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RESEARCH ON PROPERTY SERVICE MODE INNOVATION IN THE CONTEXT OF TRANSFORMATION AND UPGRADING

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Abstract. Property service mode innovation is the basic means of property service enterprise management. Discussing the property service mode in terms of transformation and upgrading is of rich research significance, taking Wenzhou Sapphire Property Service Co. LTD. in China (hereafter referred to as "Sapphire Service") as an example. First, based on the development of property service in China, this paper summarizes the 4E mode of traditional property service, ensuring cleaning, ensuring greening, ensuring maintenance and ensuring security, and analyzes the existing problems. Second, combined with the development needs of the property service industry, this paper proposes the 4R mode of modern property service, realizing quality requirements, realizing pleasure service, realizing social responsibility and realizing green health, and summarizes its basic characteristics. Finally, based on the above modes in the practice at Sapphire Service, some management implications are put forward for the industrial transformation and upgrading requirements.

Keywords: transformation and upgrading, property service mode, 4E mode, 4R mode, management implications.

Introduction

Due to the rapid development of the property service industry in China, competition in the property service market is becoming increasingly fierce. Most small and medium-sized property service enterprises are in an obviously weak position compared with large property service enterprises in the high-end property service market. To obtain property service projects, some small and medium-sized property service enterprises win the bid at a price lower than the operating cost. These small and medium-sized property service enterprises often cut costs by lowering the standard of daily service, resulting in a bad reputation, and becoming trapped in a vicious circle. In recent years, a few large property service enterprises have expanded rapidly, while many small and medium-sized property service enterprises are on the edge of being eliminated from the market. The property service market exhibits a polarization trend. Therefore, the transformation and upgrading of the property service industry is imperative. The wide application of the Internet of Things and big data technology has provided unprecedented opportunities and challenges for the transformation and upgrading of the property service industry. Service mode innovation is an effective way for enterprise transformation and upgrading (Wu, 2012), and property service mode innovation is the key to the development of property service enterprises. How to make use of modern science & technology and modern management methods to innovate the property service mode is the basic challenge of the majority of property service enterprises.

1. Literature review

Transformation and upgrading, specifically, industrial transformation and upgrading, refers to the development process of reasonable and effective resource allocation within an industry, reasonable coordination among different industries and steady improvement of production efficiency (Gan et al., 2020). Gereffi (1999) found that transformation and upgrading is the process toward capital-intensive and technology-intensive profitable fields. The driving force of industrial transformation and upgrading comes from income growth (Foellmi & Zweimüller, 2008), production technology innovation (Ngai & Pissarides, 2007), and organizational specialization (Greunz, 2004). Mellor and Hyland (2005) suggested that industrial development should be promoted by learning, innovation and management at a low level of economic development. The influencing

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factors of industrial transformation and upgrading include national income, market demand, total investment, technological research and development and participation in the international division of labor (Han, 2021). The basic theories of industrial transformation and upgrading include reproduction theory, comparative advantage theory, industrial structure optimization theory (Yang & Li, 2019), endogenous growth theory and new structural economics (Han, 2021). The related research on transformation and upgrading examines regional inequality (Cheong & Wu, 2014), labor productivity (Schröeder, 2015), land use (Pan & Song, 2017), industrial clusters (Ye et al., 2020), green technology innovation (Du et al., 2021), etc.

Research on property management can be divided into two aspects. On the one hand, some scholars have analyzed the social problems related to property management based on the characteristics of different realistic situations and have put forward relevant countermeasures. Rephann (2008) studied how the characteristics of rental residential properties affect crimes and put forward suggestions for local governments to reduce rental property crimes. Eichholtz et al. (2016) analyzed the relationship between investors' distance from their assets and the effective rents of these assets through a large dataset of US offices and studied the extent to which property managers can influence this relationship. Based on the requirements of property service enterprises to study elderly property services, Huang and Lee (2019) comprehensively used the factor analysis method, cluster analysis and the chi-square test to identify different population characteristics and living conditions of property service. Shen et al. (2021) used fuzzy Delphi method and analytic hierarchy process to construct the quality evaluation scale of property service companies, and determined the key indicators of property service that customers and operators in this industry valued most.

On the other hand, scholars proposed some new methods using property management scenarios and carried out empirical analysis. Gomes and Rangel (2009) proposed a multiattribute decision-making method based on TODIM and applied it to property rankings with different characteristics. Chiang and Perng (2018) proposed a hybrid model combining SERVQUAL, Kano and Refined Kano to analyze the categories and quality attributes of property services valued by customers in Taiwan using a sample of 300 customers. According to the requirements of large-scale, multistage and bounded rationality based on property service perceived information fusion, the classic LINMAP model is extended into the LINMAP model based on large group evaluation information fusion (Zuo et al., 2019), the LINMAP model based on dynamic information fusion (Zuo et al., 2020) and the LINMAP model based on bounded rationality evaluation information fusion (Zuo et al., 2021). Lin et al. (2022) proposed the TODIM model based on multi-attribute multi-scale method and applied it to property service quality evaluation.

The service mode is a universal and typical service method, content and structure in service practice (Chen & Ding, 2014). There are many research results on service mode, some of which are industry specific. Pla-Barber et al. (2011) proposed that the determinants of the entry mode selection of manufacturing enterprises cannot be directly transferred to the internationalization of soft service enterprises based on a sample study of more than 1,200 hotel industry entry enterprises in Spain. Then, Villar et al. (2012) looked further and concluded that the intangibility and complexity of services provided by hotels moderated the relationship between environmental uncertainty and entry mode choice. Wang et al. (2018) examined the market's market's reaction to the introduction of a new service mode through empirical research on financial enterprises and provided different dimensions of reference for future investors when introducing new information services. Gazcón-Rivera et al. (2021) proposed an extended failure mode and effect analysis method and applied it to the general service industry represented by the transportation service supply chain. Furthermore, there are a few studies concerning the property service mode. Deng and Wang (2004) explain the main characteristics of the property customer service center mode and some problems existing in practice. Liu et al. (2013) proposed the concept of property energy management and four service modes: general contracting mode, combination mode, platform operator mode and operation service mode. Marcinkowski and Gawin (2021) selected the facility management industry as an example to study the development of data-driven business models. However, there is no research on the service mode of the property service industry.

