International Journal of Management, Economics and Social Sciences
2015, Vol. 4(1), pp.32 – 41.
ISSN 2304 – 1366
http://www.ijmess.com

Information Technology Adoption Models in Retailing Industry

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The purpose of this study, which drew upon an implementation model of information technology to apply a systematic strategy for services innovations in Taiwan's retailing industry. The two major differences between the business model before and after importing an information system were as follows. One was the improvement in internal operational efficiency, such as the information exchanged between suppliers or companies. The other was the optimization of consumer services, which created different new services and features. Based on DOI (diffusion of innovation) theory, importing an information system into a supermarket chain was analyzed using the ICT (information communications technology) and improved service processing was thus obtained. The results showed that retailing industry presented an in-depth discussion of the strategies, models and important factors used to upgrade its efficiency and business performance. Doing this would increase customers' satisfaction, creating loyal customers, and result in favorable word-of-mouth marketing. This enterprise intercompany transfer cargo efficient to reduce the stock rate would be beneficial to both suppliers and customers.

Keywords: Information Technology (IT), business performance, Diffusion of Innovations (DoI) theory, Information Communication Technology (ICT), Word-of-mouth

JEL: L81, M31, O14

In recent years, product quality and cost have been emphasized as the core issues in obtaining and retaining competitive advantage (Brown and Dant, 2011). The economic and industrial environments of the operating mode of traditional retailing industry have lost their competitiveness. Many suppliers deal with retail store variety items, management inefficiency problems and attempt to control outlet inventory, sales situation, etc. The rise of the service sector has generated more and more interest in service-oriented and relationship quality (Wang *et al.*, 2013). Services are deeds, processes, and performances. Traditional retailing industry is well suited to innovative services because they typically have greater resources than individuals and a management system to marshal those resources for a collective purpose.

Traditional retailing industry also faces strong incentives to develop differentiating new services, which may give them a competitive advantage. That will be emphasizing the coming quick and convenient era. Environmental competition factors have made retail business across the industries increasingly fuzzy as regards multi-services development trends (Pauwels *et al.*, 2011). The problems are how to create differentiated products, improve service quality

Manuscript received December 21, 2014; revised February 24, 2015; accepted March 4, 2015.
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and enhance service experiences so as effectively to expand the consumer area and business opportunities. The industries must focus on information communication technology (ICT) and services for more innovations and integrations. However, business innovation models have been built by strengthening internal management mechanisms, processes and through virtual platforms integration. In information processing efficiency, the emphasis has moved to delivery requirements.

Cooperation and alliances with other industries with the aim of developing business opportunities is another focus. Setting up special stores for displays and sales in various outlets, building online shopping website platforms and offering kiosk machines and convenient ways to encourage local consumers and tourists to go shopping are also explored. Peter Drucker pointed out that it is more important to " do the right thing" (effectiveness) than " to do things right" (efficiency). The most successful companies excel at both. A process needed to improve supplier delivery orders and build vendor management platforms. IT has significant effects on the productivity of retailing. These trends have led to expanding the scale of procurement and reducing operating and purchase costs in order to improve business performance. Consequently, it is diversity in the service, price transparency, emphasis on fast, convenient times and formats all working in the information technology (Sorescu *et al.*, 2011).

LITERATURE REVIEW

Information technology (IT) is an essential tool, commonly accepted today that has significant effects on the productivity of industries to enhance the competitiveness of the economy of a country. These effects will only be fully realized if, and when, IT are widely spread and used. There are different forms required for discount stores, supermarkets and different types of convenience stores. Therefore, the retailing industries create a new type of services with ICT applications, such as vending machines, unmanned shops, and other outlets. How to integrate suppliers, shorten distribution schedules and to reduce purchasing costs are becoming important issues.

Retailers focus on supply chain management systems, marketing and sales, procurement, distribution and finance. Therefore, it is necessary for retailers to shorten delivery times and reduce inventory through faster information transmission (Fu *et al.*, 2004). A retailing business model innovation as a change beyond current practice in one or more elements of a retailing business model (i.e., retailing format, activities, and governance) and their interdependencies, thereby modifying the retailer's organizing logic for value creation and appropriation (Sorescu *et al.*, 2011). Information technology (IT) is generally considered an enabler of a firm's agility. In this study, we draw upon innovation diffusion theory (Brancheau and Wetherbe, 1990) and more recent conceptualizations of IT adoption behavior to innovation-decision process among Rogers' (1995) adopter categories (see Figure 1). The innovation process generally involves a number of individuals, perhaps including both supporters and opponents of the new idea, each of whom plays a role in the innovation-decision.

