

CHAPTER - II

REVIEW OF LITERATURE

2.1. FOREIGN STUDIES

Mehmet Barut, Robert Brown, Nicole Freund, Jonathan May, and Elizabeth Reinhart (2006) noted that organizations should consider their corporate responsibility before adopting a new technology. Also the cost of implementing a new technology must be take care since there may be hidden costs. If RFID technology is used correctly it can lead to tremendous improvement in the supply chain.

Brian L. Dos Santos and Lars S. Smith (2008) pointed out that Managing supply chains effectively is becoming increasingly challenging as outsourcing and off shoring increases, and globalization makes marketplaces more competitive. RFID can benefit retailers and upstream supply chain members. It can help reduce counterfeiting it can improve on-shelf availability, customer service, inventory management, downstream forecasting, and warehouse and back room operations.

Lee Revere, Ken Black, and Faiza Zalila (2010) pointed that Technologies increase efficiency, enhance quality, and improve patient safety in healthcare organizations. RFIDs can be integrated into all areas of internal patient supply chain, serving as clearinghouses of information. By providing timely information on patients, processes, and equipment, RFIDs can save time and reduce costs while simultaneously improving quality and patient safety.

Heim, Wentworth, and Peng (2010) noted that RFID service applications offer both benefits and drawbacks for customers. These are important inputs to managerial decisions regarding how RFID might be used

to design or enhance service operations. Useful decision-making tools and frameworks may help managers to prioritize between potential RFID applications for service process improvement, evaluate the feasibility and ROI for each application, and make appropriate and timely Decisions.

Young M. Lee, Feng Cheng and Ying Tat Leung (2009) in their study pointed that using RFID technology the Inventory can be tracked more accurately in real time, resulting in reduced processing time and labour. more significantly, the complete visibility of accurate inventory data throughout the entire supply chain, from manufacturing shop floor to warehouses to retail stores, brings opportunities for transformation and improvement in various processes of the supply chain this will help the firm in inventory management and tracking and will save time. Retailers such as Wal-Mart Stores, Target Stores, Tesco, Metro Stores, and US Department of Defence have accelerated the pace of adopting technology in industry and have reduced labour costs, and losses due to inventory shrinkage. Hence adapting to new technology will benefit the firm and the customers as well and the customer service can be improved.

Journals

Selwyn Piramuthu (2013) studied the recall dynamics of perishable food supply networks because of its complexity. The complexity is added because of time delay in identifying the contamination source. The authors illustrate how RFID generated traceability at finer levels of granularity both upstream and downstream will determine appropriate visibility levels and recall policies.

Mithu Bhattacharya (2012) argued that while several large retailers have mandated RFID deployment across their value chains, the case for RFID adoption in retail remains uncertain. The study aims to provide a

realistic perspective of immense potential of RFID, taking adoption drivers, potential benefits, and implementation challenges into account.

Cosmin Condea et al. (2012) studied value of RFID for retail store operations, particularly use of the technology to automate shelf replenishment decisions. They construct and test an inventory control policy based on RFID data with case-level tagging. The model incorporated RFID hardware capable of detecting bidirectional product movements between a store's backroom and sales floor. They found that the RFID-based policies have the potential to improve cost efficiency and service levels. However, different sensitivities to cost factors and suboptimal read rates must be considered when choosing a policy.

Cleopatra Bardaki et al. (2010) studied the application of RFID-enabled system supporting promotions management. They devise a system that provides both back-end functionality to supply chain partners by measuring promotions effectiveness and front-end functionality to consumers by providing personalized selection of alternative promotion gifts. The study reveals that deployment of RFID services in retail context presents a number of technology and individual challenges in the form that require special treatment. These challenges refer to accurate readability of products, handling of exception events, health concerns, and consumer privacy. The study proposed specific implementation solutions for each challenge. A field study performed in a Greek retail outlet which revealed that shoppers evaluated more favorably RFID augmented promotion management method compared to traditional methods. The authors also conducted a workshop with retailers and suppliers. In terms of market acceptance, although the service provides multiple benefits to supply chain operations, factors related to cost, consumer privacy, and current maturity of RFID technology still prohibit the service's wide adoption by the industry.

The results of a cost-benefit analysis indicated that the investment is financially viable, under certain assumptions, and breaks even after 3 years.

Cleopatra Bardaki et al. (2012) communicated the lessons learned during the deployment of two RFID retail applications namely dynamic pricing of fresh products and management of promotions in the supermarket floor in two real life pilot sites in Greece and Ireland. The lessons are presented in three inter-related perspectives; engineering challenges and associated solutions, individual adoption factors, and organizational success indicators. The authors argue that these findings might inform the design community to develop better RFID instantiations.

Mohsen Attaran (2011) argued that RFID has been attracting considerable attention from large retailers and consumer goods manufacturers with the expectation of improved efficiencies, and significant business benefits. Despite many useful applications, the technology's potential has yet to be fully realized. The author highlight RFID's promises as well as its pitfalls in the retail supply chain, discuss potential strategic benefits of this technology, explore the many factors that may contribute to RFID success, identify the implementation challenges and key business drivers, and suggest a possible relationship among implementation factors and success variables.

Amine Ayad, (2008) examined the key factors within the control of store managers to optimizing inventory and store results in a big box retail environment. The study found that different stores within same companies and different departments within same stores deliver different results due, mainly, to human factors specifically, critical thinking, functional knowledge, and leadership. The study proposed a practical tools and ideas to optimizing inventory and business results in big-box stores.

Xihui Zhang et al (2010) explained that the impact of adoption and deployment of radio frequency identification technology (RFID) in retail supply chains results in an influx of data, supporting the development of better information and increased knowledge on organization's information technology infrastructure, but also the quality and timeliness of its business intelligence and decision-making.