In addition, facility management is a research field closely related to the research topic of this paper. Modern property management originated in Great Britain in the 1860s, and China introduced it in the early 1980s (Zuo et al., 2019). Facility management is a research topic of property management in most European and American countries, but it is only a basic function of property service. There have been many studies related to this topic. Natale et al. (2014) studied the experience of lean six sigma into the patient-centered medical home of 33 primary care physician and proposed that appropriate project management practices could achieve effective transition without interrupting practice operations. To determine the technical characteristics required to meet each maturity level, Williams et al. (2019) defined eight information system maturity levels and related technical infrastructure capabilities and deconstructed specific technical capabilities. Mahmood et al. (2020) proposed a computer vision-based approach that extracts representative horizontal sections from constructed and planned point clouds, makes models similar, limits unnecessary transformations to reduce search space, and estimates registration transformation matrices based on line features. Blume et al. (2020) describe the development of a data-driven DT for TBS operations and its application to an industrial CT case study in Germany. Yang and Tsai (2021) illustrate the real benefits of achieving intelligent management by summarizing the potential technology to meet practical needs and the development of intelligent electrical components to address

potential failure modes. Wang et al. (2022) proposed a framework of a facility safety-maintenance-performance audit loop and selected public facilities as an example to verify the effectiveness of the framework. Based on the importance of cultural relics in the HBIM process, Darwish and Hassanien (2022) discussed a new framework that integrates HBIM, DT and blockchain technology to provide more efficient and effective preventive protection.

In summary, research on industrial transformation and upgrading has formed a mature theoretical system, the related method research on property management application is abundant, the application of service mode is quite extensive, and research on facility management provides a basis that can be used for reference. However, there are few studies on the transformation and upgrading of the property service industry. The existing research is limited to the construction of different types of property service modes and lacks an exploration of the operation mechanism of the property service mode and industrial transformation and upgrading. Specifically, there is no relevant research on the innovation of property service mode in terms of of transformation and upgrading. The basic framework of this paper is as follows. The next section introduces the research framework of this paper. Section 3 analyzes the 4E (which refers to the four phrases: ensuring cleaning, ensuring greening, ensuring maintenance and ensuring security) mode of traditional property service and its existing problems according to property service practice in China. Section 4 analyzes the problems and dynamic mechanism of the 4E mode of traditional property service. Section 5 analyzes the 4R (which refers to the four phrases: realizing quality requirements, realizing pleasure service, realizing social responsibility and realizing green health) mode of modern property service and its characteristics based on the property service practice of Sapphire Service in China. Section 6 explains the practice of transformation and upgrading of property service mode and its enlightenment to property service enterprise management. Finally, the last section concludes this paper.

2. Research framework

In this paper, basic theories include property management, facilities management, service perception, industrial structure, modern management, basic methods include document analysis, field investigation, inductive and deductive, expert opinions and example analysis, and the research contents include the 4E mode of traditional property service and the 4R mode of modern property service. The research framework of this paper is shown in Figure 1. The research process of this paper is divided into four stages, which are described as follows.

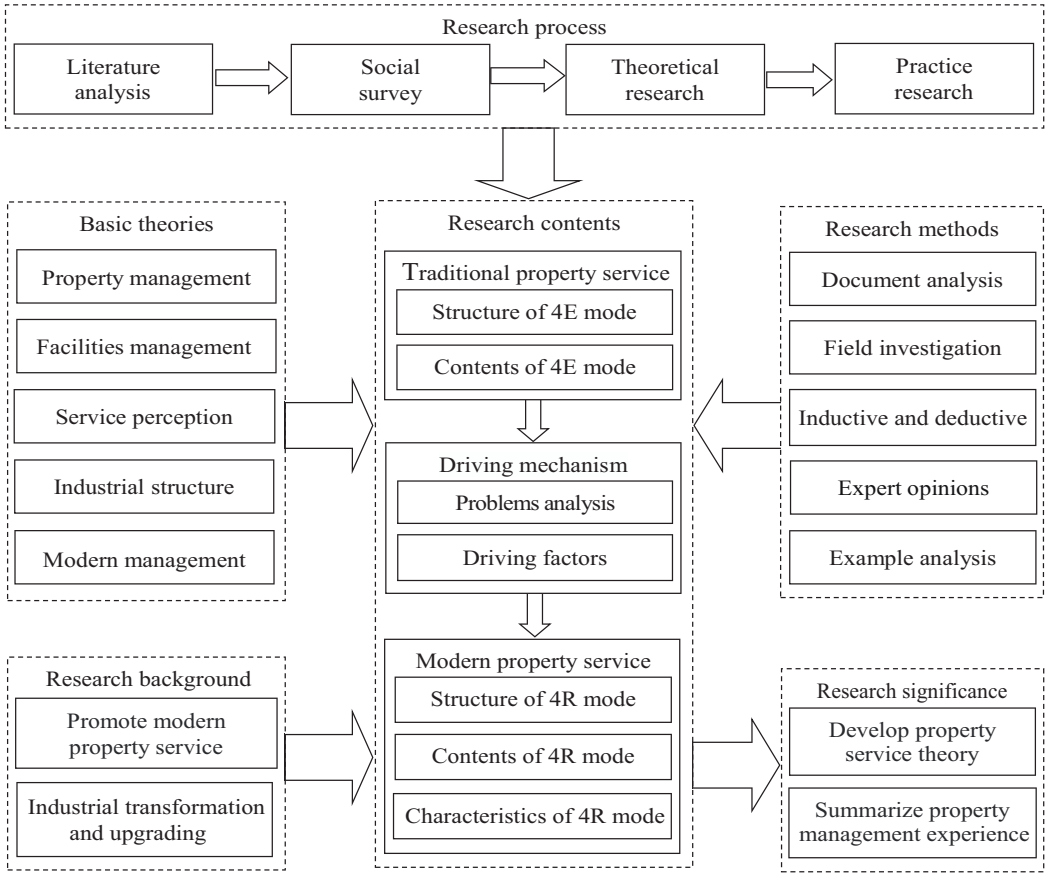

Figure 1. Research framework diagram

(1) Phase 1: literature analysis

Literature analysis is the basis of this paper. This stage focuses on trending research topics such as property service, service mode, transformation and upgrading, and facility management through a comprehensive review of the literature. At the same time, the property service industry trends, public policies and hot social materials were collected.

(2) Phase 2: social survey

Social investigation is one of the key stages of this paper. The objects of the social survey include a number of property service enterprises and property management associations. The methods of social surveys include field trips, interviews with professionals and questionnaires. The information collected at this stage includes the cognition of professionals and managers on the development problems and trends of the property service industry and the cognition of customers and property service personnel on the development status of the industry.

(3) Phase 3: theoretical research

Theoretical research forms the core of this paper. The theoretical research includes the 4E mode of traditional property service, the driving mechanism of property industry development and the 4R mode of modern property service. Induction and deduction are the main methods of this stage, and several rounds of expert opinion consultation were carried out simultaneously. The research ideas are as follows: based on relevant theories and practices, the property service mode is preliminary summarized and constructed, the above modes are modified by consulting experts, and the final modes are determined after three rounds of expert consultation.

(4) Phase 4: practice research

The practice research reflects the realistic value of this research. Taking the practice of the transformation and upgrading of the property service mode at Sapphire Service in China as an example, the necessity and effectiveness of the transformation of the property service mode are illustrated by comparing a group of operating indicators. At the same time, this paper summarizes some experiences that can be used to improve the management of property service enterprises. This stage mainly uses the method of case analysis, inductive and deductive, supplemented by comparative analysis of operating indicators.

