Development of an RFID-Based Tourist Management System: The Case of Kenting Resort Village in Taiwan

Hsiang-Yung Feng, Assistant Professor, Department of Leisure, Recreation and Creative Industry Management, National Pingtung Institute of Commerce, Taiwan

ABSTRACT

The number of radio frequency identification (RFID) applications in different industries increases continuously. But, there are few cases about application of RFID in hospitality industry. In this research, we study the application of RFID by a resort village. This case located at Kenting on the southern part of Taiwan. Since 2008, the resort village extends RFID application projects – Ubiquitous full-heart service establishing project. In order to promote service quality in tourism industry, extension of more application of RFID or technology is convenient. High-quality services improve customer satisfaction, increase market share, and enhance profitability of service organizations. This case makes both internal service systems "RFID" and "WLAN" platform in data exchange for each others. And there are eight sub-system and 28 modules within this system. These systems provide not only standardization in operation but also a condition of healthful and careful stay for tourists.

Keywords: *Radio-frequency identification (RFID); Tourist management system; Service quality*

INTRODUCTION

The number of radio frequency identification (RFID) applications in different industries increases continuously. While the initial RFID application areas were generally industrial, applications like retail sector, supply chain management, warehouse management, logistics, manufacturing, military applications, and service sector also present a potential for RFID applications. The aim of this paper is to investigate the possibility of utilizing RFID in hospitality industry as a tool for improving service quality, customer satisfaction, market share, and profitability.

There are few cases about application of RFID in hospitality industry, because RFID technology is a relatively new technology in the business environment. In this research, we study the application of RFID by a resort village. This case located at Kenting on the southern part of Taiwan. Since 2008, the resort village extends RFID application projects – Ubiquitous full-heart service establishing project. This project include of the following service items: RFID wrist-ring real-time recognition function, WSN/ZitBee position configuration, activities safety and sporting suggestion design, and standard operation regulation.

This paper will take a brief review on RFID technology, applications, future threats, and opportunities are given. It is import to review service quality literature and RFID applications to promote service quality. Via the analysis of the case study, changes in business process are exposed and the contributions of RFID-based solutions are discussed according to the selected service quality dimensions.

LITERATURE REVIEW

RFID Technology

It's always a must-be business that enterprises utilize technology to promote the operation process. Recent years, an increasing number of enterprises are either investigating the possibility of or devoting resources to the implementation of radio frequency identification (RFID) systems. In fact, RFID technology has been widely used in many industries and enterprises, for example, the airline industry (Wyld et al., 2005; O'Connor, 2006), cattle industry (Mennecke and Townsend, 2005), construction (Jaseiskis and Ei-Misalami, 2003; Song et al., 2006), logistics (Ngai et

al., 2007), healthcare (Collins, 2005), and manufacturing (Swedberg, 2006). There are few cases in service sectors and hospitality industry.

RFID is a type of identifying information using radio transmissions. The RFID technology is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. RFID systems use radio waves to transmit information from an integrated circuit tag through a wireless interchange to a host computer (Clarke et al., 2006). In the usual context, this implies a small tag or label that identifies a specific object. RFID is a relatively new automatic identification system (auto-Id). Auto-Id refers to the methods of recognizing objects, getting information about them, and entering that data or feeding it directly into computer systems without any human involvement. Automatic identification and data capture technologies include barcodes, optic character recognition (OCR), magnetic stripes, smart cards, and biometrics. Typically, RFID systems consist of a microchip with a coiled antenna and a reader. Data and energy are transmitted without any contact between the microchip and the reader. The reader sends out electromagnetic waves that form a magnetic field so that the microchip's circuits are powered. The chip modulates the waves and sends back to the reader. The reader converts the new waves into digital data.

Service Quality

Establishing service quality is not an effortless subject to complete but it eventually provides an effective way of achieving success among competing services (Lewis, 1993). It is stated that high-quality services improve customer satisfaction, increase market share, and enhance profitability of service organizations (Hoffman and Bateson, 1997).

