the aged, smart endowment should meet the material and spiritual needs of the elderly, and aims to create a more healthy, comfortable, safe and convenient environment for the elderly [5]. Combined with the above concepts, the author believes that smart endowment uses the current new generation of information technology products to achieve effective docking and optimal allocation of individuals, families, communities, institutions and health endowment resources, to promote the intelligent upgrading of health endowment services, to meet the diversified and multi-level needs of the elderly, and to improve the efficiency and level of the quality of endowment services. Its connotation includes three aspects. One is to use the new generation of information technology, including Internet of Things technology, computer network technology, and intelligent control technology [6], to build smart endowment platform [7], smart endowment system and smart endowment terminal. Second is the endowment service network [8]. The system effectively connects individuals, families, communities and institutions (endowment institutions, hospitals, etc.) to form a network, diversified endowment service model. Third is to promote the realization of high-quality and efficient services [9]. By using modern science and technology, it is available to reduce the cost of manpower and time, and improve the quality of services on demand. Smart endowment technology mainly uses the new generation of information technology, such as Internet of Things, cloud computing, big data and artificial intelligence. Its implementation is based on capital investment, facility construction, institution introduction, product development, personnel training, the cooperation of nursing personnel and family members, etc.

III. REVIEW OF RESEARCH ON SMART ENDOWMENT

Domestic and foreign scholars have rich research on smart endowment. The research on smart endowment mainly

focuses on the following aspects. Firstly, the research on the demand for smart endowment mainly includes the content of information demand for home-based endowment based on community service [10], the elderly's demand for social networking sites [11], the main factors influencing the acceptance of smart endowment technology by the elderly in the community [12], and the survey of the elderly's perceptive needs and preferences for "smart home" sensor technology [13]. The second is the study of the smart endowment service system, including the development path of the smart endowment service system [14], the construction of the smart endowment service system based on individual needs [15], and the necessary guarantee for the smart endowment service system to become more scientific and standardized [16]. Third is the research on the realization path of smart endowment. It is necessary to foster a multi-level industrial system for the aged service industry [17], improve unified government planning, promote enterprise participation in innovation and social collaboration [18], and develop the intelligent assistant technology [19], etc. Fourth is to study the limitations of smart endowment. Smart endowment industry has not yet formed a scale [5]. And the construction of smart endowment service information platform in some areas is slow, lack of overall planning and overall consideration [20], and so on. Through the relevant research on the existing smart endowment in academic circles, it is found that few documents have made the studies from the perspective of the application of technology in state-run nursing home. In view of this, it is necessary to deepen the research on the implementation of technology in state-run nursing home and improve the application effect of technology in state-run nursing home.

IV. DILEMMA IN TECHNOLOGY APPLICATION OF STATE-RUN NURSING HOME: BASED ON TECHNOLOGY ENACTMENT FRAMEWORK THEORY

In the process of studying the effect of modern information technology on the Federal Government and the Army of the United States, Professor Jane E. Fountain put forward the theory of "technology enactment framework" around the information technology, and the theory of organization and system, explained the organizational and institutional challenges in the construction of virtual government, provided a rigorous research method for analyzing the core elements of organization, network and system, and also provided a new perspective for us to better observe the application status of smart endowment technology, as shown in "Fig. 1".