3. The 4E mode of traditional property service

The 4E mode of traditional property service is the basic requirement of property service enterprises for the development of traditional business. The practice of property service in China has formed a mature system, but its theoretical research is relatively limited. The 4E mode is based on the investigation of the development practice of the traditional property service industry in China and is obtained by the author's analysis and summary on the basis of consultations with experts. In short, the 4E mode of traditional property service is a generalization of the traditional property service mode based on the overall development of the industry.

3.1. Basic structure of the 4E mode of traditional property service

The 4E mode of traditional property service includes ensuring cleaning, ensuring greening, ensuring maintenance and ensuring security. Ensuring cleaning means that property services should meet the requirements of environmental health services, ensuring greening means that property services should meet the requirements of property service area greening services, ensuring maintenance means that property services should meet the requirements of equipment and facilities services, and ensuring safety means that property services should meet the requirements of order maintenance services. Traditional property service provides the 4E service to buildings and their attached facilities to keep them running. Therefore, the 4E mode of traditional property service embodies material-oriented management thought. The four basic functions of the traditional property service enterprise, namely, cleaning, greening, maintenance and security, are interrelated and constitute a whole around the buildings and their attached facilities. The logical structure of the 4E mode of traditional property service is shown in Figure 2.

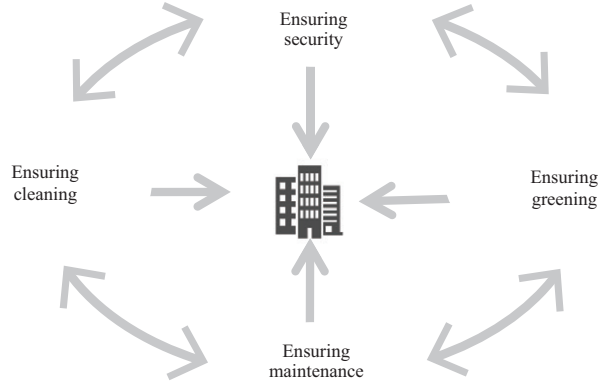

Figure 2. Logical structure diagram of the 4E mode of traditional property service

As the 4E mode is the basic requirement of traditional property service, it becomes the standard to judge property service quality in carrying out various property services according to the requirements of the 4E mode. With the development of the transformation and upgrading of the property service industry, property service enterprises attach importance to customer perceived value, carry out property value-added services and promote the construction of intelligent platforms. Modern property service must be based on the service function of the 4E mode, so the 4E mode is the cornerstone of modern property service.

3.2. The main content of the 4E mode of traditional property service

(1) Ensuring cleaning. Property cleaning services refer to the daily cleaning work carried out by property cleaning personnel in accordance with the relevant rules and regu-

Table 1. Summaries of definition, content and indicators of the 4E mode

Sub-service in 4E mode	Definition	Content	Evaluation indicators
Cleaning	The daily cleaning work carried out by property cleaning personnel	Clean and remove garbage from floors, walls, porches, garden paths, toilets, etc.	Tangibility, reliability, responsiveness, empathy, assurance
Greening	Make vegetation grow normally, to achieve beautiful and comfortable environment	Carry out weeding, pruning, watering, loosening soil and fertilization, etc.	
Maintenance	To regularly inspect and make repairs when maintenance requests are received	To keep clean, keep ventilation, to maintain facilities, to ensure normal operation of facilities and equipment, etc.	
Security	Ensure order and safety in the public areas of property services	Implement patrol, safety, fire, access, vehicle management and related regulations	

lations of property enterprises. The property service enterprise should draw up the cleaning schedule according to the characteristics of each property service project in advance and implement the cleaning work system strictly after the approval of the property service enterprise. The cleaning service area mainly includes the grounds, walls, porches, garden roads, garbage, toilets, etc. The cleaning service requires cleaners to perform daily cleaning according to the rules and regulations of property enterprises and cleaning supervisors to conscientiously perform daily inspection and supervision. In general, the main content of cleaning services is embodied by the responsibilities of cleaning personnel and cleaning supervisors.

(2) Ensuring greening. Property greening services make vegetation grow normally and achieve the goal of creating a beautiful and comfortable green environment, which includes weeding, pruning, watering, loosening soil and fertilization in the public area of property service projects. Property management objects include trees, shrubs, flowers, lawns, ground cover, etc. In daily property greening service work, the director of the environmental department is responsible for the organization and implementation of greening work in property service projects, and the gardener is responsible for the daily management and maintenance of greening. In general, the main content of property greening services is embodied by the responsibilities of the director of the environmental department and the gardener.

(3) Ensuring maintenance. Property maintenance service requires the engineering department to regularly inspect the public areas of property projects and make timely repairs when problems are found or maintenance requests are received. The main goal of property maintenance service is as follows: to keep the property clean, ensure proper ventilation, maintain the public area and customer room facilities, and ensure the normal operation of public facilities and equipment, no gas or water leaks, and no rodent damage in all areas and equipment rooms. In general, the main content of property maintenance service is embodied by the responsibilities of engineering supervisors and engineering personnel.

(4) Ensuring security. Property security services refer to the order and security in the property service area, which mainly includes patrol, safety, fire management, responsibility for the recording of time and labor, responsibility for channel management, vehicle management in and out of the parking lot, and the formulation and implementation of fire safety rules and regulations. In general, the main content of property security services is embodied by the responsibilities of property security supervisors, security officers and fire control officers.

In the practice of property service, different property service functions are interrelated. For example, maintenance and safety can jointly promote the improvement of public building property service (Wang et al., 2022). Therefore, the 4E function is a whole and constitutes the main content of traditional property services. Due to the lack of relevant definitions in theoretical research on property service, this paper determines the definition and its content of each property service based on relevant literature, field research and expert opinions. There are abundant researches on service quality evaluation indicators, among which the five dimensions of tangibility, reliability, responsiveness, empathy and assurance proposed by Zeithaml et al. (1993) are the most representative. This paper uses the above evaluation indicators to evaluate each sub-service in 4E mode. Based on the above analysis, the definition, content and indicators corresponding to the 4E mode of traditional property service are shown in Table 1.

4. Analysis of the problems and dynamic mechanism of the 4E mode of traditional property service

4.1. Problem analysis of the 4E mode of traditional property service

The 4E mode of traditional property service plays an important role in the development of the property service industry in China. With the development of the transformation and upgrading of the property service industry, the modern service industry has put forward higher requirements for property service modes. Some problems existing in the 4E mode of traditional property service are analyzed as follows.

(1) Weak service consciousness of property service personnel. Many property service personnel are limited to the basic business of the 4E mode and lack the awareness

of serving customers. In the practice of property customer service, many staff have poor service attitudes, are not familiar with service etiquette and are indifferent to customers' inquiries. There are even verbal or physical conflicts with customers over staff faults, which seriously damages the image of property service enterprises. The above phenomena are particularly common in small and medium-sized property service enterprises.

