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Constructing an Online Property Management System for Leisure Farms

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CONSTRUCTING AN ONLINE PROPERTY MANAGEMENT SYSTEM FOR LEISURE FARMS

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Abstract

Taiwan's flourishing tourism industry has stimulated the development of a small and medium-sized hotel industry, including leisure farms. Nevertheless, most small hotel operators lack sufficient hotel operation and management knowledge. Although the adoption of appropriate property management systems (PMSs) could help small hotels improve management performance, the huge purchase costs and maintenance expenses of conventional property management systems make them unsuitable for most leisure farms and other small hotels. In order to overcome this problem, this study tries to take a nominal leisure farm in South Taiwan as an example, and employs the "Web service" concept to create a suitable online property management system. The findings of this study reveal that a Web service model incorporating the concepts of "software as a service" and "service-oriented architecture" can successfully reduce software deployment time and costs, hardware adoption costs, and overall maintenance manpower costs.

Keywords: Leisure Farms, Property Management System, Software as a Service, Service-Oriented Architecture

Introduction

Contemporary management scholarship considers information to make an important contribution to a company's competitive advantage [1], and the use of information technology can reduce operating costs and increase sales revenue [2]. In addition, the organization has been seen as a system for obtaining, analyzing, and disseminating information, which is used to develop and maintain a competitive advantage [3]. Olsen and Connolly [4] suggested that knowledge and information are vital elements of competition for the hospitality industry. Taiwan's flourishing tourism industry has launched a trend towards small hotels such as boarding houses and leisure farms. In addition, stress associated with urbanization and industrialization has made travel an important leisure option for citizens. Rural tourism has become an important part of travel in Taiwan. The information systems used by small rural hotels are still not as good as those employed by large chain hotels. This is chiefly due to the fact that the integration systems designed in accordance with manual operating procedures and meeting the needs of large hotels are very expensive, and are mostly beyond the means of the operators of small and medium-sized hotels. Moreover, the management of a small hotel is extremely different from that of a business hotel, and most small hotel managers lack sufficient hotel management expertise, let alone the use of information technology to improve management efficiency. As a consequence, hotels of this type usually cannot find suitable stand-alone applications programs. Recently, information technology in the form of Web services has made great strides in terms of prices, delivery, and operating risk. In particular, the recently promoted SaaS (software as a service) concept has dramatically reduced system deployment costs, and the use of service oriented architecture (SOA) can ensure that system deployment can provide functional flexibility. As a result, this research tries to design an appropriate on-line property management system employing the foregoing system design methods and architecture in order to conform to the special conditions and operations of leisure farms.

The goal of this study is to develop an on-line property management system for leisure farms that can increase their competitive advantages, while providing a basis for the continuing development of information applications. The chief goals of this paper are therefore:

(1) To explore the characteristics of leisure farms, and gain an understanding of the information needs of property management systems.
(2) To use the Web service concept to develop an appropriate deployment model.
(3) To use a .NET platform application program to deploy the proposed on-line system.

Property Management System

The most important concept in the field of hotel software is that of systems integration, which refers to a hotel system's utilization and linkage. O'Connor proposes that property management system functions should include a record of guests registered at the hotel, confirmation of room type, maintenance and tracking of customer accounts and payments, front-desk tasks, and other tasks such as operating level and management level reports [5]. These

functions facilitate the management and control of the hotel as a whole. An ideal management system should possess a full range of functions, and should be able to handle all transactions from initial telephone queries to final billing. As far as detailed system functions are concerned, Kasavana and Cahill suggest that a property management system's main transaction processing functions should include the following basic items shown in Table 1 [6]:

Table 1: Basic property management system functions [6]

Front-desk service system	Reservations Room management Guest accounting
Back-office operating system	Accounts receivable Accounts payable Payroll accounting Inventory Purchasing Financial reporting

It can be inferred from the foregoing literature that, although individual property management systems are composed of applications software directly connected with front-desk and back-office tasks, neither their constituent elements nor their necessary functions are entirely the same; rather, these two systems must work together to manage the hotel real estate and handle matters associated with guest lodging.