Alan D. Smith and O. Felix Offodile (2009) made a direct interview process were store managers of a major retail giant that has been a consistent leader in promoting the benefits of RFID enabling technology with its supply chain partners participated. The study found that Information Technology (IT) related prerequisites, operational efficiency metrics and managerial and financial opportunities were statistically significant groupings of factors. Three hypotheses were tested with mixed results concerning the importance of RFID based technology implementation, the degree of properly developed IT infrastructure before implementation, the expectations of timely and substantial Return on Investment (ROI) and if mandated, to implement RFID applications would have expected internal organisational improvement while seeing the value added of RFID based implementation.

Irwin Brown and John Russell (2007) made an exploratory investigation into RFID adoption in South African retail organisations, and identified factors that have an impact on the adoption status. The findings showed that many retailers had not yet adopted RFID or even conducted pilot studies, but intended to in the future. This positive intention was explained by technological factors (e.g., perceived benefits), organisational factors (e.g., top management awareness and interest), and external factors (e.g., the efforts of standards-making bodies). That none of the organisations had yet reached the stage of conducting pilot studies was again explained by

technological factors (e.g., cost), organisational factors (e.g., the lack of organisational readiness), and external factors (e.g., lack of global standards). The implications of these and other findings are discussed.

Massimo Bertolini (2012) quantified the business benefits that can be achieved through the deployment of Radio frequency identification (RFID) technology in the apparel and fashion supply chain. The study aims to provide quantitative results regarding logistics and store processes, as well as different areas and processes that could be affected by RFID, including both operational aspects (e.g. shipping and receiving, inventory counts, etc.) and strategic issues related to garments try-ons, store replenishment, inventory management, customer satisfaction and sales volume. The main finding of study is the punctual assessment of savings and increase in sales volume that can be achieved in the apparel supply chain through RFID deployment, with a special focus at the store level. Specifically, RFID is proven to provide benefits at operational levels through increased visibility of materials flows, labour reduction and higher accuracy of the store operations; moreover, it is demonstrated that the greatest contribution of RFID lies in its ability to provide new data, which allows consistently increasing sales and improving customer satisfaction.

Ming Chih Tsai (2010) identified important factors affecting industrial RFID adoption intention using statistical analysis. Because of its inter-organizational nature, the study extended the theory of diffusion of innovation and developed an analytical model correlating relative advantage, complexity, organizational readiness, and supply chain integration with adoption intention. The results indicated that the four constructs were all significant in affecting RFID adoption, and supply chain integration produced an effect similar to that of conventional innovation. An indirect effect of it on organizational readiness was also found to be significant.

Gaukler (2011) presented a model to help evaluate the impact of an introduction of item level radio frequency identification (RFID) in a retail environment where stock-out-based substitution is common. First, the impact of RFID in a centralized setting where retailer and manufacturer are studied as one entity. This is concerned with evaluating the profitability of RFID and exploring which product properties favor an RFID implementation. Second, the impact of RFID in a decentralized setting, where retailer and manufacturer independently maximize their profits is studied. The problem of sharing the costs of RFID, from both the perspective of tag costs and fixed costs are investigated. The study results showed that the presence of substitution at the shelf plays a major role in determining the expected benefits of an RFID implementation, as well as in determining the optimal allocation of these benefits among retailer and manufacturer. It is therefore critically important that decision makers make strong efforts to correctly account for substitution effects when evaluating potential item-level RFID implementations in the retail sector.

David C. Wyld (2010) examined the unique value proposition presented by RFID (radio frequency identification) for jewelry retailers' inventory management. The article provides a general overview of RFID technology. The author then presents findings on its use in jewelry retailing to date by innovative companies around the world. The research establishes that RFID based inventory tracking is exceptionally well-suited to the jewelry industry due a variety of factors, including the values, origins, sizes and form factors of jewelry items. Early adopting jewelry retailers have found that RFID based inventory tracking can address their needs for better inventory management and control, heightened security, and improved business intelligence.

Narges Kasiri et al. (2012) studied the item level Radio Frequency Identification (RFID) adoption in retailing. In adopting this technology, managers need to be able to identify its direct and indirect benefits. These benefits are expected to be significant and have begun to be studied empirically and analytically in narrow, isolated segments (e.g., supply chain management). This study focused on applications of RFID in the retail sector, specifically in store operations. The authors used a balanced score card (BSC) model as a decision making framework to build a holistic model of RFID enabled changes throughout retail store operations including marketing, merchandising, and supply chain management. The results indicate that benefits in the areas of merchandising and marketing may not be realized as directly as those in the supply chain, but their effects should not be underestimated. The proposed BSC model can also indicate potential opportunities for item level RFID use in retailing and serve as a guideline for further studies.

Pfleuger Jr et al. (2011) argued that even though many consumers regularly experience RFID technology, some are yet concerned with the potential for privacy loss as a result of RFID tags on purchased items. The authors studied the linkages between normative ethical perceptions of RFID technology and a cognitive framework incorporating: (a) beliefs regarding organisations' information assurance policies, (b) social exchange theory (reciprocity), and (c) concepts from the theory of planned behaviour (perceived behavioural control, attitudes toward RFID, and subjective norms). They found that, reciprocity and perceptions of information policy had positive effects on consumers' ethical perceptions of RFID as did attitudes toward RFID.

Kruger et al (2011) argued that the pervasive computing platforms present a major new opportunity for retailers to lower costs and build a deeper relationship with customers.

Gaukler, (2010) studied the potential operational benefits of item level radio frequency identification (RFID) in a retail environment. The study was conducted in the context of a retail store operation with backroom and shelf stock under the assumption of multiple replenishment and sales periods. Backroom stock is replenished according to a periodic review order up to policy and shelf stock is replenished continually from the backroom. Backroom replenishment decisions are made based on demand forecasts that are updated in each sales period based on previous sales. The author argued that the influence of item level RFID is two-fold: first, it directly affects the number of products sold through the efficiency and effectiveness of the backroom-to-shelf replenishment process. Second, it indirectly affects the retailer's demand forecast: more products sold mean a higher demand forecast, which means a higher order up to level in the backroom. The study found that 80-85 percent of the total RFID benefit is directly due to the backroom-to-shelf process, and only 15-20 percent is due to an improvement in backroom stocking. The author argue that though most current retail RFID implementations and pilots focus on case and pallet level RFID to ensure correct backroom stocking, that this type of benefit accounts for less than 20 percent of total potential RFID benefits.

