THE IMPLEMENTATION OF RADIO FREQUENCY IDENTIFICATION TECHNOLOGY IN TAIWAN

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ABSTRACT

Radio Frequency Identification (RFID) is an evolving technology that can offer many efficient and practical solutions for business. In US, RFID is quickly being adopted by many of manufacturers and suppliers due to economic incentives, realistic advantage, and external pressures from retailer like Wal-Mart [1][2]. But in Taiwan, even technological ability and infrastructure is good, there are actually few companies that implement RFID technology. This study tries to understand the reason. So, two companies, which have already adopted the RFID system, are chosen to be the interview target. We find twelve factors influence the adoption and two of them are the major ones that cause the failure or stop of RFID project.
Key Words and Phrases: Radio Frequency Identification (RFID), Factors of Adoption Project

INTRODUCTION

In order to gain market share, the large retailers like Wal-Mart are looking for one of the best innovative ways to reduce costs of supply chain. Wal-Mart believes that RFID technology can reduce chance of out of stock, offer better inventory management, and increase margins of business [8]. By adopting RFID technology, retailers can move the stress of the supply chains to upstream suppliers and obtain the financial benefits [6][7]. However, in Taiwan, there is no such large-scale retailer to request the partners of supply chain to adopt RFID technology. Even Taiwan is the top-tier producing country of the information technology products, not many enterprises or manufacturers had embedded RFID into their business processes yet. This study tries to understand and analyze what the reason is and expect that the research results can be useful and advisable for other enterprises while considering this technology. Therefore, some executive managers of two leading companies, which have already implemented the RFID technology into their information system, were chosen to be interviewed. We would like to collect practical opinion of RFID technology adoption from industries in Taiwan and hope to find out important factors influencing the adoption and usage of RFID technology.

METHODOLOGY

The research procedure is divided into several steps as follows. First, establish the research scope. Electronic industry is the leading one in Taiwan. Hence, we picked up two large-scale electronic companies in Taiwan, which have adopted RFID technology and evaluated the effectiveness and efficiency of adoption. Then find six key persons, who were leading the adoption projects or using the implemented RFID systems. They are production managers, sales managers and warehouse managers. Before the face-to-face talks, the formal interview schedule and procedure was designed. Then the

interview outline and questionnaire was planned based on the Technology Acceptance Model as shown in Figure 1 [3][4][5]. That means we design the interview question according to two constructs of perceived usefulness and perceived ease of use. Then interviews and discussions were taken twice. The first time is with four persons and the second time is with two persons. For the sake of usefulness of interview materials, fuzzy Delphi method [10] and the geometry mean value computation [9] was adopted to increase the reliability and validity of collected information. That means the above-mentioned procedures and methods were repeated and recalculated several times in order to focus their opinion.
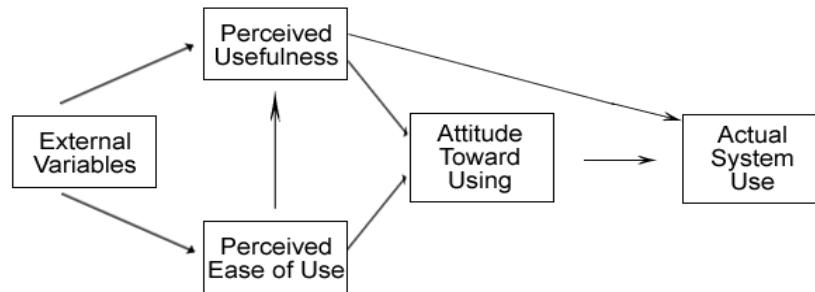

Figure 1 Technology Acceptance Model [3][4][5]

IMPLICATIONS

From the collected information, we find that these two enterprises had extremely high expectation toward the effectiveness and efficiency of RFID system before the adoption project. But, after adoption, they think there are many factors affecting the efficiency and usage of RFID. These factors are categorized in 12 groups, which are people, partners, products, promotion, cost, place, privacy, standard, reengineering, compatibility, government regulations and international development. These factors involve environmental, organizational, moral, engineering, and lawful considerations. From these results, two major problems for adoption are products and cost.

Products

The first problem is that RFID development library is not yet complete. Even the technical department of RFID hardware supplier just provides incomplete solution. Development of advanced application must spend a lot of money to outsource and the follow-up maintenance certainly is not easy. The second serious problem is that the reading rate for RFID tags is not good enough. Therefore, they need to correct the wrong data manually. Sometimes, this causes trouble or confusion. The product of above-mentioned enterprises is of high price, like main boards, graphic cards, notebooks and so on. So, any item is important and should be corrected by hands if mistakes happen. As expressed by the production managers and inventory managers, this correcting job becomes the significant burden and nightmare. Furthermore, the metal, moisture and other environmental factors may affect the reading procedure. So, they must position the RFID tags in a certain way or direction in order to correctly communicate with readers. This causes that some of the competitive advantages of the RFID technology are lost.

Cost

The main reason to adopt an RFID system is to achieve the economic and managerial benefits. For many companies, there is a clear object about how an RFID system can improve their business. These companies are usually large enough with high volumes of products or sales and would like to pay for high cost of

RFID. However, for smaller companies, this advantage becomes much ambiguous. The small-sized to medium-sized companies with small warehouses or simple processes might not save manpower or increase efficiency significantly by using RFID. As described by those two leading companies, most of their partners or upstream supplier are of small to medium size and do not obtain enough benefit to cover the expensive implementation cost of RFID technology. Except the establishing cost, these companies also think that the maintenance cost is not acceptable. As a result of these reasons, one company had already temporarily given up to use the RFID system. Only after these major problems are solved, then they will reconsider to restore usage of the RFID system.

CONCLUSIONS

According to above implication, we suggest that RFID hardware vendor should speed up the footstep to solve the problems of reading accuracy and stability. Moreover, the necessary development tools should be ample enough and easy to use. Mass production to reduce the unit price is very important for customers to accept or adopt it. Furthermore, RFID driver, third party developer and application software supplier should cooperate to provide the standardized interfaces and libraries, which can facilitate the development of advance application system. So, the feasibility and efficiency of RFID system can be enhanced. Only after the above-mentioned condition is achieved, it could be possible for these enterprises to consider the adoption of RFID system.

In the near future, we hope to compare the experience of US companies with ours. It may reveal what would be different factors for adoption of RFID system under different environment and culture.

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