The first property management system was implemented at the New York Hilton Hotel in 1963 in order to achieve a degree of automation. This system employed computer control of front-desk operations (the system successfully improved operation control, reduced paperwork, and provided better services). Hoteliers began widely using information systems after this date [7]. According to a research report issued by the American Hotel and Lodging Association (AH&LA), although less than 10% of American hotels employed computerized operations in 1980, 95.3% of these hotels had adopted computer technology by 1994, and as many as 97.2% of all hotels with at least 300 rooms had computerized by that date [8].

Since widespread use of property management systems does not imply outstanding performance, however. Hensdill noted that hotels lagged far behind other industries in the application of automation, the main reason for this being that computer technology designed in accordance with the characteristics of the hotel industry had failed to meet hotels' operating needs [9]. Another reason for this was the fact that, in spite of the high cost of computer systems installation and subsequent maintenance, the systems failed to increase productivity to a degree proportional to their cost [8]. This was the so-called "Output Paradox" [10]. However, obtaining effective information is a key to success for all types of businesses, and information can be used to create a competitive advantage; hotels are certainly no exception to this rule. The hotel industry is a relatively mature industry, and the goal of hotel managers is typically to increase market share, and not to attempt to expand the market as a whole. As a consequence, although computerization has not been as urgent a task for medium and small hotels as it has been for large hotels, even smaller hotels cannot avoid this trend [8].

Taiwan's small hotel operators have been slower to apply information technology to their operations than their counterparts in other countries, and most small hotels are still at the computerization stage – i.e., they are still using computers merely for information storage, calculations, and printing of bills and invoices [11]. The research of Lin Yue-hsiu and Liu Tsong-zen indicated that domestic property management systems of a decade or more ago included front-desk operating subsystems, and the main functions of these subsystems consisted of guest history management, front-desk reception and cashier, house-keeping management, and telephone accounting system. Back office operating systems of the time had the main functions of accounting and ledger management, personnel affairs/payroll management, and inventory management [12]. Out of necessity, many systems included uninterruptible power supply (UPS) and antivirus subsystems. As far as contribution to hotel performance was concerned, the most appreciated function of such systems was their ability to effectively establish guest history portfolio files.

In the past, information technology research in the hotel industry chiefly emphasized methods of applying information systems, the advantages that could be obtained from adopting such systems [13], factors causing system deployment failure [14], the competitive advantage conferred by information technology when implementing strategies [15], the effect of information technology on hotel performance [16], effective existing application models [17], and factors affecting the use of information technology [18]. Past research on the adoption of information technology for management purposes by medium and small hotels analyzed background push/pull factors [19] and successful cases of adoption [20]. Research on the subject in Taiwan examined the state of the use of existing information technology in the hotel industry [12]. In line with the development of network technology in recent years, the hotel industry has also gradually begun to explore applications of this technology. Research on this aspect has investigated the effect of hotel web site attributes and characteristics on customer perceptions [21] and management of

reservations through online distribution channels [22]. Domestic research has addressed the profit-making effectiveness of hotel web sites [23] and analyzed service quality applications [24]. Most research in this area involving medium and small hotels has focused on preliminary application models, effect of Internet use on hotel coordination and performance [25], how the use of networks and online platforms enhance operating performance [26], and how to integrate the Internet with marketing information systems [27]. It can be seen from the foregoing studies that most research has not dealt with medium-sized and small hotels, and most work has addressed management issues after information system adoption. As a result, any research on the deployment of information systems at smaller hotels will be of significant academic value.

Methodologies

This study used the system development life cycle (SDLC) model [28] as research framework and derived the research workflow as shown in Figure 1.