(2) Low degree of specialization in property service enterprises. Traditional property service enterprises provide property services according to 4E requirements, which cannot meet the needs of modern services for resource integration and technological innovation. Based on the background of the modern service industry, the specialization of property services should keep pace with customer needs. Modern property service has put forward higher requirements for the mechanization, networking and intelligence of property service, as well as the quality of property service personnel.

(3) Low-level informatization of property service enterprises. With the rapid development of big data, cloud computing and artificial intelligence, the 4E mode of traditional property service has been difficult to adapt to the development requirements of property equipment and facilities. Garbage collection, gate security and vehicle management depend on the support of information technology. Customer information, property service fees and other data processing functions require a management information system. The contradiction between the integrity of property service and the dispersion of customers is difficult to reconcile. Customers have higher requirements for efficiency, frequency and experience of property service in modern property service.

(4) Single business scope in traditional property service enterprises. There are many value-added services closely related to property services, such as housing brokerage, online-to-offline e-commerce, community finance, housekeeping services, elderly care services and material distribution. The proportion of these value-added services is increasing rapidly, providing an opportunity for the transformation and upgrading of property service enterprises. Whereupon it is difficult for a single business scope to meet the multilevel and diversified demands of customers, and it cannot adapt to the requirements of the transformation and upgrading of property service enterprises. Many property service enterprises only engage in basic property service, which may cost them many development opportunities. In addition, there are other problems in traditional property service enterprise management. There may be inconsistent performance appraisal standards, inadequate internal control, inadequate supervision of property service quality, low recruitment requirements for staff, imperfect human resource training systems, lack of awareness of human resource development, and generally low staff quality.

4.2. Dynamic mechanisms of transformation and upgrading of property service mode

The problems existing in the traditional property service mode have increasingly become the factors hindering the sustainable development of the property service industry (Zuo et al., 2020), and transformation and upgrading have become the basic trend of the development of the property service industry (Xie, 2013). The driving force for the transformation and upgrading of the property service industry comes from the industry itself and the external environment, which can be summarized into four aspects: service concepts, market demands, emerging technologies and industrial policies, as shown in Figure 3. The details are as follows.

(1) The service concept guides the transformation of property service behavior. The service concept is the crystallization of many factors, such as societal, economical and cultural. From material-oriented to human-oriented is the basic trend of the property service concept. The change in the property service concept comes from the change in the market competition environment, which has an important impact on the business strategy of property service enterprises. In a deeper sense, the change in the property service concept will affect the behavior of owners and property service personnel. The change in the property service concept is both an opportunity and a challenge for property service enterprises. Property service enterprises need to formulate measures for the development of modern property service modes and abandon some measures that hinder the transformation and upgrading of the property service industry.

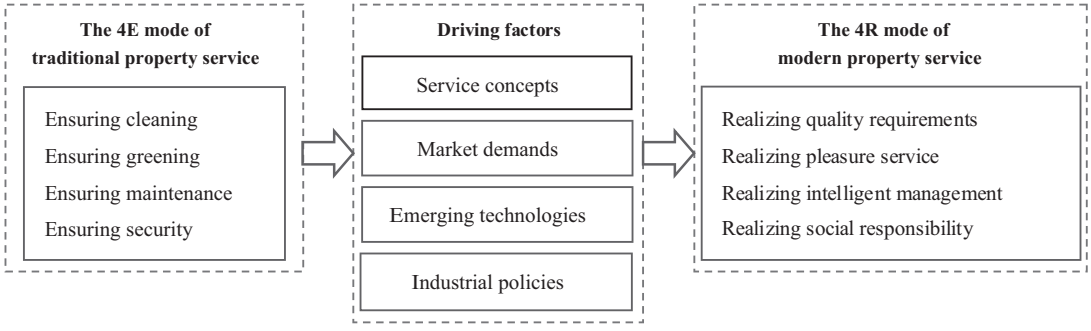

Figure 3. Driving factor analysis of the transformation and upgrading of the property service mode

(2) Market competition promotes the transformation of the property service market. The market competition environment is the basis for property service enterprises to formulate strategies. The property service industry in China has entered the marketization stage, and property service enterprises need accurate market positioning. Property service enterprises should adjust service objects by contracting new property service projects according to the needs of market competition environments. Once the market positioning is determined, property service enterprises should conduct in-depth research on property service modes according to the characteristics of the service object and provide property service with market competitiveness for customers.

(3) Emerging technologies are an important thrust for property service upgrading. Emerging property service technologies have a profound impact on basic property service equipment, office automation equipment and value-added service tools. Emerging technologies have a comprehensive influence on property service enterprise management. The introduction of new property service technology requires enterprises to invest a great deal of capital, which may place pressure on enterprise management. Property equipment and facilities with emerging technologies bring property service enterprise management comprehensive upgrades. The key to the effect of using emerging technologies in property service is the change of property service concept. The adoption of emerging technologies is beneficial to the transformation and upgrading of property service enterprises.

(4) Industrial policies provide a good environment for property service transformation. Industrial policy is an important part of the external environment that affects industrial development. The property service industry is related to the national economy and people's livelihood, and the government should focus on the industry. The Chinese government attached great importance to the development of the modern service industry in recent years and has promulgated many relevant policies to provide opportunities in taxation, financial subsidies and management systems for the development of the property service industry. Property service enterprises can make full use of the industrial development environment provided by the government to promote the transformation and upgrading of the industry and achieve high-quality development.

5. The 4R mode of modern property service

Similar to the 4E mode of traditional property service, the 4R mode is constructed based on the practical experience of the development of the property service industry. According to the problems existing in the traditional property service industry and the requirements of the transformation and upgrading of the property service industry, this paper proposes the 4R mode of modern property service and summarizes its characteristics.

5.1. Basic structure of the 4R mode of modern property service

Compared with traditional property service, modern property service follows the concept of human orientation and applies modern management methods and emerging technologies to property service. Based on the requirements of industrial transformation and upgrading, the 4R mode of modern property service is put forward centering on customer demand. The 4R mode is divided into four dimensions: realizing quality requirements, realizing pleasure service, realizing intelligent management, and realizing social responsibility. "Realizing" is the original meaning of "making real or concrete" or "giving reality or substance to." In this paper, it is both the process of pursuing goals and the state of achieving goals. The 4R mode means that modern property service enterprises pursue sincere service, comprehensive service, comfortable service and perfect service.

The 4R mode of modern property service is based on the development of property service quality, implementing pleasure service for employees and intelligent management of equipment, and finally realizing corporate social responsibility. The four goals of the 4R mode are interconnected and constantly improving. Modern property service enterprises will start a new round of property service upgrades after realizing each stage goal. The different goals of the 4R mode are interrelated as a whole, which is a cycle from the macro point of view. The internal logical structure of the 4R mode is shown in Figure 4.