One of the most important researches on service quality is Parasuraman et al. (1988) model known as SERVQUAL. In this model, the service quality is determined as the gap between customer expectation and perceived performance. Therefore, service quality is explained and assessed by the formula of perception minus expectation. According to SERVQUAL computation, the higher the score, the better the quality of service and vice versa (Parasuraman et al., 1985). After an extensive study of both customers and executives of different organizations, SERVQUAL states five dimensions for service quality: tangibles, reliability, assurance, responsiveness, and empathy.

Since SERVQUAL has been criticized, hospitality researchers designed a content-specific scale—LODGSERV—for assessing service quality in hotels (Knutson etal., 1990). In the study, among the five dimensions, reliability was found to be the most important of the five dimensions for lodging consumers followed, in ranking, by assurance, responsiveness, tangibles, and empathy.

RFID Applications to Promote Service Quality

There are many cases, which happened in operation process, make use of RFID to promote production efficiency. The initial application areas of RFID can be listed as retail sector, supply chain management, warehouse management, logistics management, manufacturing, and military applications (Roberts, 2006). The purposes of this paper are to investigate the possibility of utilizing RFID to improve service quality in hospitality industry, and base on supplier-facing and customer-facing perspective to explain the RFID diffusion process.

In the supplier-facing diffusion path, the implementation starts at the boundary between supply-chain partners (inbound logistics), with the goal of cost reduction through better management of material flow from suppliers through regional warehouses to individual store locations. In starting at the supply-chain interface (i.e. the far back office), enterprise is following an efficiency strategy, whereby the overall goal is cost reduction achieved by enhanced component visibility and reduced stock uncertainty. The path pursued by enterprise is aligned with its overall strategy of the pursuit of lower-cost operations through efficiency improvements.

In contrast to the supplier-facing diffusion path, our framework proposes an alternate customer-facing path as a different strategy for implementing an RFID system. In the customer-facing path, the diffusion pattern is reversed, moving from the front office (outbound logistics) through the back office (operations) and eventually to the linkages with suppliers (inbound logistics). The significance of the reversed diffusion path is that the organization implementing the technology has decided to focus first on service effectiveness and then on the subsequent efficiencies.

METHODLOGY

There are few cases about application of RFID in hospitality industry, because RFID technology is a relatively new technology in the business environment. So, a conceptual and theoretical research in the area is limited. Case studies are appropriate in the early stages of research when little is known about the phenomenon of interest (Eisenhardt, 1989). Also, case studies are especially useful for researching phenomena, where little empirical evidence is available and to answer the how and why questions regarding these phenomena (Yin, 2003).

In this research, we study the application of RFID by a resort village. This case located at Kenting on the southern part of Taiwan. The resort village owned at least 15 years and served 400 rooms, 350 employees. It is a famous hotel in Taiwan, and representative enterprise in tourism industry.

CASE STUDY

Case Introduction

Kenting resort village is located on the southern part of Taiwan. It owned at least 15 years and served over 400 rooms, 350 employees. This hotel is unique fixed-position resort village on the southern Taiwan and good for families traveling. Since 2008, they divided 68 independent rooms as Kids hotel and extend RFID application projects – Ubiquitous full-heart service establishing project.

This project include of the following service items:

1. RFID wrist-ring real-time recognition function: Shorten the service process, increase safety control and consumption efficiency.
2. WSN/ZitBee position configuration. It could make enjoy each activity individually
3. Activities safety and Sporting suggestion design. It could help customers adopt proper fix sporting and own correct sport habit.
4. Standard operation regulation. It provides 400 rooms services and venture shops efficient operation process knowledge.