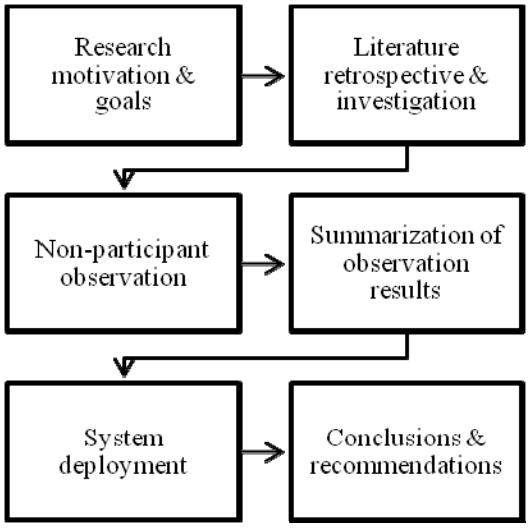

Figure 1: Executing Process of this research

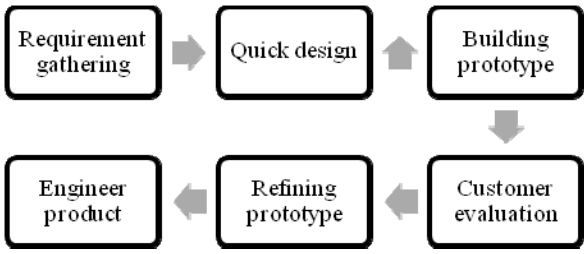

Figure 2: Process of prototyping model

This study employed a specific leisure farm in southern of Taiwan as its research subject. Because the deployment personnel encountered in this study did not understand the user's needs, and the user was unable to clearly and fully express his needs, the system development life cycle prototyping model shown in Figure 2 was used as a deployment program. This prototyping model enabled the rapid development of a prototype specifically focused on the user's needs and also easily grasped by technical personnel. The prototype served as a tool for user communication and learning, and facilitated the early discovery of problems. The prototype provided a basis for evolutionary improvement during the next cycle, and enabled the development of a complete initial prototype system.

Observation Method

Most observations were performed with the observer as a participant. The observation period consisted of July and August of 2008, and each observing period was two weeks in length. Observation time was from one to two days, and emphasis was placed on the farm operating environment and service processes. The study attempted to clarify questions posed to on-site employees in the event of poorly-understood problems and interaction between personnel. An effort was made to understand the effect of the environment and operations at the time of adoption on peripheral processes, and field notes were used to record possible system needs or risks.

System Analysis Tools

The service-oriented architecture concept was integrated with the characteristics of property management systems and leisure farms in order to enhance system application value. In addition, the software as a service method was employed to respond to leisure farms' cost and manpower considerations. Finally, the service blueprint design allowed the realization of a prototype property management system.

System development tools

A Collaborate Work Space (CWS) platform was used as a system core development platform. The rapid development platform was written by Star Software Co., Ltd. on the .NET framework, and was certified by Microsoft (certification no. Sm0703300607).

Results and Analysis

The recreational farm serving as the research subject was chiefly operated by a married couple, the couple's three children, their grandparents, and a small number of employees from outside the family. The farm was managed as a family business, and a total of approximately 20 persons worked at the farm. The farm's capital was roughly NT$10 million. The people living on the farm held various positions, and

were directly involved in serving guests.

The farm has been in existence for 17 years, and made a shift from agricultural production to tourism several years ago. At that time, many traditional farms gradually decided to combine tourism with production in line with the government's policy of promoting tourism and recreation. This farm thus transformed itself into a recreational farm.

The farm currently has 62 guest rooms, which is a typical size for a small hotel. Having been in existence for more than a decade, the farm possesses plentiful business experience. Because the farm has maintained long-term relationships with many companies and businesses, groups comprise a relatively large percentage of its guests. In addition, the recent increase in marketing in Malaysia and Singapore is gradually beginning to pay off, and the number of guests at the farm has been increasing. After a site survey was performed using the observation method, it was found that the farm's location in a relatively isolated mountain area makes transportation somewhat inconvenient. As far as information equipment is concerned, the farm possesses only an Intel 486-grade desktop computer, which is used chiefly to record basic customer information and product documents, and to support Internet access for queries. Back office space at the farm is only about the size of an ordinary table counter. Operating procedures at the farms still involve ordinary pen and paper. Management is conducted on the basis of experience and estimates; printed reports are not usually employed. With regard to the degree of computerization, only the younger family members and personnel regularly use computers, and older persons involved with farm management are not very familiar with computer use.

Problem Analysis

The site survey revealed that the farm currently combines basic hotel functions with rural recreational activities. Due to the lack of manpower on the farm, however, only one or two family members or non-family employees are in charge of many departments. The farm lacks the resources to assign a dedicated information employee responsible for providing support. In addition, due to the farm's location in the mountains, the use of conventional hardware might result in maintenance difficulties. On the other hand, the farm's operating model has a high degree of flexibility, and customer accounts are handled using several methods. This aspect differs from the fixed business items of most ordinary hotels. The farm conducts most business manually, mainly using paper and verbal negotiations, and it has a relatively high information technology use threshold.