Qian Wang et al (2010) found that UK logistics warehouses heavily have invested towards larger and more centralized automation systems. They indicated that this trend is partially because of the disadvantage of manual operation resulting in the slow storage and retrieval speed, the high labor cost, and the high frequency of human errors. In addition, the growing demand for online shopping and customers requesting a fast delivery,

retailers require more efficient distribution centres in which improved performances of warehousing systems through automation are increasingly desirable for these companies. They presented a conceptual design of a RFID based automated warehousing system with its inherent feature of scalability and reconfigurability.

Roussos (2006) discussed on the benefits of item level RFID tagging. He envisages that the carts could potentially include onboard computers that recognize products placed inside and that display information and promotions retrieved wirelessly from the system back end. RFID enabled smart phones, which are commercially available today and becoming increasingly popular, could carry out the same function. Item-level deployment of RFID technology would also allow for quick checkout aisles that scan all products at once and thus eliminate queues, which are consistently reported as one of the most negative aspects of supermarket shopping.

However, he also describes the potential problems in item level RFID tagging. Embedding RFID devices in consumers' loyalty or frequent shopper cards to identify individuals could expedite system login and charge the shopping cost directly to the customer's account at the point of sale unless removed at the POS, item level tags will inevitably follow the consumer home. This scenario undoubtedly raises numerous privacy concerns.

Kent and Mentzer (2003) studied the investment in inter-organizational information technology on the long term supply chain relationship. Behavioural variables like trust, commitment, dependence and long term relationship were evaluated. The study suggested that if retailers perceive their suppliers are investing in Inter organizational information technology, the retailer will be more committed to the relationship. From a

managerial perspective, the finding that logistics efficiency is a significant consequence of relationship commitment based on trust and perceived supplier investment in Inter-organizational information technology has definite supply chain management implications.

Chang et al (2006) explored the causal relationship among intrinsic attributes, perceptions of RFID and its impact on business performance in the context of retailing. Four major categories of RFID benefits were identified: (a) improved inventory management, (b) velocity of retail cycle, (c) integrated business model, and (d) efficiency of store operation. In addition, three major risk factors were recognized: (a) lack of technical expertise, (b) complexity of the technology, and (c) uncertainty of the technology. They found a significant relationship between the intrinsic attributes and benefits of RFID, but the connection between intrinsic attributes and risks of RFID was not substantiated. They also found that there is a significant relationship between benefits of RFID and the strategic impact on business performance. In particular, two RFID benefit factors, velocity of retail cycle and improved inventory management, had a strong effect on business.

Loebbecke et al. (2008) in their paper described the early weeks of a live pilot of item-level RFID by METRO Group's German department store, Kaufhof. The RFID-Enabled Sales Floor utilizes UHF Gen2 RFID tags on fashion items, combined with RFID enabled dressing rooms, intelligent displays, and smart mirrors. The pilot represents a pioneering attempt to conduct end-to-end UHF item level tracking of items through the point-of-sale. The study reflected on the implications of ubiquitous item level RFID technology and offered suggestions for further research on the socio-technical implications of this important product and process innovation.

Marzocchi and Zammit (2006) discussed how self scanning technologies can be used in retail. The study tried to ascertain whether satisfaction with self scanning technologies has any impact on consumers' overall opinion of the supermarket and their intention to patronize the store with greater frequency.

Thesis

Wei Zhou (2008) argued that being able to reveal product information at the item-level in a way that is fully automatic, instantaneous, and touch less, RFID is emerging as the hottest information tracing technology in supply chain management. The author highlights that the benefits of RFID such as: reducing labour cost, increasing sales, decreasing inventory cost, accelerating physical flow, and improves quality control works out well because information visibility eliminates uncertainty. This research investigates the benefits and business applications of item-level information visibility in three different perspectives: (1) value of item-level information, (2) knowledge based item-level Manufacturing and (3) item-level information sharing in oligopoly.

Reports

Commonwealth of Australia (2006) has designed a guide to help Australian small to medium sized enterprises (SMEs) understand the potential benefits of radio frequency identification (RFID) technology in doing business. The report envisage that in the next few years key players in the Australian retail market are likely to be influential in leading a trend towards adoption of RFID technology for supply chain management. It said that a business that is prepared for these trends is likely to be less vulnerable to poor or hasty decision-making in implementing an RFID solution.

The report also argued that when looking at adopting RFID technology it is important to understand what can and cannot be achieved. Even with the very strong technical background and a steep learning curve, it is still essential to understand the physical requirements of laying out a RFID environment to minimize RF interference from hardware and to optimise read rates.

Magazines

Rajiv Sodhi (2012) argued that the consumers of today demand a greater choice, good experience and a more interaction from a brand which has an impact on the fashion industry. The author recommends that this challenge can only be managed by improving operational efficiency and sales. Therefore, adoption of technology is no more luxury but essential. The application of technology in fashion industry is novel. The author describes about one of such technology, Interactive dressing rooms! It is a simple 8 sq.ft. glass booth. The wall that forms the door turns opaque for privacy when the shopper needs to try on garments, and clears off when friends outside the booth are asked for opinion. One of the closet's walls offers a mirror that helps the customer have a 360 degree view of the garment. The other wall has interactive closets. Sensors read the electronic tags on items and activate a touch screen that throws up information on their colour, fabric, and size. Such is the power of technology. The fashion industry also adopts technology such as QR codes, augmented reality, social analytics, computer assisted design software, and radio frequency to the fullest extent.

Conference Papers

Katina Michael (2012) investigated the dimensions of the problem of people-tracking through the devices that they carry. Location surveillance has very serious negative implications for individuals, yet there are very limited safeguards. Though the technology has legal constraints, the study

focused on the key question of whether or not location based technology can be used to do clever marketing or is really a breach of consumer privacy. The study addresses new marketing areas such as anonymous handset-based tracking in malls, complementary innovations like neuro-marketing techniques, application of RFID on retail clothing, data mining of customer transactions, and even thought-controlled computing technologies.