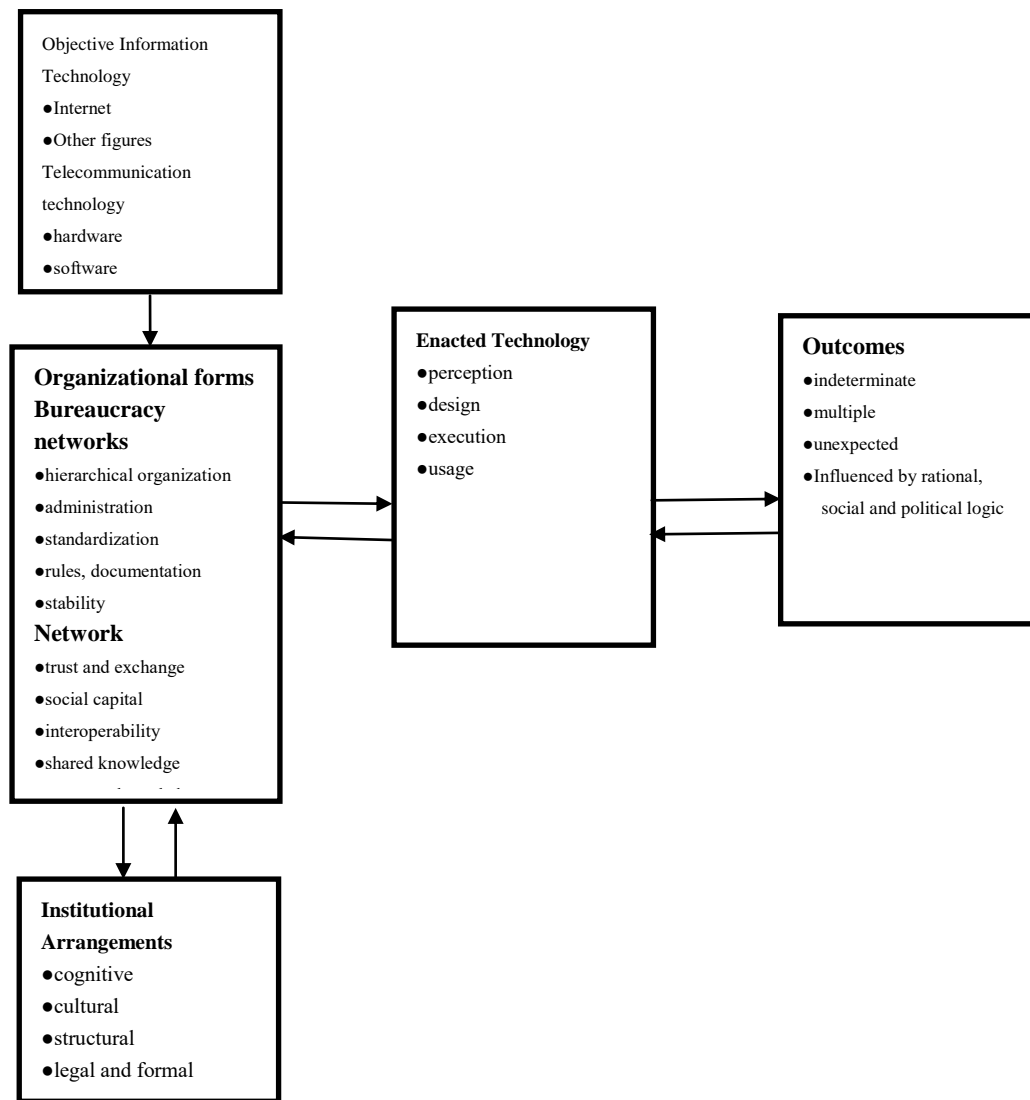


Fig. 1. Technology enactment: a framework for analysis [21].

The technology enactment framework includes five elements: first, objective information technology: in the application of smart endowment technology, it mainly refers to the Internet of Things, the Internet, cloud computing, big data, intelligent hardware and so on. Professor Jane E.Fountain believes that these information technologies are endogenous and constantly changing in the process of design and application; second, the organizational forms: and it mainly refers to bureaucracy system and inter-organizational network. Institutions and organizations enable information technology to be implemented. Conversely, information technology transforms organizations and systems to better adapt to the development of technology; third, institutional arrangement: it mainly refers to the original institutional system and the institutional arrangements matched with the reform and innovation of information technology; fourth, the enacted technology: it refers to the information technology that is perceived, defined, designed and used by the individual in a subjective way; fifth, the outcomes: it is the

outcomes of the implementation of existing rules and network relationship. Analyzing the application of smart endowment technology based on the five elements of technology enactment framework, it is helpful to comprehensively understand the obstacles of technology implementation in state-run nursing home, and to analyze the dilemma and countermeasures of the development of smart endowment in state-run nursing home.

A. Objective Information Technology

The main problems existing in the field of smart endowment are the insufficient use of objective information technologies such as Internet, Internet of Things, cloud computing, big data, intelligent hardware and so on. It is reflected in the uneven infrastructure construction of state-run nursing home. Some of nursing homes have completed the pre-construction of smart endowment, including smart endowment platforms, systems and intelligent terminals. However, some of nursing homes are still in the initial stage

or construction of smart endowment, lacking the basis of information technology application. Second, the function of information technology has not been fully developed. Although some state-run nursing homes in the construction of smart endowment have introduced smart endowment system, they have not adapted to the new information system from the administrative level to the level of nursing staff for the aged. On the contrary, they have retained a large part of their business from the system. Third, the hardware configuration is not in place, and the software systems are incompatible.