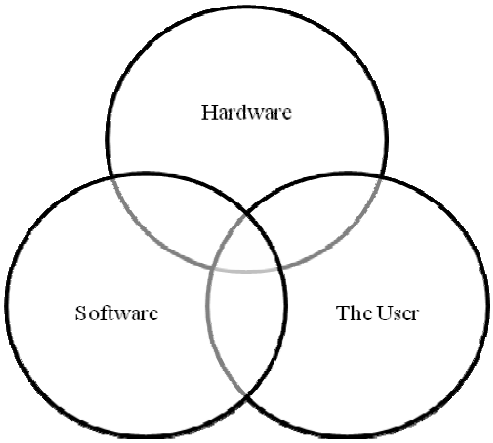

Figure 3: Concept of a computer system [5]

This system was developed on the basis of the system development life cycle concept. This study employs the proposal of O'Connor (2004), who suggested that computer systems are composed of the three constituent elements of hardware, software, and the user as shown in Figure 3, and classifies problem aspects as the three types of system hardware, application software, and operating procedures.

The site survey and the results of the analysis revealed that, due to system hardware restrictions and the farm's geographical conditions, operating costs entailed by the deployment of a conventional property management system (PMS) would be a major burden for the farm. In addition, installation of all equipment on the farm would force the farm to create the necessary space, and would also increase management costs. Furthermore, it would be difficult to obtain prompt maintenance by information personnel if a malfunction occurred. Because of this, it was necessary to simplify the system's routine operation and maintenance tasks, and thereby minimize the need for information management ability. With regard to application software, since the farm's management style and consumption model differ slightly from those of ordinary hotels, an ordinary property management system might be insufficiently applicable, and the high flexibility of the farm's consumption model might require a system containing corresponding operating concepts. In terms of planning operating procedures, it was frequently difficult to induce personnel who were familiar with the old model and who often lacked computer knowledge to move to the new system. Finally, the question of how to optimize process design was encountered. As a result, it was necessary to strengthen training associated with the foregoing problems. In conjunction with these issues, this study derived the response methods corresponding to each influencing factor as shown in Table 2.

Table 2: Analysis of influencing factors

Aspect	Influencing factor	Response concept

influenced		
System hardware	Geographical location factor Peripheral environmental factor Capital restriction factor	Simplification of overall preparation and maintenance work, elimination of information management system need restrictions.
Applications software	Applicability factor Flexibility factor	Repeated discussion of different design methods, and enhancement of system fine-tuning flexibility.
Operating procedures	Habit shifting factor Use threshold factor Process design factor	Design of standard service processes, and use of training and auxiliary programs to increase usage.

System Analysis

With regard to system hardware deployment, the software as a service (SaaS) concept shown in Figure 4 is a means of providing software over the Internet. In this concept, a service provider (typically a small or medium-sized business) maintains necessary basic facilities and software/hardware operating platforms, and also bears responsibility for all preliminary installation and subsequent maintenance tasks. The user business does not need to purchase hardware or software, establish an equipment room, or hire IT personnel, and can use the system via the Internet. Many small businesses employing a SaaS model find that it can dramatically reduce huge front-end hardware expenses, and the only required equipment is an ordinary PC connected to the Internet. The SaaS model makes it unnecessary for businesses to purchase, install, and maintain basic facilities and applications programs [29].

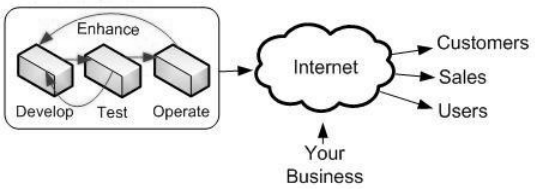

Figure 4: Concept of software as a service (SaaS)

The service-oriented architecture shown in Figure 5 served as the central concept of application software design. Service-oriented architecture is a new type of system architecture that chiefly involves a set of software elements assembled to meet the needs of a business. These elements usually include software, services, and process elements. When a business faces external demands, the processes bear responsibility for defining external demand handling steps. Services encompass all program elements required in specific steps, and software elements bear responsibility for executing operating programs. Employing standardized middleware, the componentization of functions allows the business to access and assemble existing functional elements when it is necessary to compile a new system in order to meet certain needs, such as customer information queries, remittances, and corporate accounts; this approach can accelerate the commercialization of services [30].