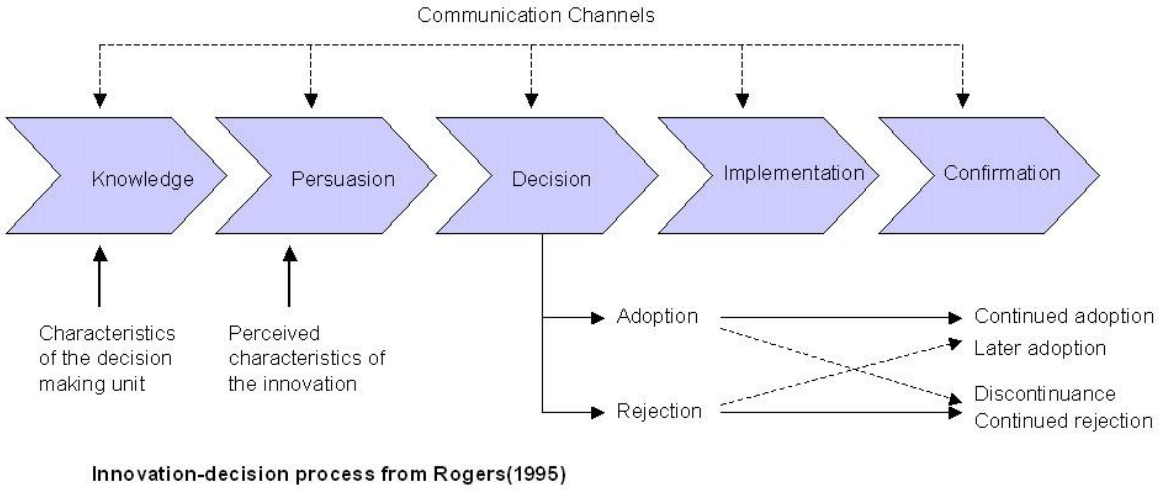

Figure 1: Innovation Decision Process

Diffusion of innovation (DOI) theory is a new idea and technology spread through culture, operating at the retailing industry. The DOI theory sees innovations as being communicated through certain channels over time and within a particular social system (Rogers, 1995). Roberts and Grover (2012) investigated how IT facilitated a firm's customer agility and competitive activity. Lu and Ram (2011) also studied the premise that organizations need to develop superior firm-wide IT capabilities to manage their IT resources successfully and realize the agility. Customer agility captures the extent to which a firm is able to sense and respond quickly to customer-based opportunities for innovation and competitive action. They draw from the dynamic capability of IT business value research streams and propose that IT play an important role in facilitating a "knowledge creating" synergy derived from interaction between a firm's web-based customer infrastructure and its analytical ability. A typical premise is that greater IT investment enables a firm to be agiler (Lu and Ram, 2011).

Individuals are seen as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting an innovation is approximately normally distributed over time (Rogers, 1995). Breaking this normal distribution into segments leads to the segregation of individuals to the five categories of individual innovativeness: innovators, early adopters, early majority, late majority, laggards (from earliest to latest adopters) (Rogers, 1995). Different types of technological innovations are often categorized into such as "radical" versus "incremental." Different types of innovation require different kinds of underlying knowledge and have different impacts on the industry's competitors and customers. Radical innovation is an innovation that is very new and different from prior solutions. Incremental innovation is an innovation that makes a relatively minor change from (or adjustment to) existing practices. Thus, radicalness might be conceived as the combination of newness and the degree of differentness (Sood and Tellis, 2005).

Sutcliffe's (1990) study included an in-depth discussion of 30 successful enterprise resource planning (EPR) cases. The study enhances a

firm's ability to sense customer-based opportunities. IT also plays an important role in the "process enhancing" synergy obtained from the interaction between a firm's coordination efforts and its level of information systems integration, which facilitates the firm's ability to respond to those opportunities. The path a technology takes time is termed its technology trajectory. Technology trajectories are most often used to represent the technology's rate of performance improvement or its rate of adoption in the marketplace. The s-curve patterns (see Figure 2) so often observed in both the rate of technology improvement and the rate of technology diffusion to the market (Schilling and Esmundo, 2009). The technology begins to gain legitimacy as a worthwhile endeavor, attracting other developers. Furthermore, measures for assessing the technology are developed, to target their attention toward those activities that reap the greatest improvement per unit of effort, enabling performance to increase rapidly.