B. Organizational Forms

In the framework of technology enactment, bureaucracy is at the center of the framework. At the level of hierarchical structure, the traditional management of state-run nursing homes regards the government as the sole power center [22], which covers all the decision-making process on the development of state-run nursing homes. The establishment of state-run nursing homes, the sources of funds, the arrangement of elderly residents, the introduction of talents, logistical services and infrastructure construction all follow the instructions of the state or competent authorities, and the internal management of state-run nursing homes also follows the instructions of the state or competent authorities. It is a hierarchical management structure, that is, the hierarchical system of departments is adopted in internal administration. At the standardization level, smart endowment is a new endowment model, lacking industry service standards. At the level of jurisdiction, some state-run nursing homes adopt the mode of combination of medical care and endowment, and accept the dual leadership of civil administration and health care committee. Although it is conducive to improving the endowment service system, it also brings some difficulties of dual leadership of state-run nursing homes: imperfect policy of combination of medical care and maintenance, unbalanced supply and demand of resources, and information islands.

C. Institutional Arrangements

In terms of cognition, some elderly people are affected by the traditional concept of child-rearing and old-age prevention, cultural level and living habits, and have low recognition of smart endowment. They don't adapt to smart endowment because of fear of science and technology [23]. The cognitive characteristics of the elderly also determine that it takes a long time for them to accept the new information technology. In terms of culture, "filial piety culture" is deeply rooted in traditional Chinese concepts. The supportive culture of family endowment is still in the mainstream. In addition, occasional media reports of abuse of the elderly in nursing homes have led to conflicts by citizens and the elderly in their ideological concepts, and they do not recognize that smart endowment in state-run nursing homes can bring about a happier life in their later years. As far as social structure is concerned, China has entered an aging society as early as the end of last century. The proportion of the elderly population has increased, and the pressure of endowment services has increased. Because of the large population base, the long-term low birth rate and the prolongation of life expectancy, the trend of family

miniaturization and empty nesting is obvious [24]. The function of traditional family endowment is weakening, and the pressure of institutional endowment is increasing. In terms of law, the construction of smart endowment service system is still in its infancy. At present, the state has issued a series of policies related to smart endowment. However, there is no legal guarantee mechanism matching the application of smart endowment technology, and there is no open, transparent and standardized information technology access system.

D. Enacted Technology

There are limitations in the subjective perception, definition and use of smart endowment information technology by administrative staff and front-line nursing staff of state-run nursing homes. According to technology acceptance model, users' perceived usefulness and perceived ease of use of information technology will affect users' attitudes toward information systems and then affect users' use of the system [25]. Some of the administrative management personnel and core technicians of nursing homes can conscientiously perceive the role of smart endowment system, platform, terminal and other information technology in improving the quality of endowment services. On the basis of mastering its application skillfully, they can put forward feasible modification suggestions to software enterprises for smart endowment software. Although some nursing homes have introduced and built some smart endowment systems, they do not have adequate perception of the new information technology from the management level to the front-line nursing staff. They only use the smart endowment system as a way to maintain the current relationship between society and network, but do not give full play to the role of smart endowment technology.

E. Outcomes

The introduction of smart endowment information system into state-run nursing homes has multiple impacts on their traditional endowment model. The positive aspect is that it integrates modern technology. Through high-tech technology, equipment, facilities and scientific and humanized management, it not only improves the quality and efficiency of service work, but also reduces the cost of manpower and time, which enriches the material life and the spiritual life of the elderly. However, there are also unexpected results. In the process of technology implementation, technological reform only changes some working methods, but the traditional thinking mode and working relationship still exist. Participants in the network quickly adjust the new "work requirements" and still obtain corresponding benefits according to the traditional "interactive relationship".

The application results of technology in state-run nursing home are also influenced by rational, social and political logic. Institutions enter the technology execution framework in the form of cognitive, cultural, normative and social structural embodiment. Smart endowment involves many levels of system. Therefore, the results of technology application are diverse, unpredictable and non-decisive. Even

if different nursing homes introduce the same smart endowment technology software, the application effect may be quite different. The result comes from technological, rational, social and political logic. The applicability of technology is different. Whether technology is used in a rational way and so on will affect the application of intelligent endowment technology in state-run nursing home, resulting in different consequences.

V. COUNTERMEASURES AND SUGGESTIONS ON PROMOTING THE APPLICATION OF SMART ENDOWMENT IN STATE-RUN NURSING HOME

China entered the aging society ahead of time when it did not enter the modernization. The acceleration of aging will inevitably lead to serious structural shortage of labor force, which will lead to the situation of "no money for the aged" and "no one for the aged" [27]. Smart endowment conforms to the development of the times. Combined with state-run endowment, it can promote the improvement of the quality of endowment service, and improve the social endowment service system based on home, community and institution. However, when information technology is introduced into state-run nursing homes, there will be many difficulties. It is necessary to integrate "technology" smoothly into the management and service system of state-run nursing homes; state-run nursing homes can better achieve "responsibility and effectiveness". According to the enlightenment of technology implementation framework theory, it is needed to improve the quality of service provided by state-run nursing homes from four aspects.