Danfeng (2010) reviewed the key points about the cooperation for the inner performance of retail chain. The study finds that to cooperate the information among retailers, stores, traffics and suppliers in the retail chain, the system should build the real time monitor system of goods traced by an RFID system firstly. The integration of retail chain information based on RFID can coordinate each part of retail chain with higher level of profitability and efficiency. The study reviewed the RFID tracing technology and proposed a frame of the E-cooperation retail chain information system. With the E-cooperation information system management, the retail chain can improve the quality of services as quick response to customers, optimal inventories, flexible operation processes and scientific traffic routes.

Yacine Rekik et al (2009) argued that a finite-horizon, single-stage, single-product periodic review store inventory in which inventory records are inaccurate because of the theft type errors that arise within the store. They compare three approaches based on which the inventory system can be managed in presence of theft errors. In the first approach, the inventory manager ignores errors occurring in the store. In the second approach, the benefit that can be achieved through a better knowledge of errors, i.e. by taking into account this information in designing the inventory policy. In the third approach, the contribution of a perfect RFID technology that enables to improve the system. The comparison between the three approaches permits to analyze the impact of theft errors and the value of the RFID technology on the inventory system.

Chen Xin (2009) highlighted that as a technological replacement to bar codes, radio frequency identification (RFID) tags are on the brink of introduction in retailing on a major scale. This technology will allow real-time tracking of products on an item-by-item basis (instead of the current SKU-by-SKU basis). Retailers and logistics providers will be able to pinpoint items around the clock and counting inventories will no longer be necessary. While benefitting consumer goods manufacturers, distribution centers, retail stores and customers with a deep innovation, RFID also faces lots of problems that should be solved before it's used widely.

Dane, et al. (2010) examined the impact of radio-frequency identification (RFID) technology on the inventory control practices of a small-to-medium retailer using a proof of concept (PoC) approach. They found that in a small-to-medium retail environment, RFID technology could act as a loss prevention mechanism, an enabler for locating misplaced stock, and make a significant contribution to the overall improvement of the delivery process. However, by simulation they found that the items with overlapping RFID tags wrapped around them could not be detected by the reader when they passed through the entry/exit. It was also found that concealing items had an effect on whether they would read or not. The study revealed that the readability of RFID tags was not affected when applied to products of varying compositions, except for metal products.

Pagey (2008) argued that though RFID technology has made great advancements in supply chain, but its use in retail POS has been marred with controversies due to privacy issues. These issues arise because passive tags respond to any interrogating reader. In future, mobile RFID readers will be as ubiquitous as cell phones or even embedded in cell phones. This will further exacerbate privacy issues and will slow down this technology's deployment in the retail domain.

Gomez et al (2012) proposed a system to monitor the route taken by customers inside the store using the technology of Radio Frequency Identification (RFID). This technology is used to identify the shopping carts as they move around the store. Customer route information is sent to a central computer wirelessly so it can be processed, stored, and displayed on a screen. This information will help the store manager to develop strategies to improve the shopping process in the supermarket.

Goebel and Günther (2011) argued that the product availability in retail stores is a major competitive factor. Insufficient replenishment processes and missing inventory visibility still account for a major fraction of lost sales. They proposed that Radio Frequency Identification (RFID) would eliminate inventory record inaccuracy and improve the means of employees and customers to localize products. However, the ratio of the information value and the cost of technology is a question. By simulation, the authors demonstrated that a positive ROI is possible at the current price of passive RFID transponders.

Alqahtani and Wamba (2012) drawing both on innovation diffusion theory and Radio frequency identification (RFID) technology assessed the influence of a set of determinants on the intention of Saudi Arabian retail firms to adopt RFID technology. They found that while the RFID relative advantage, the top management support and information intensity do not have any influence on the intention of Saudi Arabia retail firms adoption for RFID technology, the firm technology competence, competitive pressure and social issues do impact on their adoption intention.

Haifang Cheng et al. (2010) found that to cooperate the information among retailers, stores, traffics and suppliers in the retail chain, the information system should build the real time monitor system of goods that are traced by an RFID system in first place. The integration of retail chain

information based on RFID can coordinate each part of retail chain with higher level of profitability and efficiency. With the E-cooperation information system management, the retail chain can improve the quality of services as quick response to customers, optimal inventories, flexible operation processes and scientific traffic routes.

Chen Xin (2009) identified radio frequency identification (RFID) tags as a technological replacement to bar codes and said that they will be introduced in to retailing on a major scale. This technology will allow real-time tracking of products on an item-by-item basis (instead of the current SKU-by-SKU basis). Retailers and logistics providers will be able to pinpoint items around the clock and counting inventories will no longer be necessary. While benefitting consumer goods manufacturers, distribution centers, retail stores and customers with a deep innovation, RFID also faces many problems that should be solved before it is used widely.

Tao Yong peng (2011) described the working principle and system components of RFID technology and made an objective comparison of the two-dimensional bar code industry and RFID. He recommends development of RFID in the future for the development of e-commerce.

Szmerekovsky et al. (2010) investigated whether it is possible for the manufacturer as well as the retailer to derive economic benefits from item-level RFID. They considered a particular model of shelf-space and price-dependent retail demand and two configurations of the supply chain. In both instances, the interaction between the supplier and the retailer is via a wholesale price contract. In one case it is the supplier who sets a linear wholesale tariff on the finished goods. In another case both retail and wholesale prices are set exogenously, and the supplier must pay the retailer for shelf-space so that the retailer will carry the supplier's product. They found that in both cases when the supplier benefits from item-level RFID so does the retailer. However when the supplier sets the wholesale price the

interests of the supplier and the retailer are aligned if the retailer benefits from item-level RFID then so does the supplier and vice versa. On the other hand if wholesale prices are set exogenously, and the supplier is able to command payment for shelf-space it is possible for the interests not to be aligned: the retailer may be benefiting from RFID technology as the supplier is losing money.