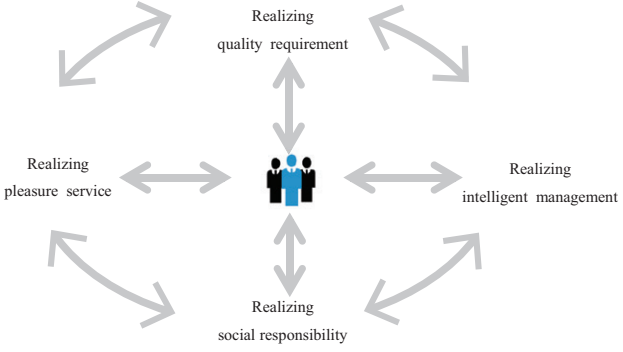

Figure 4. Logical structure diagram of the 4R mode of modern property service

5.2. The main content of the 4R mode of modern property service

(1) Realizing quality requirements. Property service quality specifications are the impetus to realizing quality requirements. The property service quality specifications of the 4R mode can be roughly divided into three categories: basic service, professional service and value-added service. Furthermore, the related subcategories involve service image, visual identification (VI) equipment & production, equipment management, security management, environment maintenance, VI content management, customer service and catering service, etc. Table 2 lists the relevant categories and their contents.

Table 2. Classification of property service quality specifications

Categories	Subcategories	Content summary
Basic services	Service image	Includes appearance, standing and posture and politeness, etc.
	VI production & installation	Including the color, font, size, installation, hanging, mounting position, etc.
Professional services	Equipment management	Includes equipment management policies, objectives, tasks, and processes, etc.
	Security management	Includes handover, duty patrol, access control system and dispute settlement, etc.
	Environmental maintenance	Includes purpose, scope and specific management standards, etc.
	VI content management	Includes content design and signage, etc.
Value-added services	Customer service	Includes basic standards, security management and environment maintenance, etc.
	Catering service	Includes health management, fire safety and price control, etc.

(2) Realizing pleasure service. Realizing pleasure service is one of the basic means of modern property service. Realizing pleasure services should benefit stakeholders: employees, owners and the public. Different service topics are designed according to different service objects: development services are committed to employee growth, super services provide professional and high-quality services to owners, and shared services aim to actively develop public services. In the practice of property service, we can also design different subtopics and determine their respective functions according to the actual situation. Table 3 lists the objects, topics and functions of the pleasure service.

(3) Realizing intelligent management. Realizing intelligent management is the basic goal of property service skill construction. The content of property service skill construction mainly includes property information equipment, property mechanical equipment and property health care facilities. Property information equipment includes daily inspection, maintenance, greening and other equipment. Property mechanical equipment includes floor washing machines, chain saws, edge cutting machines and other equipment. Property health facilities include health check equipment, nursing machines, massage chairs and other equipment. Different property service systems have different characteristics, but intelligence is the common characteristic of all kinds of systems. Table 4 shows various property service systems, equipment and their characteristics.

(4) Realizing social responsibility. The social responsibilities of property service enterprises take all employees as the main body to serve the public. The key point is to realize the social value of property service enterprises. Prop-

Table 3. Topics and their functions of pleasure service

Object	Topic	Subtopic	Function
Owners	Super services	Etiquette service	Etiquette when meeting owners
		Expert service	Solve household problems for owners
		Home service	Provide daily service to owners
Employees	Development services	Staff school	Focus on employee growth
		Staff harbor	Caring about employees' lives
		Staff show	Demonstrate employee hobbies
Publics	Shared services	Warm service	Special holidays care for vulnerable groups
		Considerate service	Provide convenience for visitors
		Reassuring service	Undertake community management duties

Table 4. Intelligent management system, equipment and characteristics

Systems	Equipment	Characteristics
Property information equipment	Daily inspection, maintenance management, greening, cleaning, parking, door card, meter reading, notices, announcements, online customer service, office, etc.	Informatization Intellectualization
Property mechanical equipment	Floor washing machine, chain saw, edge cutting machine, hedgerow machine, irrigation machine, lawn mower, tall branch machine, leaf suction machine, patrol car, air detector, noise detector, ozone disinfection machine and computer network equipment, etc.	Automation Intellectualization
Property health facilities	Health check equipment, nursing machines, massage chairs, therapy machines and vending machines, etc.	Humanization Intellectualization

Table 5. The types, themes and contents of activities to fulfill social responsibilities

Types	Themes	Contents
Festival activities	Spring Festival, Dragon Boat Festival, Mid-Autumn Festival, Double Ninth Festival, Children's Day, World Health Day, Thanksgiving Day, World Standard Day	Carry out celebrations or visits activities according to different festivals
Thematic activities	Red butler service, volunteer service for large events	Organize employees or volunteers for specific activities

erty service enterprises should carry out various forms of activities regularly and irregularly to fulfill their social responsibilities. Property service enterprises can organize butlers to perform tasks other than the service contract, organize employees to visit relevant social groups at different festivals, and organize volunteers to serve large public activities in the city. Table 5 shows the types, themes and contents of social responsibility activities.

5.3. Characteristics of the 4R mode of modern property service

The 4E mode of traditional property service is different from the 4R mode of modern property service. The latter, however, is not a complete negation of the former but rather builds on it. Compared with the 4E mode, the 4R mode has the following characteristics.

(1) Effectively strengthen customer demand management. To strengthen customer demand management, modern property service enterprises should have a systematic arrangement. There are at least two important measures. On the one hand, property service enterprises should have special customer service departments. Excellent property service projects have a special customer service department that is staffed by professional customer service personnel, and the customer service department usually has a higher status than other departments. This organizational structure gives the customer service department the authority to coordinate with relevant functions. On the other hand, property service enterprises should regularly conduct in-depth customer satisfaction surveys. The data analysis results can be used as the basis for property service personnel to improve service quality.

(2) Comprehensively improve property service standards. Comprehensively improving property service standards should be carried out around the following measures. First, on the basis of the relevant functions of the 4E mode, property service standards are formulated, and the corresponding operation process is formulated for each task of each post. Second, property service enterprises should build a perfect training and assessment system, which cultivates the ability of property service personnel to effectively implement property service standards. Third, to ensure the improvement of property service quality, property service assessment standards must be open and transparent, and property service personnel should accept comprehensive supervision according to the assessment standards. For the service object, this mechanism will increase customers' confidence in property management.

(3) Make full use of modern information technology. With the development of the internet, the Internet of Things and artificial intelligence, modern information technology has gradually become part of people's lives. Modern information technology has become the fundamental driving force for the transformation and upgrading of property services. The concrete experience of property service enterprises in making full use of modern information technology is as follows. First, the comprehensive application of computers and the internet is the foundation of the development of modern information technology. Second, property service enterprises should actively adapt to the basic trend that most customer needs have changed from the offline mode to the online mode. Third, using modern information technology to develop property management can effectively reduce service costs and improve management levels. In other words, the full application of modern information technology can promote the development of the property service industry.