A. Promoting the Construction of Smart Endowment System

On the one hand, the government strengthens the top-level design and promotes the construction of the smart endowment system. The government should create a good legal environment, policy environment, social environment and cultural environment for smart endowment, improve the matching legal guarantee mechanism for the application of smart endowment technology, establish an open, transparent and standardized information technology access system, and build a standard system for smart endowment, so as to provide policy support for the application of smart endowment technology. On the other hand, it is necessary to strengthen the research on the demand of smart endowment services, dock the demand and supply, and improve the application effect of information technology.

B. Promoting the Reform of Organizational Form of State-run Nursing Home

On the one hand, the hierarchical organization is flattened. In order to adapt to the development situation of smart endowment, the administrative decision-making power of state-run nursing home needs to be decentralized and the freedom of management should be increased appropriately, so as to facilitate the scientific and democratic decision-making of state-run nursing home. On the other hand, it is necessary to improve the relevant policies on the combination of medical treatment and endowment, clearly

divide the responsibilities of civil affairs, health care commission and other government management departments, and avoid the embarrassing situation of "double management, or no management" in state-run nursing home, so as to achieve the balance of supply and demand of resources, information sharing and so on.

C. A Comprehensive Survey of Technical Implementation

After entering the state-run nursing homes, the information technology related to smart endowment will experience a process of being perceived, defined and "designed" before being adopted. Therefore, the "enacted technology" is no longer "objective information technology", but "degraded technology", resulting in a part of information technology being perceived to be inadequate and unable to play its full role, or being perceived but not being executed. Therefore, it is necessary to comprehensively examine the differences between "enacted technology" and "objective information technology" in order to ensure the consistency between "enacted technology" and "objective information technology". On the other hand, state-run nursing homes should strengthen the training of administrators and front-line nursing staff, enhance their ability to perceive information technologies such as smart endowment systems, platforms and terminals, and accurately apply these information technologies, so as to ensure that "enacted technologies" can reduce labor costs, speed up information transmission, improve decision-making efficiency and enhance the quality of endowment service.

D. Strengthening the Evaluation of Information Technology Application Results

On the one hand, it is clear that information technology related to smart endowment may change the original bureaucratic network and interactive structure. "Information technology" may improve the scientificization and democratization of decision-making, and may increase communication channels among managers, front-line nursing staff and the elderly. Secondly, the latest "objective information technology" may bring unpredictable changes and can not be introduced blindly. It is necessary to systematically evaluate the matching degree between information technology and state-run nursing home, such as whether the overall planning of local governments, financial resources, and traditional endowment service can be integrated smoothly, and so on, and scientifically introduce information technology in line with the actual situation of state-run nursing home to feedback the results of information technology application to the decision-making process to improve the development effect of smart endowment.

VI. CONCLUSION

The innovation of this study is to propose obstacles to technology implementation in state-run nursing home, hoping to bring some enlightenment to the research of technology implementation in state-run nursing home. However, there are still some problems. The scope of the study is limited to state-run nursing home, and the research methods are limited to qualitative research. There is no

further study on the specifics of technical enactment obstacles in state-run nursing home. There are some shortcomings in quantitative research and quantitative analysis. In the future, the author will further study the limitations of this study.