Xiaojun Wang (2010) argued that the perishables are increasingly important for grocery retailers, as they have become a main reason for many consumers to choose where to shop. However, perishable food waste stemmed from inappropriate quality control and excessive inventories that have to be either marked down before the “sell-by-date” or thrown away after the date, remains a major challenge in grocery retail chains. The study proposed the use of RFID technology to track the food quality degradation that can be integrated in a pricing decision.

Sha, and Lai Guo-Liang (2012) argued that although the development of information system focused on the analysis of customer behaviour, it was unable to collect customer behaviour effectively. Therefore, it is difficult to use the system analyze the actions and characters for customers. They described the application of innovative digital content technology to improve service quality of retail stores. They defend that the system can indeed effectively obtain customer behavior information and effectively analyze it for retail stores. Hence, it can meet the customers’ demands better compared to any past store information system.

Busu et al. (2011) arguing that RFID is a promising technology for automated non-line-of-sight object identification outlined the development of Auto-Checkout system. They describe a system to read and detect multiple tags/ groceries simultaneously. Auto-checkout system can solve the problem customer queues getting longer and make it fast of queures.

Besbes and Hamam (2011) proposed an intelligent RFID (Radio Frequency Identification) checkout to facilitate access and payment, to assist visually impaired people and to improve marketing strategy. To avoid saturated queues, which are usual scene in conventional stores, they recommend the remote identification of the customer and items purchased. Payment is then performed by to online payment or by ATM or credit cards. They propose seven major criteria to ensure high performance and smooth operation of this checkout such as:

- Improving marketing strategy by displaying specific advertisement for each customer depending on the history of his previous purchases.
- Vocally assisting vocally the visually impaired people (Vocal Messages: welcome, total, confirmation...)
- Checking the validity of products during purchase process to avoid sales of expired unhealthy products
- Adding a biometric security level by using fingerprints so that the customer can confirm his identity and validate his purchase. This makes stealing others' identity cards useless.
- Enabling the customer performing the transaction faster by automatic online payment and sending electronic invoice to his inbox.
- Offering to the owner the possibility to check and supervise the history of transactions via internet.
- Saving energy by activating the RFID reader only if a user enters or leaves.

Yilmaz et al (2012) argued that the real competitive advantage is highly dependent on businesses' technological developments. New

technologies make all kinds of businesses to be much more aware about these developments. In retail marketing, if the unnecessary cost is somewhat avoided, consumers could benefit from not only the less expensive goods but also from the quality of service tremendously. They described a dynamic retail monitoring and control system to dynamically analyze the process, time, reliability and cost, between producer and consumer. The key component of the system includes Radio Frequency Identification (RFID) technology to improve the quality of service through the guided service. The proposed system aims high return investment, reducing cost, raising revenue and improving customer satisfaction by providing an efficient inventory control for retailers and vendors.

Anssens et al (2011) discussed that the RFID is a trend in the retail sector and made possible a quick inventory of a large stock, therefore it is expected to improve productivity. Currently the solutions are based on inventories, which record the input and the output of the goods and provide the stock situation. They develop another solution based on the real-time visibility of the items. With a sensor network, it is possible to detect all the items and locate them. It captured three data: the item identification, the place and the time.

Xavier et al. (2010) argued that in times of big business competition, technology such as RFID can be a very important tool for companies to get an advantage over their competitors. This paper maps the use of RFID in different sectors and highlights the advances and difficulties.

Lin, Po and Orellan (2010) used a case study approach for a children apparel retail chain which has implemented POS systems to ascertain the most important service experience variables determining the customer purchase decision and the clerks influence on customer purchase. The finding suggest that storefront employees should take initiative in helping

pay attention to the customer. It can determine whether or not a customer purchases an article.

Xiaoran Wu and Subramaniam (2009) using the Technology-Organisation-Environment (TOE) framework the authors have developed a theoretical model for RFID adoption and infusion. Based on the study the implications for managers are, managers should not only evaluate potential benefits of innovation but also evaluate innovation maturity for adoption when managers make decisions on innovation adoption.

Chieu, et al (2010) discusses a framework for deployment of business analytics solutions on a cloud platform. The solutions are characterized by a need to process and manage large volumes of data, rapid on boarding of new retailers and CPs and an ability to plug in different analytical providers. The framework provides a standardized mechanism to deploy solutions in the cloud. Dane, et al (2010) examines the impact of radio frequency identification (RFID) technology on the inventory control practices of a small to medium retailer. When integrating into a firms business processes, the RFID technology allows “any tagged entity to become a mobile, intelligent, communicating component of the organizations overall information infrastructure”.

Books

Stephan Zielke et al. (2011) tested the customer acceptance on a new interactive information terminal in grocery retailing. They use the extended Technology Acceptance Model to analyze the customer acceptance. They tested the moderating effect of the technology experience on the impact of the ease of use. The results showed that perceived usefulness, perceived ease of use, and perceived enjoyment influence the customer acceptance of the terminal via direct and indirect effects. However, the results for the

moderating effects of technology experience on the impact of the ease of use were unexpected as the ease of use only influenced the acceptance directly for experienced users. The authors recommend that the customer's acceptance of technology does not just depend on the ease of use, but along with the experience created by the technology use. This experience content of the technology will encourage even the non technology savvy people to try the technology.

Irene Gil Saura et al (2011) studied the benefits of information and communication technologies (ICT) for distribution channel members. They attempt to analyze the level of use and assessment as well as the differences between the different actors' perceptions of their respective suppliers' ICT. They look at how suppliers prioritizing the implementation of certain technological solutions, depending on the retail activity. The results show that from the supplier's point of view, it is desirable to adapt technology to the level of the customer's investment in ICT as well as to the expected degree of technological development. Provided that this adaptation is successful, there will be an acceptable level of technological alignment that may facilitate a long-lasting relationship between seller and customer. Therefore, sellers should prioritize the applications most valued by customers. The authors recommend that the supplier must assess customer needs derived from the purchase process and the after-sale service as a previous step in its ICT investment decisions. For consumers, the wide variety of technological solutions implemented by retailers adds value to the service in terms of convenience, customization, reliability, accurateness and flexibility. Provided that retailers implement training and technical support actions to familiarize consumers with their ICT solutions, technology may constitute a source of mutual benefits for both buyers and sellers.