(4) Adjust property service projects in a timely manner. With the marketization of the property service industry, the competition in the property service market is increasingly fierce, especially for the high-end residential property service market. As most large property service enterprises in China are the subsidiary enterprises of large real estate enterprises, these real estate enterprises are mainly concentrated in the residential real estate field. Due to the obvious resource advantages of large property service enterprises, high-end residential property service projects have become the target pursued by large property service enterprises, and most small and medium-sized property service enterprises are on the verge of being eliminated. Property service project adjustment is the breakthrough of the transformation of property service, thus forming the basis of promoting the upgrading of property services. Therefore, property service enterprises can speed up the development of transformation and upgrading by adjusting property service projects appropriately.

6. Practice and implications of the transformation and upgrading of the property service mode

6.1. Example of transformation and upgrading of property service mode

This paper selected Wenzhou Sapphires Property Service Co., LTD. in China as an example for analysis. In the early stage of the establishment of the enterprise, Sapphires

Service carried out property services according to the requirements of the 4E mode of traditional property services. Subsequently, Sapphires Service has been facing fierce competition in the high-end residential property service market, and its property service operation cost has been increasing. To cope with the challenges brought by market changes, Sapphires Service started the on road to transformation and upgrading and actively developed and practiced the 4R mode of modern property service.

(1) Introduction to the enterprise and its development. Sapphires Service, founded in September 1996, is the only property service enterprise with state-owned capital shares in Wenzhou, China. By the end of 2021, the business area of Sapphires Service included Zhejiang and Fujian provinces, with four branches: Jingshan, Dongtou, Fuding and Zhonghui. Sapphires Service has been awarded honors as one of Wenzhou's top 100 service enterprises, a national first-class qualification property management unit, a Wenzhou Property Management Association vice chairman unit, an excellent enterprise in the property service industry, etc. Since Sapphires Service started its transformation and upgrading in 2016, the total number of employees of Sapphires Service has increased from approximately 600 to more than 1,700, the total amount of business has quadrupled, and the profit margin has been increasing year after year. Sapphires Service has entered a benign development state.

(2) Transformation of the property service market. In 2016, Sapphires Service managed 16 residential projects, including the first batch of old residential projects, such as the Shangpin apartments. Then, Sapphires Service contracted high-grade residential projects, such as Junting village. In the past five years, Sapphires Service has made great efforts to develop the nonresidential business market. Sapphires Service nonresidential business has included university campuses, transportation services, production services and urban complex projects. By the end of 2020, Sapphires Service had more than 50 nonresidential projects, accounting for 80% of the total.

(3) Upgrading of property service capability. The upgrading of property service capability focuses on property service features, property service standards and property intelligent platforms. For the development of property service features, Sapphire service has developed the Zhen Xing service system according to the requirements of developing different businesses. With the increasing number of public construction property service projects, Sapphires Service has implanted the concepts of "red" and "green" into its service system. The former emphasizes the leading role of political ideas, while the latter emphasizes the concept of sustainable development. In the development of property services standards, these standards are the key to guaranteeing property service quality. Sapphires Service constantly improves the property service operation and management standard system. Based on the requirements of different property service environments, Sapphires Service has developed its own characteristic standards and guidelines and continuously improves the business ability of all staff through its training system. In the development of property intelligent platforms, the internet makes people's lives convenient. Sapphire Service combines property service with internet technology to create an intelligent property service platform. The platform covers human resources, financial management, basic property services and other functions, effectively improving the management efficiency of Sapphires Service.

(4) Comparative analysis of the main business indicators. The transformation and upgrading of Sapphires Service began in 2016, that is, Sapphire Service was based on the 4E mode of traditional property service before 2016 and the 4R mode of modern property service after 2016. We collected several important indicators, such as turnover, profit, facility input and service satisfaction, of Sapphire Service for the most recent ten years. The histogram of relevant data is summarized in Figure 5. Obviously, the

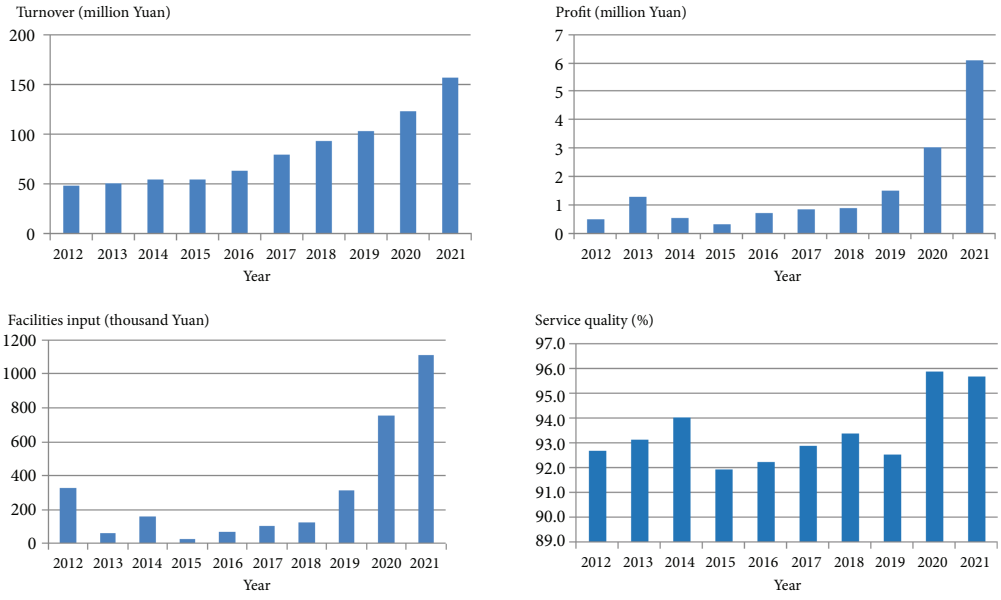

Figure 5. Changes in the main indicators of Sapphire Service in the past ten years

above indicators show that Sapphire Service has grown faster since 2016. The cause of these changes is the intensified competition in China's property service industry in the past five years, and many small and medium-sized property service enterprises have been eliminated from the market. This shows the application effect of the modern property service 4R mode in Sapphire Service.

6.2. The implications from the transformation and upgrading of the property service mode

The transformation and upgrading of property service has become the consensus of the property service industry, and the property service mode is one of the core challenges of property service enterprise management. The evolution of property service from the 4E mode to the 4R mode is the path exploration of the transformation and upgrading of property service enterprises. Based on the above research, the management implications of the transformation and upgrading development of property service enterprises are as follows.

(1) Developing modern services is the general trend. For traditional property service enterprises, decision-makers in fierce market competition must maintain a clear understanding, adhere to the right target and do the right thing. Market strategies can be changed and service projects can be adjusted, but the development direction must remain stable. The development direction of property service enterprises is to constantly improve their own business level to meet the requirements of industry development. Modern service is not invariable and may have specific connotations under specific conditions. To adhere to the overall direction of modern property service is to require property service enterprises to comply with the overall trend of modern property service and to use modern management methods and modern information technology to constantly meet the needs of customers.