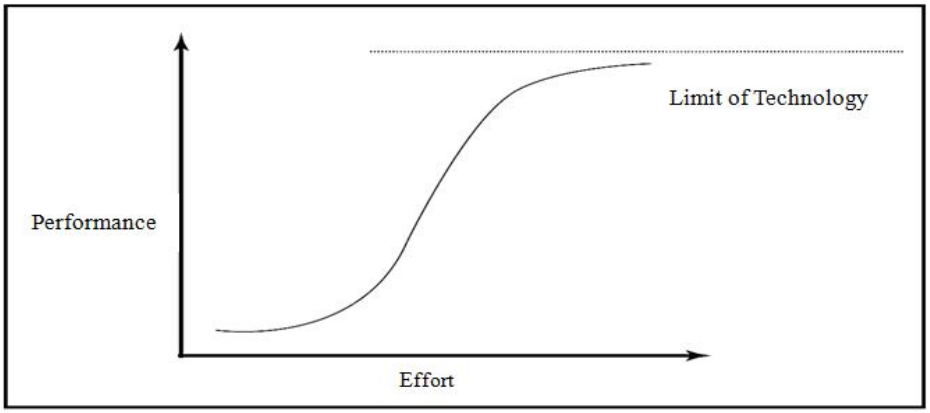

Figure 2: S-Curve of Technology Performance (Schilling and Esmundo, 2009)

Khan's (2000) study used the seven procedure improving steps proposed by Harbour (1994) to improve the speed quality and cost of an air cargo service. Mohanty and Deshmukh (2000) also studied a case that implemented a supply-chain management system. To assist the traditional retail industry in enhancing competitiveness via online shopping, the Taiwan government has assisted companies in the introduction of information communication technology management systems.

THEORETICAL FRAMEWORK

The most used theories are the diffusion of innovation (DOI) (Rogers, 1995), the technology acceptance model (TAM) (Davis, 1986; Davis, 1989; Davis *et al.*, 1989), theory of planned behavior (TPB) (Ajzen, 1985; Ajzen, 1991), unified theory of acceptance and use of technology (UTAUT) (Venkatesh *et al.*, 2003). Since the early applications of DOI to IS research, the theory has been applied and adapted in various ways. After reviewing the relevant literature, the service innovation of application system management (see Figure 3) and integration includes products, online shopping platform and enterprise resource planning (ERP) in Figure 4.

Before the system was imported, the operational center routinely contacted each chain store through traditional means (such as phone or

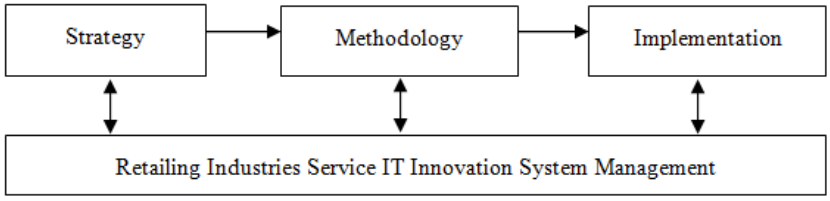

Figure 3: Implementation Model

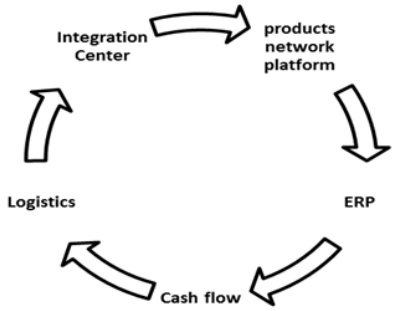

Figure 4: Integration of Information Technology

e-mail) to check the inventory of each store, and then placed orders to their suppliers after summarizing the inventory every week. The sales and inventory status could not be collected immediately at the time. Also, the product transferring operation for each store still needed to go through the operational center in order to reveal the current inventory status of each store. The slow delivery of information highly reduced their operational efficiency.

After the information system had been imported, all traditional manual procedures were replaced by the new procedures employing information technology. This reduced the time for the procedures in sending documents back and forth, and also helped the operational center and suppliers access real-time information, so that the overall efficiency increased.

After the information system had been imported, every chain store and the operational center was connected through an information system via the Internet, so that inventory information is always immediately updated. The operational center could simultaneously monitor the sales condition of each chain store, so that contacting the supplier or transferring from other stores immediately could replenish any out of stock situations of any chain store. Also, every chain store could directly inquire regarding the inventory of other stores through the system for transfers.

Strategy: Transformation

The implementation of retailing service innovation in the earliest stage constituted the enterprise transformation. Thereafter, building an electronic business involving the internet was also an individual enterprise transformation. This involved the transformation of systemic structure, organizational structure and operational mode (to innovate the procedure and organization). Only

when transformation was done could the enterprise maintain its competitive advantages in the internet era.