Internal System and Infrastructure

Achieving future extensible and applicable ICT system, this case makes ubiquitous concept to establish basically internal service system. “RFID” and “WLAN” exchange platform can make information exchange for each others. There are eight sub-system and 28 modules within this system. The RFID information exchange platform provides (1) RFID value-added service sub-system; (2) RFID door security integration sub-system; (3) CRM (Customer-Relationship-Management System) Feedback sub-system; (4)Customers Care and Tracing sub-system; (5) WLAN individual fitness recommendation sub-system; (6)WLAN wireless physical sensor control subsystem; (7) Staff-Position Tracing Sub-system; and (8)Body condition control and recommendation sub-system.

Besides this, the service system also combined internal light-fiber and wireless network framework with ZigBee and RF network to have customers use LCD plate through PDA or touch-Pad to deliver customers’ needs.

External Tourist’s Applications

The service system design value-added customization service on external tourists in order to reach real-time service, and shorten operation time. All the service content include of:

1. RFID bracelet real-time recognition -- Shorten the operation time of reception counters, café monitor, consuming efficiency, CRM data catching, real-time customer reply, door-lock and security promotion.
2. WSN/ZigBee position inquiry -- Real-time tracing relatives position and offer customers relax, independent activities.
3. Activity safety and exercise suggestion design -- Wireless whole-route care monitor, exercise-auto-guide service.
4. Standard operation process design -- There are 400 room services and over ten shops or cafes inside the hotel and embedded with innovation technology service. This makes service become more and more efficient than it used to be.

RFID information platform	WLAN information platform
RFID value-added service sub-system	WLAN individual fitness recommendation sub-system
RFID value-added service sub-system	WLAN wireless physical sensor control subsystem
CRM(Customer-Relationship-Management System) Feedback sub-system	Staff- Position Tracing Sub-system
Customers Care and Tracing sub-system	Body condition control and recommendation sub-system

Figure 1: The contents of RFID and WLAN information platform

CONCLUSION

When this project finished, this hotel provide a new, real-time, and ubiquitous auto service environment. The service system can take care individual customer's need and figure out customer's body status, and consider activity area safety protection.

Promote Operation Efficiency and Increase Safety Reliability

RFID and WSN technology application in this case have been able to automatically monitor users' safety position, body fitness condition, and actively feedback to customers. Not only users easily manipulate, but also actively feedback proper sports suggestion and methods to customers. It increased customers' willingness to try and use.

On the other hand, this service system also provides pre-paid deposit and activities control through e-environment. It can save customers waiting time and also auto-record customers consuming process and content.

Provide Condition of Healthful and Careful Stay

After this case finishing RFID and relative information infrastructure, it also provides a long-stay or parent-kid family have higher willingness to resort. This innovative service environment design attract domestic and exotic tourists to travel here, and stimulus Kenting tourism industry catching more investing fund and commercial opportunities.

Figure 2: The seamless service of this case

Standardization in Customer Relationship and Operation

Tag with digit identification function can supervise workers standard operation process. It can record detailed proceeding for each customer and avoid workers to revise any record. The customers can go anywhere and do anything very easily without disturbing from staff or workers. That makes customer more privacy and free like living at home.

Underline for the Tourism Industry Value Chain

Finally, this case succeeds to integrate tourism industry service chain. It integrates upper-stream suppliers and down-stream service. This supply chain, actually is strategic alliances teams, succeed in integrating cash stream, goods streams, information, and commercial stream activities. E-service environment enhance supplies electronic-supply real-time feedback abilities in this case. It's obvious that service quality, business management process, supply-time, and cost down have been all promoted. A complete and closed cooperation supply tourism service system appears on South Taiwan.

RFID applications on different industries such as retail, supply chain, warehouse management, logistics, manufacturing, and military are increasing in number. The possibility of utilizing RFID as a tool for improving service quality in the hospitality industry has been investigated by a real case study, a Kenting resort village. The interpretation of the case study findings provides some suggestions about potential utilization of RFID in hospitality.

In order to promote service quality in tourism industry, extension of more application of RFID or technology is convenient. High-quality services improve customer satisfaction, increase market share, and enhance profitability of service organizations.

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