(2) Emerging information technology is the basic means. For the basic service function of property service enterprises, emerging information technology can effectively promote property service quality. Emerging information technology can partially replace labor and relieve the difficult problem of recruiting and retaining human resources. The application of emerging information technology in financial and administrative affairs can improve work efficiency and ensure the quality of work. In terms of macromanagement strategies, property service enterprises should actively embrace emerging information technology and create a business environment suitable for the development of modern information technology. Specific business strategies can lay a solid technical foundation for the sustainable development of property service enterprises through cooperation with relevant scientific research institutions.

(3) Meeting customer needs is the core power. Different from the 4E mode of traditional property service, the 4R mode of modern property service insists on being customer-centered and pursues continuously meeting customer needs. In the specific property service management strategy, property service enterprises should distinguish between residential and public property projects. The customer is usually the owner in a residential property service project. Property service enterprises should focus attention on customers' demands for property preservation and appreciation while providing daily services. For public property service projects, the service object of the property service enterprise is the public organization, and the final service object is visitors who enjoy public service. Therefore, property service enterprises should focus attention on the effective operation of public organization functions and provide high-quality services for public service organizations and visitors.

(4) Reasonable market positioning is the key strategy. Property service enterprises are limited in capital, technology, human resources and other aspects. How to break through the dilemma in the fierce competition environment is a realistic problem that property service enterprises urgently need to solve. The property service industry is in the market expansion stage, and developing property service enterprises through contracting new property service projects will be the general trend in the next decade. The key strategy for the development of property service enterprises is to reasonably position the property service market and implement a differentiation strategy. For example, due to the lack of resources to participate in comprehensive competition, small and medium-sized property service enterprises in the region are facing competition from industry giants in the residential market. According to the comparative advantage principle, contracting public construction projects is a feasible strategy for the development of small and medium-sized real estate service enterprises.

Conclusions

The research content of this paper mainly includes the following four points. 1) According to the actual situation of the development of property service in China, the 4E mode of traditional property service is summarized. 2) Based on the existing problems of traditional property service, the dynamic mechanism of property service transformation and upgrading is analyzed. 3) Based on the needs of transformation and upgrading, the 4R mode of modern property service is proposed, and its characteristics are summarized. 4) According to the above theoretical analysis, some suggestions for the transformation and development of property service enterprises are proposed. Among them, the 4E mode of traditional property service is the innovative summary, while the 4R mode of modern property service is the core innovation point of this paper.

In terms of transformation and upgrading from traditional property to modern property, property service enterprises are facing both opportunities and challenges. Some businesses are doing better and better, while others are increasingly on the brink of bankruptcy. There have been many such stories in China's property service

industry in recent years. Property service mode innovation is a key means that involves all aspects of property service enterprise management. Based on the study results, the concrete measures of property service enterprises to improve the property service mode include the following. 1) Update the service concept according to the requirements of the modern service industry and develop the modern property service industry. 2) Keep up with customer needs by adjusting service content and adapting to customer type change. 3) Reposition the market and design marketing strategies by changing property service items. 4) Vigorously use emerging technologies to improve service efficiency and enhance the comprehensive service level.

Although the property service mode proposed in this paper has been well verified in the development practice of Sapphires Service, its universality needs further verification due to the limitation of example and time, and this research is qualitative research in general. Therefore, subsequent theoretical research should continue to summarize the application experience of the property service mode in practice and carry out theoretical analysis on the relevant property service mode by using quantitative analysis methods.

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Author contributions

LIU Lijun was responsible for the method and the conclusion. ZUO Wenjin was the corresponding author and responsible for the research design and model development. HU Qiang and ZENG Lanting was responsible for the data collection and analysis.

Disclosure statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Blume, C., Blume, S., Thiede, S., & Herrmann, C. (2020). Data-driven digital twins for technical building services operation in factories: a cooling tower case study. *Journal of Manufacturing and Materials Processing*, *4*(4), 97. https://doi.org/10.3390/jmmp4040097

Chen, H., & Ding, Y. Q. (2014). A study of the models of urban community-based care for elderly people in China. *Journal of Jiangsu University*, *16*(2), 14–18. http://qikan.cqvip.com/Qikan/Article/Detail?id=49249660

Cheong, T. S., & Wu, Y. (2014). The impacts of structural transformation and industrial upgrading on regional inequality in china. *China Economic Review*, *31*, 339–350. https://doi.org/10.1016/j.chieco.2014.09.007

Chiang, T. Y., & Perng, Y. H. (2018). A new model to improve service quality in the property management industry. *International Journal of Strategic Property Management*, *22*(5), 436–446. https://doi.org/10.3846/ijspm.2018.5226

Darwish, A., & Hassanien, A. E. (2022). IoHCT: Internet of cultural heritage things digital twins for conservation and health monitoring of cultural in the age of digital transformation. In A. E. Hassanien, A. Darwish, & V. Snasel (Eds.), *Studies in systems, decision and control: Vol. 423. Digital twins for digital transformation: innovation in industry* (pp. 1–21). Springer. https://doi.org/10.1007/978-3-030-96802-1_1

Deng, R., & Wang, W. (2004). Study on the mode of property management customer's service center. In *Proceedings of 2004 International Conference on Construction & Real Estate Management* (pp. 427–431). Shenzhen Polytechnic, Shenzhen.

Du, K., Cheng, Y., & Yao, X. (2021). Environmental regulation, green technology innovation, and industrial structure upgrading: the road to the green transformation of Chinese cities. *Energy Economics*, *98*, 105247. https://doi.org/10.1016/j.eneco.2021.105247

Eichholtz, P., Holtermans, R., & Ynder, E. (2016). The economic effects of owner distance and local property management in US office markets. *Journal of Economic Geography*, *16*(4), 781–803. https://doi.org/10.1093/jeg/lbv018

Foellmi, R., & Zweimüller, J. (2008). Structural change, Engel's consumption cycles and Kaldor's facts of economic growth. *Journal of Monetary Economics*, *55*(7), 1317–1328. https://doi.org/10.1016/j.jmoneco.2008.09.001

Gan, X. Q., Li, Y. J., & Jiang, B. W. (2020). Fiscal decentralization, local government behavior and upgrading of industrial structure. *Reform*, *36*(10), 86–103. http://www.cqvip.com/QK/94534X/202010/7103063671.html

Gazcón-Rivera, A., Nosedal-Sánchez, J., & Trigos, F. (2021). Transactional failure mode and effect analysis an application to map risks in the service industry. *Case Studies on Transport Policy*, *9*(2), 1467–1475. https://doi.org/10.1016/j.cstp.2021.07.004

Gereffi, G. (1999). International trade and industrial upgrading in the apparel commodity chain. *Journal of International Economics*, *48*(1), 37–70. https://doi.org/10.1016/S0022-1996(98)00075-0

Gomes, L. F. A. M., & Rangel, L. A. D. (2009). An application of the Todim method to the multicriteria rental evaluation of residential properties. *European Journal of Operational Research*, *193*(1), 204–211. https://doi.org/10.1016/j.ejor.2007.10.046