After the system had been imported, the operational procedure description of the company was well defined. The procedures provided inventory inquiries for one store or multiple stores according to the role of the operational center or the chain store, so that the inventory deployment could be efficient, and replenishment could be on time to provide customers with the best services.

The procedure description of the operational center and chain store is as follows:

The operational center inquiries regarding the inventory and sales of each store through the information system; if the inventory of any product reaches the inventory baseline, they can proceed with the replenishment procedure (issuing orders) through the platform to avoid being out of stock.

Chain Store: When any product in a chain store is out of stock, the store can submit a request to the operational center through the system platform, or it can proceed with product transferring procedure across stores through the system platform, to prevent overstocking (store product sales conditions differ depending on the nature of its environment) in Figure 5 and Figure 6.

Sales Procedure

Sales procedure before and after the system was imported.

Figure 5: Sales Procedure before the System was Imported (As-is)

Figure 6: Sales Procedure after the System was Imported (To-be)

The sales of the company were mostly done in 4 retail stores, so the entire sales procedure involved a sole channel and the benefit was relatively limited; hence, there was no way for the company to inform more consumers about current discount information and product contents.

Methodology: Seeking Government Support

To reduce a higher risk in implementing service innovation, retailing industry sought government support as part of its strategy in 2013. During the implementation process, the government

committee regularly checked the rate of progress and ensured the process on schedule in 2013.

Implementation: Establishing Service Innovation Systems

Currently, for the sales procedure of the company, the operational center collects product sales information from each store (or from the store managers), analyzes and discusses the status, and then plans corresponding product sales promotion. After final confirmation, the discount information/DM/advertisement will be delivered to and displayed in every store (single sales channel). After the system is imported, the entire sales procedure stays the same, but the two biggest differences are as follows:

(1) Product sales status can instantly be inquired and tabulated through an online system, so the efficiency of the system greatly increases (phone calls, faxes and emails were used for communication in the past).

(2) The company can expand the single sales channel into multiple sales channels, including all chain stores, electronic shopping malls, online stores (such as Yahoo, postal service shopping mall, yam.com), and a substantial number of stores via alliances in different industries.

Even though the sales procedure (collecting information → planning on discount contents for current period → delivering to the channels) is no different from the one in the past, the procedure utilizes a system platform and multiple channels to effectively promote the convenience of the entire sales procedure and diversification of sales channels. This will improve the subsidized manufacturers in data collecting, and also effectively promote product sales for subsidized manufacturers by the exposure of multiple channels.

Purchasing Procedure for Consumers

To be successful, a firm also needs to look for competitive advantages beyond its own operations (see Figure 7), into the value chains of suppliers, distributors, and customers. The retailing company has partnered with specific

(1) Purchasing procedure for consumers before importing the system (As-is)

Figure 7: Consumer Purchasing Procedure before Importing the System

(2) Purchasing procedure for consumers after importing the system (To-be)

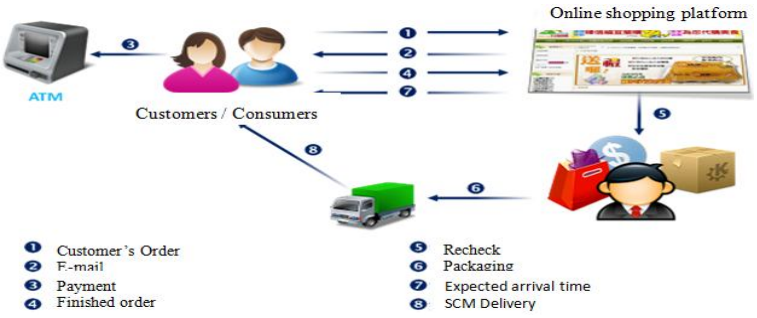

Figure 8: Consumer Purchasing Procedure after Importing the System

suppliers and distributors to create a superior value delivery network (see Figure 8). Competitive advantage also accrues to companies that possess distinctive capabilities, whereas core competencies tend to refer to areas of special technical and production expertise, distinctive capabilities tend to describe excellence in broader business processes.

Information technology adoption model is including enterprise resources planning (ERP), supply chain management (SCM), cash flow and logistics system management, internet network, customer relationship management (CRM), and online shopping platform. The data center of retailing industry will use special energy technologies to maximize energy-saving efficiency. To establish a structure of service innovation systems to ensure that the process moved smoothly. As a result, it makes consumers' lives more convenient to go online shopping.