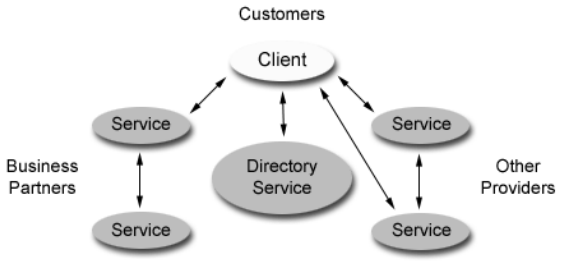

Figure 5: Conceptual diagram of service oriented architecture (SOA)

Following the confirmation of system hardware and software concepts, operating procedures were formulated in accordance with Shostack's service blueprint concept [31]. This involved the display of process steps and interactions, and interaction between users and the system, and description of various user actions and the system's corresponding responsibilities. After analyzing the service items required by leisure farm's information system, the system functions were categorized as the following four items:

(1) Reservation tasks: From a customer telephone reservation to completion of data entry and form print-out.
(2) Reception tasks: From confirmation of information to assignment of a room after a customer arrives at the farm.
(3) Lodging tasks: All service tasks while a customer is staying at the farm.
(4) Check-out tasks: All information checking and accounts settlement processes when a customer checks out.

With regard to the influencing factors uncovered during problem analysis, this study proposed the remedies shown in Table 3 after analyzing the foregoing items.

Table 3: Deployment concepts and plans

Aspect	Response	Actual plan
System hardware	Simplification of overall preparation and maintenance work, elimination of information management system need	Use of SaaS concept to meet program needs, maintain infrastructure, and eliminate the need for equipment and software purchases

	restrictions.	
Application software	Repeated discussion of different design methods, and enhancement of system fine-tuning flexibility.	Use of the SOA concept to achieve componentization of functions andaccelerate the commercial of functions
Operating procedures	Design of standard service processes, and use of training and auxiliary programs to increase usage.	Use of the service blueprint concept to describe the system from the user's point of view in terms of actions and the system's functions

System Deployment

Because the system employs the SaaS concept, it can be accessed using an Internet browser. The structure of system function can be developed as shown in Figure 6.