REFERENCES

- [1] Source: Website of the Ministry of Industry and Information Technology of the People's Republic of China, <http://www.miit.gov.cn/n1146295/n1652858/n1652930/n3757016/c5490122/content.html> (in Chinese)
- [2] Sun Mengchu, Gao Huansha, Xue Qunhui. Progress in research on smart endowment in China and foreign areas [J]. *Special Zone Economy*, 2016(6): 71-73. (in Chinese)
- [3] Zuo Meiyun. The connotation, model and opportunity of smart endowment [J]. *China Public Security*, 2014(10): 48-50. (in Chinese)
- [4] Zheng Shibao. Internet of Things and smart endowment [J]. *Video Engineering*, 2014, 38(22): 24-27. (in Chinese)
- [5] Bai Mei, Zhu Qinghua. Analysis of the status quo of smart endowment and development countermeasures [J]. *Modern Management Science*, 2016(09): 63-65. (in Chinese)
- [6] Zhang Liya, Song Xiaoyang. Application and countermeasures of information technology in the endowment service industry [J]. *Science and Technology Management Research*, 2015, 35(05): 170-174. (in Chinese)
- [7] Bai Mei. Smart endowment: the endowment service system needs top-level design [J]. *Jiangsu Commercial Forum*, 2016 (03): 33-36. (in Chinese)
- [8] Li Changyuan. Problems and Countermeasures of "Internet +" applied in community endowment services [J]. *Journal of Beijing University of Posts and Telecommunications (Social Sciences Edition)*, 2016, 18(05): 67-73. (in Chinese)
- [9] Zhang Huijun. Giving play to the strategic driving role of innovation-driven reform in supply-side reform [J]. *Theoretical Horizon*, 2016(01): 8-10. (in Chinese)
- [10] Liu Mancheng, Zuo Meiyun, Li Qiudi. Study on the information demand of home-based endowment based on community service [J]. *China Journal of Information Systems*, 2012(02): 87-99. (in Chinese)
- [11] Meng Fanxing, Pilsung Choe, Yang Huasheng, Wu Qingchao. Evaluation of the usability of social networking sites for the aged in China [J]. *Ergonomics*, 2014, 20(03): 42-46. (in Chinese)
- [12] Peek S T M , Wouters E J M , Van Hoof J , et al. Factors influencing acceptance of technology for aging in place: a systematic review[J]. *International Journal of Medical Informatics*, 2014, 83(4): 235-248.
- [13] Demiris G , Hensel B K , Skubic M , et al. Senior residents' perceived need of and preferences for "smart home" sensor technologies [J]. *International Journal of Technology Assessment in Health Care*, 2008, 24(1): 120-124.
- [14] Guo Anhui. Analysis of the development path of China's smart endowment service system against the background of Internet+ [J]. *Times Finance*, 2017(09): 280+285. (in Chinese)
- [15] Huang Wei, Yuan Jingfeng, Li Lingzhi. The construction and platform design of smart endowment service system based on individual demand [J]. *Journal of Engineering Management*, 2018, 32(03): 147-152. (in Chinese)
- [16] Lin Guoqi, Feng Jie, Fan Wenxia. Study on the construction of smart endowment standard system [J]. *Co-operative economy & Science* , 2016(08): 169-171. (in Chinese)
- [17] Qi Jianyong. Smart endowment, a revolution in China [J]. *China Public Security*, 2015 (08): 56-58. (in Chinese)
- [18] Zhang Yi, Mou Nengye, Hao Juanjuan. Research on the new endowment mode based on "smart endowment" and "combination of medical treatment and endowment" [J]. *Rural Economy and Science-Technology*, 2018, 29(07): 223-225. (in Chinese)
- [19] Rashidi P, Mihailidis A. A survey on ambient-assisted living tools for older adults [J]. *IEEE Journal of Biomedical and Health Informatics*, 2013, 17(3): 579-590.
- [20] Sui Dangchen, Peng Qingchao. "Internet + Home-based endowment": The mode of smart home-based endowment service [J]. *Journal of Xinjiang Normal University (Philosophy and Social Sciences Edition)*, 2016, 37(05): 128-135. (in Chinese)
- [21] Jane E.Fountain. Building a virtual government: information technology and institutional innovation [M], Renmin University of China Press, 2010, p. 81. (in Chinese)
- [22] Ding Xiancun, Ye Di. Exploration of rural community governance in minjiang demonstration zone in the multi-governance community model — based on the investigation of community governance in Yangpu district of Shanghai [J]. *Theoretic Research*, 2015(04): 96-100. (in Chinese)
- [23] Qu Zhen. Smart endowment: Opportunities, challenges and countermeasures [J]. *Journal of Hunan Academy of Governance*, 2016(03): 108-112. (in Chinese)
- [24] Yan Bingqiu, Gao Xiaolu. Influence factors and community differences of urban elderly's satisfaction for home-based endowment [J]. *Geographical Research*, 2013, 32(07): 1269-1279. (in Chinese)
- [25] Yang Xuecheng, Ge Tingting, Lan Bing. Research on the influencing factors of brand Weibo credibility [J]. *Journal of Shanxi University of Finance and Economics*, 2013, 35(10): 68-80. (in Chinese)
- [26] Zhao Ying. The dilemma and countermeasures of China's E-Government from the Perspective of "technical implementation framework" [J]. *Administration & Law*, 2016(10): 33-41. (in Chinese)
- [27] Zhang Lei, Han Yongle. The main mode, existing problems and countermeasures of current smart endowment in China [J]. *Social Security Study*, 2017(02): 30-37. (in Chinese)