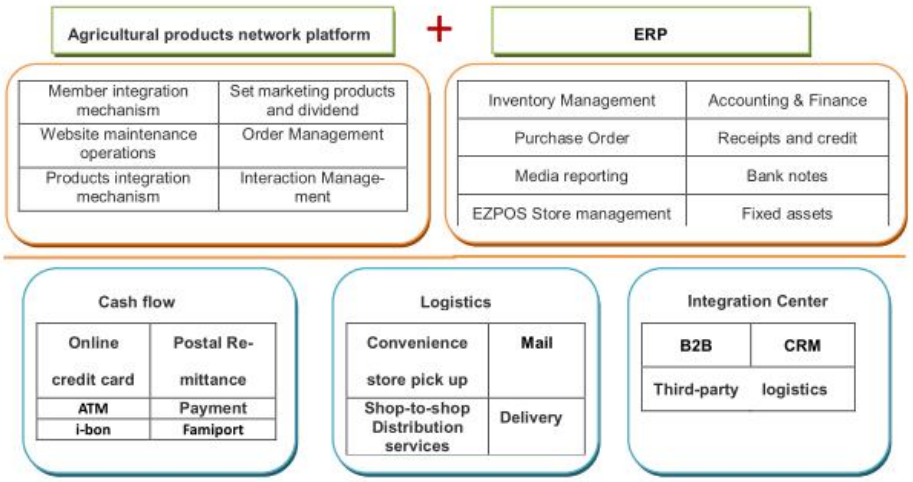

Figure 9: Structure of ICT Integration

Structure of ICT Integration

Before this case was imported, consumers could only purchase the product from each store according to the purchasing procedure as there were no common inter-store services provided among stores. This is simple consumer behavior. After this case was imported, the difference compared to the old purchasing procedure for consumers is that the new procedure not only enhances physical store services, but also increases new online stores on a virtual channel (Yahoo shopping mall, yam.com stores and postal service stores); online purchasing services create more revenue for the company.

The system has to enable users to acquire information ubiquitously through wireless handheld devices, wireless environment evaluation, user end-positioning, information communication quality, system security and redundancy (see Figure 9).

RESULTS AND DISCUSSION

Business innovation models are increasingly critical for building sustainable advantage in a marketplace defined by unrelenting change, escalating customer expectations, and intense competition (Sorescu *et al.*, 2011). A common characteristic shared by successful serial

entrepreneurs and long-running businesses is that they do have an awareness of what it is they do and how they can use their insight to continue to succeed. Shopper marketing focused on innovations in shopper marketing in the retailing environment (Shankar *et al*., 2011).

In this study that applies the traditional retail supermarket with innovation development of internal and external technology. The successful implementation of traditional retail supermarket's information technology system depended on involving the suppliers as partners and proceeding step by step to reach the goal of transformation. The quality of customer service is in addition to the original physical channel by increasing virtual, cross-industry cooperation mode and other counties to expand customer base.

The actual purpose of the traditional retail supermarket in choosing to seek government support was to compensate for the enterprise's inadequate experience and understanding in strategies and models by learning from the government committee's experience and expertise. The model used for the implementation procedure of supermarket in this case should provide a useful reference for other traditional retail that want to introduce information systems to their companies.

CONCLUSION

Based on DOI (diffusion of innovation) theory, before this project was imported, consumers could only purchase the product from each store according to the purchasing procedure as there were no common inter-store services provided among stores. If retailing companies are to meet consumers' demand to use their service advantages to overtake their competitors, and improve their value-added service provision and replenishment. After this project was imported, the difference compared to the old purchasing procedure for consumers is that the new procedure not only enhances physical store services, but also increases new online stores on a virtual channel (Yahoo shopping mall, yam.com stores and postal service stores); online purchasing services create more revenue for the company.

To assist the retail industry in enhancing competitiveness by applying information communication technology, the Taiwan government has assisted companies in the introduction of supply chain information management systems. ICT has collected and processed market information on adjusting business strategies to increase market competitiveness. Changes in the external environment emphasis on cost leadership, differentiation and high quality marketing objectives have been unable to meet the rapidly changing requirements of the market.

Research and development have shown that existing business process thinking and re-design based on customer demand from suppliers, purchasing, production and manufacture to distribution, marketing, sales and customers on the basis of ICT application and services to the financial and other value creation process are not easy to initiate, given the competitiveness of the innovative business process. Allowing employees to participate in enterprise management and achieve effective communication within the

enterprise enables them to understand the expectations of the new process and the operation of the new organizational structure, helps establish strong adaptability, greater flexibility and a more rapid response to market demand.

The integration of ICT and innovation technology with multi-functions of applications aids retailers in implementing a system. The system has the potential to integrate cash flow, logistics and an enterprise integration center for enterprise resource planning (ERP). The model used for the implementation procedure of ICT should provide a useful strategy for other traditional industries that want to integrate information systems into their companies.

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