Bernd Hallier, (2011) while discussing the wheel of retail proposed the term Evolution Tornado of Retail. It is an enlargement of the Wheel of Retail. While the Wheel's theory is the repetition of situations over the time, the evolution tornado links the repetition with the technological/sociological upgrade of the development over the time-period. The author discuss on moving from the concepts of Point of sales (POS) to newer concepts such as Point of Consumer (POC), Point of Differentiation (POD), Point of Purchase (POP) and Point of Sales-Marketing (POS).

Point of Consumer (POC) defines the outlet as an interface of consumer-groups voicing their interests via new social media like Facebook, YouTube, LinkIn etc. The POC might combine shopping, eating/drinking, entertainment. Point of Differentiation (POD) is stressing the branding of a retail-outlet to underline the difference between company A and company B, the difference of the offer C to offer D. The main actor is the retailer putting his image above the brand-interests of the suppliers; using quite often private labels to demonstrate uniqueness.

Point of Purchase (POP) is focusing the buying-behaviour of the consumer. The POS Push action is transformed to a POP-Pull Action. Supplier and retailer are on the same eye's height acting on behalf of the consumers. Point of Sales-Marketing (POS) was developed in the 60ies/70ies to decline out-of-stock situations inside the stores and to push sales by sales-supporting-materials. It was created by the suppliers and used mainly (only) in the interest of the individual supplier. The new millennium started with internet hype (new economy) followed by an internet baisse. The author also identifies Internet, B2B, B2C, RFID, WLAN as the fifth wave in the new century and proposes Mobile technologies like mobile phone/iphone/GPS and new social media like FaceBook, YouTube or LinkdIn as the sixth wave in the retail technologies

Richard Clodfelter, (2011) reviewed and synthesized information related to technologies available at the retail POS (point-of-sale) checkout. He detailed their benefits and drawbacks for both retailers and consumers. This chapter described and analyzed five technologies of POD such as barcode scanning, electronic shelf tags, shelf-checkouts, RFID tags, and fingerprint authentication. The extent to which retailers have implemented these available technologies is described, and perspectives on the future implementation of these technologies and emerging trends are also presented. Findings would indicate that there will continue to be innovations in retail technology at POS, and shopper expectations will continue to change. At the same time, retailers will probably remain cautious in deciding if and when to adopt new technologies. They must be convinced that the innovations will deliver sufficient value to offset their expenses.

Currently, most RFID applications in retailing have centered around the stockroom and warehouse, where pallets or truckloads are scanned at one time by an electronic reader which identifies RFID tags on the outside of each pallet. Moreover, the same technology can be used on individual items to speed up the checkout process for customers if each item is equipped with an RFID tag.

The author describes three aspects of RFID technology that make it a particularly attractive alternative to barcodes are that, 1) the technology allows information to be read by radio waves from tags without requiring line of sight scanning, 2) the technology allows simultaneous and instantaneous reading of multiple tags in the vicinity of the reader, and 3) each tag can have a unique code that ultimately allows every tagged item to be individually accounted for.

On the drawbacks the author identifies costs as the primary concern for retailers. However, as a critical mass is reached, costs will drop. In 2000,

the most basic tags cost approximately one dollar each. Within a few years, the costs ranged from \$.25 to \$.40. Even at those prices, RFID tags were still not yet economical for most retailers to individually tag low-cost items in the store, such as most grocery items. However, some retailers are already using RFID tags on some expensive items, such as electronics and items prone to theft, such as CDs and DVDs. RFID tags are also a privacy concern for some consumers. If not removed or deactivated, RFID tags can be read by any electronic reader. Will this pose such a large privacy concern for customers that they will reject individually-tagged merchandise? More customer feedback is needed. There currently are too few individually-tagged items manufactured to make it worthwhile for most retailers to implement RFID scanning at checkouts. Also, retailers and suppliers still need to negotiate who is going to pay to create and affix item-level RFID tags on merchandise. Once hailed as a technology so significant that it would revolutionize retailing,

Pedro M. Reyes (2011) in his book elaborated on RFID from historical and technical perspectives. He gives the advantages and limitations of the technology and examines the standards for RFID. The author also discusses the challenges faced in implementation of RFID. He gives an overview of system architecture, variables, and factors that go into RFID implementation. Applications, security, and privacy issues are also explained. The book also discusses some case study and concludes with a look out to the future for RFID and supply chain management. The RFID benefits and the associated costs with the price of readers and the potential impact on a firm's information technology (IT) infrastructure have been discussed. Although these are real costs that have affected the decision to deploy RFID systems, an important consideration is being overlooked and often neglected. For this technology to really make a difference, the benefits should be realized system-wide closed-loop with trading partners and the

value gained should transcend to the entire supply chain. Once a determination has been made regarding the usefulness of RFID in one firm, an analysis should then be extended across the supply chain to determine if performance holds for all supply chain members.

Jasser Al-Kassab et al. (2010) studied the business value of radio frequency identification (RFID) technology in the apparel retail industry. Through a case study of an RFID project at Galeria Kaufhof, a subsidiary of Metro Group and one of the largest department store chains in Europe, they demonstrate the operational efficiency gains through the automation of logistical in-store processes, such as inventory counting or goods receipt, are possible. Moreover, RFID enables new customer applications on the sales floor, which allow for a redesign of the customer interface, and thus an improvement of the service processes and the service quality. In addition, the analyses of the gathered data on the sales floor help to close the “data void” between the goods receipt and the point of sales of the department store, thus offering the opportunity to directly observe and analyze physical in-store processes. They found that the RFID data analyses allow for deriving valuable information for the department store management in the areas of inventory management, category management, store layout management, and department store processes.