Greunz, L. (2004). Industrial structure and innovation-evidence from European regions. *Journal of Evolutionary Economics*, *14*(5), 563–592. https://doi.org/10.1007/s00191-004-0234-8

Han, M. L. (2021). *Research on the transformation and upgrading of China's economic and industrial structure under the background of high-quality development* [Doctoral dissertation]. Jilin University, China. http://cdmd.cnki.com.cn/Article/CDMD-10183-1021770790.htm

Huang, Y. H., & Lee, P. Z. (2019). Role of property management in service demands of elderly residents of apartment com-

plexes. *International Journal of Strategic Property Management*, *24*(1), 24–37. https://doi.org/10.3846/ijspm.2019.10852

Lin, S. S., Zuo, W. J., Lin, H. L., & Hu, Q. (2022). An online reviews information fusion method and its application to public property service quality evaluation. *International Journal of Strategic Property Management*, *26*(1), 1–10. https://doi.org/10.3846/ijspm.2022.16172

Liu, X., Wu, Y., & Ren, H. (2013). Concept and service mode of property energy management. *Heating Ventilating & Air Conditioning*, *43*(9), 62–65, 47. http://en.cnki.com.cn/Article_en/CJFDTotal-NTKT201309016.htm

Mahmood, B., Han, S. U., & Lee, D. U. (2020). BIM-based registration and localization of 3D point clouds of indoor scenes using geometric features for augmented reality. *Remote Sensing*, *12*(14), 2302. https://doi.org/10.3390/rs12142302

Marcinkowski, B., & Gawin, B. (2021). Data-driven business model development – insights from the facility management industry. *Journal of Facilities Management*, *19*(2), 129–149. https://doi.org/10.1108/JFM-08-2020-0051

Mellor, R., & Hyland, P. W. (2005). Manufacturing management programs: are developing economies bridging the strategic gap? *Technovation*, *25*(8), 857–863. https://doi.org/10.1016/j.technovation.2004.01.009

Natale, J., Wang, S. Y., & Taylor, J. (2014). Using lean six sigma to transform hospital system primary care practices into a patient-centered medical home. In *IIE Annual Conference* (pp. 213–222). http://www.xcdsystem.com/iie2014/abstract/finalpapers/I109.pdf

Ngai, L. R., & Pissarides, C. A. (2007). Structural change in a multi-sector model of growth. *The American Economic Review*, *97*(1), 429–443. https://doi.org/10.1257/aer.97.1.429

Pan, M., & Song, H. (2017). Transformation and upgrading of old industrial zones on collective land: empirical study on revitalization in Nanshan. *Habitat International*, *65*, 1–12. https://doi.org/10.1016/j.habitatint.2017.04.014

Pla-Barber, J., León-Darder, F., & Villar, C. (2011). The internationalization of soft-services: entry modes and main determinants in the Spanish hotel industry. *Service Business*, *5*, 139–154. https://doi.org/10.1007/s11628-011-0106-x

Rephann, T. (2008). Rental housing and crime: the role of property ownership and management. *Working Papers*, *43*(2), 435–451. https://doi.org/10.1007/s00168-008-0215-1

Schröeder, A. (2015). The end of cheap labour? Industrial transformation and "social upgrading" in China. By Florian Butollo. *International Labour Review*, *154*(3), 413–415. https://doi.org/10.1111/j.1564-913X.2015.00247.x

Shen, H. M., Tu, K. J., & Chiang, T. Y. (2021). Establish a customer property service strategy framework. *International Journal of Strategic Property Management*, *25*(3), 204–215. https://doi.org/10.3846/ijspm.2021.14568

Villar, C., Pla-Barber, J., & Leon-Darder, F. (2012). Service characteristics as moderators of the entry mode choice: empirical evidence in the hotel industry. *Service Industries Journal*, *32*(7–8), 1137–1148. https://doi.org/10.1080/02642069.2012.662497

Wang, K. C., Almassy, R., Wei, H. H., & Shohet, I. M. (2022). Integrated building maintenance and safety framework: educational and public facilities case study. *Buildings*, *12*(6), 770. https://doi.org/10.3390/buildings12060770

Wang, Y. H., Shih, K. H., & Yeh, H. H. (2018). Effect of new service modes was introduced to banking industry: a comparative analysis of internet and mobile banking. *International Journal of Mobile Communications*, *16*(3), 328–340. https://doi.org/10.1504/IJMC.2018.091384

Williams, P. A., Lovelock, B., Cabarrus, T., & Harvey, M. (2019). Improving digital hospital transformation: development of an outcomes-based infrastructure maturity assessment framework. *JMIR Medical Informatics*, *7*(1), e12465. https://doi.org/10.2196/12465

Wu, Q. (2012). Realistic meaning and realization path of SMEs' business model innovation. *On Economic Problems*, *34*(9), 79–82. http://en.cnki.com.cn/Article_en/CJFDTOTAL-JJWT201209017.htm

Xie, J. J. (2013). Learning from Vanke's good example: transformation and upgrading for development – speech by President of China Property Management Association at the third China Property Management Yangtze Forum. *China Property Management*, *12*(7), 41–42. https://xuewen.cnki.net/CJFD-WYGL201307018.html

Yang, Y. C., & Tsai, M. T. (2021). Analysis and application of energy management in Industry 4.0 with TRIZ methodology. *International Journal of Systematic Innovation*, *6*(3), 30–45. https://doi.org/10.6977/IJoSI.202103_6(3).0004

Yang, Z. A., & Li, M. H. (2019). The mechanism and effect of fiscal expenditure policy affecting industrial structure: system GMM empirical test based on China provincial panel data. *Journal of Liaoning University (Philosophy and Social Sciences Edition)*, *46*(6), 45–54. https://d.wanfangdata.com.cn/periodical

Ye, D., Wu, Y. J., & Goh, M. (2020). Hub firm transformation and industry cluster upgrading: innovation network perspective. *Management Decision*, *58*(7), 1425–1448. https://doi.org/10.1108/MD-12-2017-1266

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1993). The nature and determinants of customer expectations of service. *Journal of the Academy of Marketing Science*, *21*(1), 1–12. https://doi.org/10.1177/0092070393211001

Zuo, W. J., Li, D. F., & Yu, G. F. (2020). A general multi-attribute multi-scale decision making method based on dynamic LINMAP for property perceived service quality evaluation. *Technological and Economic Development of Economy*, *26*(5), 1052–1073. https://doi.org/10.3846/tede.2020.12726

Zuo, W. J., Li, D. F., Yu, G. F., & Zhang, L. P. (2019). A large group decision-making method and its application to the evaluation of property perceived service quality. *Journal of Intelligent & Fuzzy Systems*, *37*(1), 1513–1527. https://doi.org/10.3233/JIFS-182934

Zuo, W. J., Zhang, X. X., Zeng, S. Z., & Liu, L. J. (2021). A LINMAP method based on the bounded rationality of evaluators for property service quality evaluation. *ACCESS*, *9*, 122668–122684. https://doi.org/10.1109/ACCESS.2021.3109296