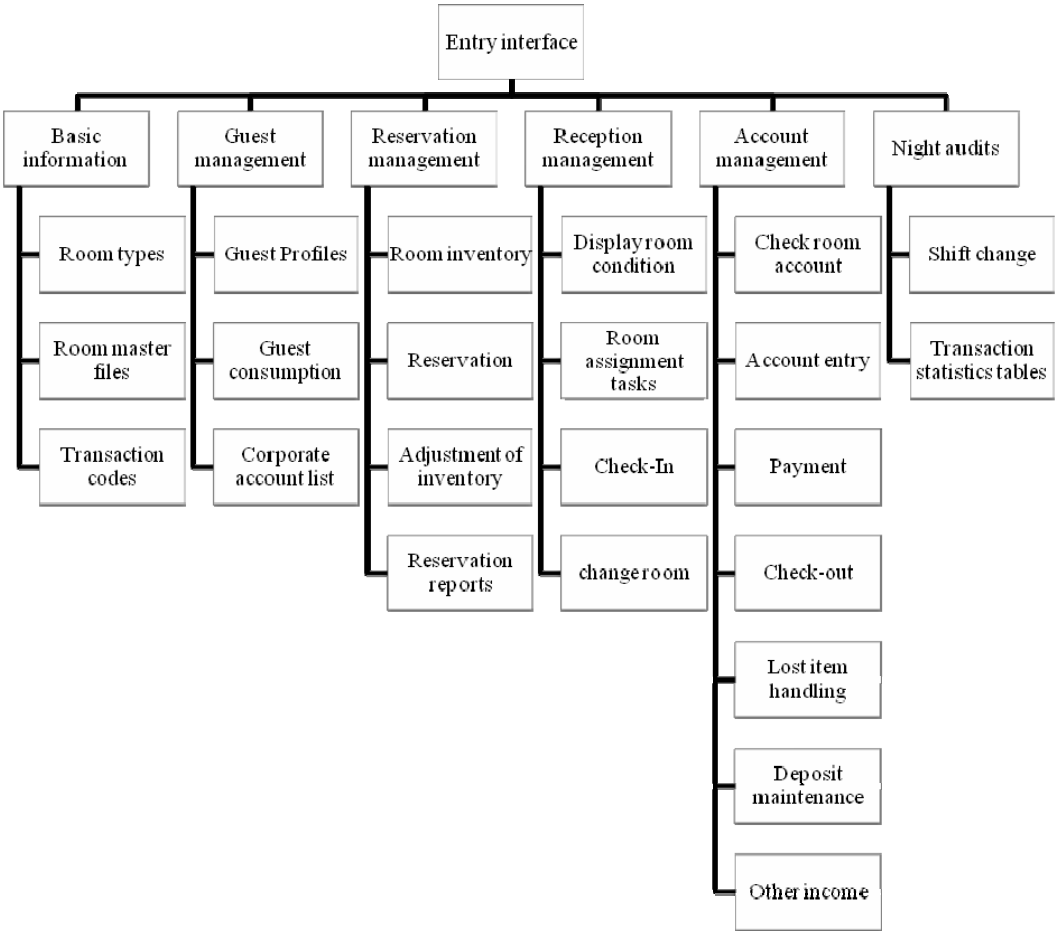

Figure 6: Structure of system functions

A user can log on after entering a self-assigned account number and password. The system can be used remotely via a wireless network, and users can access the system program on the remote server. The operation screen of proposed system can be shown in Figure 7. The system contains the following six function modules designed to handle all process needs from arrival to departure:

Figure 7: The operation screen of proposed system

(1) Basic information module:
This module contains initial settings for all products and services at the hotel, including all the room types and parameters in all room master files. With regard to maintenance of transaction codes, because most foods and recreational activities at the farm are limited to those involving locally-available resources, there will be frequent changes in transaction items. In order to facilitate operations, the system can accommodate user modification of functions in order to achieve greater flexibility.

(2) Guest management module:
The purpose of this module is to record various guests' information. Because most guests at the farm arrive in groups, and most groups are from companies and stay at the farm on a regular basis, in order to make full use of guest consumption records, and to maintain and offer promotions to long-term guests, the guest database functions are designed to achieve the goal of guest relationship management. In addition, the guest consumption function can answer queries concerning guests' consumption during past visits to the farm. Furthermore, because guests may pay using different methods, and payment for groups is often made via company accounts, a corporate account query function has been added to facilitate settlement of accounts.

(3) Reservation management module:
This module chiefly provides room inventory query and reservation entry functions for use at the time of reservation. If flexibility is required, the system's room inventory can be temporarily adjusted in order to meet guests' lodging needs. This module can also generate reservation-related reports; this function is currently mainly used to generate reservation reports and expected guest lists.

(4) Reception management module:
All functions required after guests arrive at the farm are contained in this module, especially entry and room assignment functions. Distinctions can be made between entry of individual guests and groups. To facilitate settlement of accounts, a main room number must be set when a group enters the farm. In addition, to accommodate guests who wish to change rooms on the spur of the moment, this module also contains a room change function.

(5) Account management module:
This module chiefly contains accounting and check-out functions, and allows guests' single-stay consumption records to be queried, added, and modified. Guests are checked out from the system after completion of payment tasks. This module also contains lost-item handling, meal and other product consumption, and other income record functions.

(6)Night audit module:

This module is intended to allow the setting of shift-change tasks and generate reports concerning overall transaction records.

Conclusions and Recommendations

This study employed the Web service "service-oriented architecture" concept to develop a property management system. Due to the inherent flexibility of this system, in comparison with conventional systems, it can shorten the software development cycle. In addition, although the system's functions are designed to mesh with the characteristics of leisure farms, the system offers a high degree of extensibility and management and integration elasticity. Furthermore, the "software as a service" service provision model allows users to dramatically reduce the heavy cost of simultaneous hardware and software purchases, while simultaneously alleviating personnel and geographical problems affecting system maintenance.

Because this study looks at only a single case, the system provided in this study does not necessarily employ an optimal system model; it is, however, a successfully-deployed operating model offering a property management system to the special category of leisure farms. With technology popularization in the future, a comparative study examining several types of technologies or processes in the industry may be able to determine key factors affecting system deployment in the industry.

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