Websites

Mark Roberti (2011) described the use of RFID in a store named “Common People” in Mexico City. It blends chic ambiance, an eclectic mix of art and fashion, and RFID technology to wow consumers. Every retailer in the world dreams of creating a store that is a destination a place to which locals and tourists flock because being there is an experience, and buying something is a reminder of that experience. Thus, the promoters of the store turned a four-story, 5,200-square-foot 1940s Colonial-style mansion in the

high-end Mexican district of Polanco into a unique shopping experience. They made into “a place to be filled by uncommon things for common people”. When a customer hangs up garments that he or she wants to try on in the dressing room, the RFID tags on those items are read and images of the clothing are displayed on the touch screen

2.2. INDIAN STUDIES

Journals

Ramakrishnan and Sudharani (2012) argued that India has witnessed significant growth in the organized retail store format and customers prefer shopping in new formats. Customers expect quality service from the store. However, the expectations vary from store to store, or depend on the store format.

Deepika Jhamb and Ravi Kiran (2012) found that young consumers’ are more inclined to shop from modern retail formats as compared to older ones. Consumers’ prefer modern retail formats due to its significant product attributes like improved quality, variety of brands and assortment of merchandise and store attributes like parking facility, trained sales personnel and complete security. The retention strategies, promotional strategies, growth and improvement strategies, pricing strategies and competitive strategies are the major contributors for the growth of organized retailing and play an important role in enhancing the sales of retail formats.

Dineshkumar & Vikkraman (2012) argued that the customer looking for organised retailing is found even in tier-3 cities because of the quality service provided by the new formats. Customers prefer new formats because of Fast Checkout and Time saving, Easy accessible layout, and variety of Mode of Payment.

Aradhana Gandhi (2009) explained that Information technology can and will play a major role in improving the efficiencies of the retail supply chain in India. Organizations have become aware of the importance of technology to improve efficiencies and are taking definitive steps towards leveraging IT in improving the efficiencies of the supply chain. She argued that multiple outlets at different locations, multiple handoffs, high frequency of reorder makes the retail operations a complex task. Decisions on many important strategic issues affect the supply chain. Most of the retailers suffer from financial and operational difficulties due to poor coordination of players in the value added chain. With the multiplicity of seasonal goods, highly customized products, fashionable goods, availability of close substitutes and niche products, managing retail operations become a herculean task.

Sounderpandian et al. (2007) analysed the costs and benefits of implementation of RFID. They classified the transactions generated by different RFID tag reads and discussed implementations of the data networks connecting the tag readers at the retail store. They considered the cost of implementations including the cost of tag readers, the communication network cost and other infrastructure costs. On the benefit side, they considered the benefits of these implementations including automatic checkout at retail stores and reduced inventory costs due to efficient shelf replenishment.

Srinivasan and Saravanan (2013) studied the financial challenges confronted by the retailers in Tamil Nadu. They argued that the unorganized retail format has been rapidly replaced by the modern organized retail format not only in metro and urban cities, but semi-urban areas. Even though it signifies the development in one hand; another side it severely disturbs the livelihood and survival of unorganized retailers. Though the retailers face many challenges in the wake of modern retailers, financial challenges

occupy a prominent place. The study found that low margin of profit, huge investments and lack of financial resources are the significant financial challenges faced by the unorganized retail traders.

Arul Rajan and Nandagopal (2010) studied the influence of information technology in the Retail Industry. They identify the structure of the retail Industry in India and the emerging trends pertaining to the use of Information Technology. This brings out the various aspects of the retail industry and the influence of IT in each stage. The study found that the lack of synchronization within the supply chain and discontinuous supply and the currently low IT spending by retailers in India were identified as the problem areas which can be sorted out by an effective IT system such as the retail link system.

Shashikant Rai et al. (2012) argued that the continuous withdrawal of restrictions over investment and frequent influx of foreign retailers offers more choice to Indian consumers. The authors studied the diversity and preferences of consumer behaviour in India with those from Allahabad city which fastest growing city of the Uttar Pradesh state of India, They found that in the city, preference of local store is higher than foreign retail store. They compare with the consumers in an advanced city like Bangalore which favoring foreign retail stores more than local stores.

Tanwar, et al (2008) has critically stated the different Information and communication technology available in the market. They also stated the ERP that some of the leading Indian retail firms are currently using. Information and communication technology has contributed significantly to the retail acceleration globally. However Indian retail is still leapfrogging in terms of leveraging Information and communication technology. The author states that Indian retailers can learn from the experiences of their foreign rivals and save their cost of learning.

Vidushi Handa and Navneet Grover (2012) in their paper provided detailed information about the growth of retailing industry in India. They examined the growing awareness and brand consciousness among people across different socio-economic classes in India and how the urban and semi-urban retail markets are witnessing significant growth. The study explored the role of the Government of India in the industries growth and the need for further reforms. In India the vast middle class and its almost untapped retail industry are the key attractive forces for global retail giants wanting to enter into newer markets, which in turn will help the India Retail Industry to grow faster. The paper included the growth of retail sector in India, strategies, strength and opportunities of retail stores, retail format in India, recent trends, and opportunities and challenges. This paper concluded with the likely impact of the entry of global players into the Indian retailing industry. It also highlighted the challenges faced by the industry in near future.

Thesis

Alvi, S. S. (2012) argued that customers are seeking more information to make their choices. They increasingly seek convenience in shopping and want the shopping experience to be enjoyable. To keep the shopping more exciting and not as a mundane chore, retail business are early adopter of IT and various levels of usage are emerging such as data warehousing/mining, supply chain management, scanner data bar-coding, UPC, EDI & RIFD.

Working paper

Piyush Kumar Sinha and Sanjay Kumar Kar (2007) in their working paper explained that Indian retailers are operating almost everything manually. They face several challenges like maintaining inventory, ordering

and above all keeping track of customer by maintaining consumer database. They argued that Technology would play a major role in retail development in India. Retailers will experience the impact of technology in retail. Most of the organized retailers are using available and affordable technology to capture consumer information. Modern retailers use scanner data to figure out answer to lot of questions. Through technology, retailers capture a whole lot of segmentation variables and subsequently use them for shopper segmentation. Technology helps to take better decision in some critical areas such as new product introduction, suitable product offering, quicker ordering and assortment planning. Retailers use shopper's loyalty data to design customized promotional offering for different set of customers.

Reports

Joseph and Nirupama, (2009) argued that countries like China, India and Russia lag in the adoption of organised or modern retailing because of the restrictions on foreign direct investment (FDI) in retailing. They made an attempt to rigorously analyse the impact of organized retailing on different segments of the economy. The study finds that both traditional and organized retail are bound not only to coexist but also achieve rapid and sustained growth in the coming years. This is clearly not a case of a zero sum game as both organized and traditional retail will see a massive scaling up of their activities. The retail sector left entirely in the traditional and informal segment of the economy could well emerge as a major constraint on economic growth.

Conference Papers

Ravi (2010) discussed on the methods for efficient Supply Chain management (SCM) to improve core competencies while guaranteeing efficient handling of material and products. He elaborated the basic structure

of SCM taking into account its six main parameters which are Geographical Location of SCM Partners, Logistic Dimensions, Inventory and Forecasting, Marketing and Distribution Channel Management, Product Design, Innovation and New Product Introduction and After Sale Service and Support. The discussion mainly brought out the application of Radio Frequency Identification (RFID) in the form of Electronic Product Code (EPC) and as passive tracking device to suit harsh manufacturing environment. It also discussed the Fraud Management schemes to minimize the possibility of fraudulent activities in the retail sector.

Deepak Jakate (2007) argued that the rapid growth of the Indian retail industry & low penetration levels of organized retail are attracting a large number of players and massive investment. There is fierce competition due entry of global majors & several new entrants. However the success of each player will depend on the price of its offering to the discerning Indian customer. They discuss that the Supply chain & distribution strategies are a way to differentiate their products and cut costs. Logistical expertise should be used not only to survive, but also to sustain real competitive advantage.

They recommend that since retail supply chains are complex & composed of multiple interacting supply chains for various categories & formats, they need to be highly effective as well as defect free. It will demand careful design of supply chain processes that are both robust & scalable. Lean Supply Chains are focused on supplying products at the least possible cost, thus demanding lean distribution strategies. They proposed that lean six sigma is a powerful tool for achieving this objective. A well designed & meticulously implemented lean six sigma project can yield significant benefits.

Raafat et al. (2007) described the basic aspects of RFID technology and made a case study on the application in two retail business. From

various resources, the authors reviewed the diffusion and extent of the technology's use. They argued that as the world's largest retailer and the world's largest company, Wal-Mart would be at the forefront of this process. Yet, still companies such as Prada are the ones that bring to bear the new applications that are innovative, interesting and capture ones imagination. Prada's aim was not to eliminate inefficiencies in the supply chain but to enhance the customer shopping experience, whereas, Wal-Mart with its 90,000 SKUs (stock keeping units) focused more on the efficiency of its total supply chain. The authors argued that the driving force to develop RFID technology seems not to be coming from that type of application but is being spurred by supply chain challenges. Traditional bar-coding though still effective in many environments, has many limitations: individual scans mean higher labour costs and the possibility of human errors, while RFID offers greater flexibility, more storage capacity, increased data collection and more accuracy. However, since UPC (Universal Product Code) is a standard which is used through out the industry, the bar-coding will remain a complimentary technology to RFID for the foreseeable future.

Anand and Kulshreshtha (2007) extended the TOE framework by (Tornatsky and Fleischer's) by including another aspect – customer to study an Indian retail company's B2C adoption process in India. According to the study some of the important factors for B2C adoption in an Indian retail company are first Higher value proposition of technology makes the firm adopt B2C. Secondly a firm with bigger scope encourages B2C adoption. Thirdly Competition from other retail firms makes the firm to adopt B2C. Fourthly Government environment is a critical environmental factor.

Online articles

Vikas Saraf et al (2007) present the applications of Information Technology in retailing. The retail market is a state of exponential growth.

They discuss how the retail activities such as demand and sales forecasting, inventory management, store management, transportation etc will be benefited by the use of Information Technology. They make a discussion of the new technologies evolved in retailing are Radio Frequency Identification (RFID), Smart Operating Solution Smart Ops, and Point of Sale (POS) etc. They found that retail complexities can be reduced with the help of Information Technology solutions. Using right solution can result in improved productivity and major cost saving through key advantages such as more accurate supply chain, forecasting and better inventory management. Information Technology also help retailers to solve major problems related to customer services like customer loyalty and customer satisfaction.

Books

Singh, et al (2010) conducted a study of relating organised retail supply chain management practices, competitive advantage and Organisational performance. The study was conducted in Top 10 non-livestock organized retail players operating in Punjab, Haryana, Chandigarh, New Delhi and Gurgaon in India. The results indicate that Indian retailers know that competitive advantage has high impact on supply chain practices but they fail in matching supply chain practices, competitive advantage and organizational performance.

Gupta and Pal (2012) examined issues faced by Indian retail industry in the adoption of RFID technology as an enabler of efficient retail supply chains by an in-depth case study of Big Bazaar (Future Group) conducted for a period of two months for identifying and categorizing the issues in RFID adoption. The authors argued that Indian retail landscape has also seen major transformation in the last decade. The emergence of global and multinational supply chains coupled with the emergence of organized retail

outlets has transformed the scenario. With the emergence of organized retail, Indian retailing industry is also witnessing issues, particularly related to supply chains calling for an all-round transformation of supply chains in India. While global supply chains have improved through web-integration, supply chains in India are still far-behind in the competitive landscape. The main objective of this paper is to identify issues that preclude widespread adoption of RFID in Indian retail industry and to offer solutions that may help overcome these issues.

2.3 CONCLUSION

This chapter presented the review of literature on the RFID application in retail. The studies that focused on the benefits, challenges in the retail business and its influence in customer experience and satisfaction were analysed. The literature from various sources like, research journals, conference presentations, PhD thesis, websites and books are presented from studies focusing on Indian context and rest on studies in other countries.