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RFID TECHNOLOGY: ROLE OF POS, E-COMMERCE, ERP & CRM TECHNOLOGIES INTHE RETAIL INDUSTRY

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ABSTRACT

"Retailer" also refers to a service provider who services the needs of more number of individuals, like the public. The retails shops may be in a shopping mall or on streets, which are residential, or with few or no houses. Only the pedestrians will buy from the shopping streets. To protect the customers from precipitation, the shopping street sometimes has a partial or full roof. Electronic commerce is a type of online retailing used for business-to-consumer (B2C) transactions and mail order, are examples of non-shop retailing. Retail involves the sale of huge quantities of goods to the customer. It ensures that the store attracts the customers first and then enables the customers to buy the merchandise. The customer should be engaged by the store at a single location offering him with all his needs on a one-stop basis. One of the key factors to attain an organized as well as efficient retail operation is that technology should be used as an enabler

Key Words: Retailing, RFID, Customers, Supply Chain, E-Commerce, ERP, CRM

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1. INTRODUCTION

For business and especially retail enterprise technology has been a great enabler.To improve customer satisfaction, operational efficiencies and by extension, profitability, Information Technology is the key enabler. We can get any information since we are now wireless, seamless and cashless. To sell goods and services, Retailing is a comfortable, convenient and convincing method. Retailing has now taken new forms and shapes, even though it is old as business, trade and commerce. This is due to ever changing and dynamic consumer psychology and also because of new management techniques and marketing techniques. Of the broader term, e-commerce, Retailing is one of the areas. Customers can add cash to their digital wallets from 30,000–50,000 retail outlets, which Paytm plans to set up. For accepting digital payments the company plans to acquire them as merchants, predominantly the retail players like kirana stores. To provide mobile payment services to its customers Jabong.com has become a partner with Mobile wallet company MobiKwik.

To expand its retail footprint in the country DataWind entered into partnership with HomeShop18. In order to enable better accessibility to the latter's range of tablet computers, DataWind and HomeShop18 would launch together special sales programs across mobile, broadcast and Internet media under the partnership. To accelerate retail deliveries, FashionAndYou has opened three distribution centers in Mumbai, Surat and Bengaluru. Rs 2,500 crores (US$ 402.0 million) of investment in Hyderabad, Telangana is being planned by Abu Dhabi-based Lulu Group in a modern shopping mall, a fruit and vegetable processing unit and an integrated meat-processing unit. Jubilant Retail owned Total hypermarkets is acquired by Aditya Birla Retail, the fourth-largest supermarket retail player in India and a part of the Aditya Birla Group, which is valued at US$ 40 billion.Ever since the one witnessed during World War II, the current slowdown in overall growth has not been so severe. The GDP growth contracted incessantly during the last quarter of 2008 and availability of credit came down sharply in developed large economies since the subprime-triggered crisis in the US during end of 2007 gradually spread across other parts of the world. Though policymakers' attempts to add more liquidity in these markets the financial crisis continued to trouble advanced and developing economies. As the situation got from bad to worse, many financial institutions collapsed and filed for bankruptcy.

Following this many banks/institutions made bigger write-downs. During 2007-10, the write downs on the US-originated assets alone are likely to be worth US$ 2.7 trillion while the write-downs on global exposures are expected to be worth US$ 4 trillion. Since it is likely to further strain banks' funding capabilities such massive write-down will affect the financial system to a grave extent. Already these write-downs are worsening risk of failure of banks/ financial institutions and are turning into a bigger challenge for banks/financial institutions due to solvency issues. Failure of the US investment bank Lehman Brothers, for instance, has consequently shaken the confidence of banks, investors, households etc and has had an enormous impact on the overall global financial system.More than 7% of sales is spent by the Indian organized retail players towards personnel costs. Since there is a severe scarcity for skilled labor in India the high HR costs are essentially the costs incurred on training employees. When compared to other sectors, the retail industry also faces attrition rates almost 50%, which is high. The factors that contribute to the high attrition are employee benefits offered by competitors of similar businesses, career path changes, flexible and improved working hours and conditions.

Unique product numbers are carried by RFID tags. Retailers can correlate the sales to the recorded RFID data and use that marketing information to analyze individual consumers' motion through a store, if consumers pay for goods with a debit or credit card. To optimize a store's layout to match typical consumer patterns, this type of data can help a retail store to make enhancements. Manually scanning bar codes or counting products is resource-intensive if a grocery store wants to inventory its goods, which involves workers moving aisle to aisle, tabulating items individually. In contrast, employees can quickly scan storage areas to record item quantities and locations if RFID scanners are used which can read tags even at a distance of 20 feet and acquire details of hundreds of tags per second. Installing permanent RFID scanners to provide real-time monitoring of stock looks cost-effective for some stores. The availability of products that is always in sufficient supply to meet consumer demand is ensured by this greater efficiency

2. LITERATURE REVIEW

VikasSaraf 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 came up with a discussion of the new technologies evolved in retailing are Radio Frequency Identifier (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.Enrique Mu (2007) in his thesis titled "The Role of Scanning, Evaluation and Mindfulness in the Assimilation of Information Technology: The Case of Enterprise Resource Planning (ERP) Systems", a model was proposed to describe the relations among information system mindfulness, ERP scanning, ERP evaluation and ERP adoption. The results suggest that first, collective mindfulness is a construct with two factors: alert/attentive, a state of cautious alertness, and change/situation, an awareness or knowledge of an unexpected situation or change in the firm's environment. Second, scanning of the internal environment (scanning of needs) has a main effect on ERP adoption, and this effect is moderated by the presence of information system mindfulness ("alertness" dimension), as predicted by the model; and third, ERP evaluation has rather a direct effect on ERP adoption and does not moderate the scanning-assimilation relationship as expected. In conclusion, this thesis has made contributions to the academic literature by proposing the importance of performing internal (emergent needs) and external (new technologies) scanning, understanding the duality of the scanning/ evaluation process, by exploring the dimensions and role of collective mindfulness in IT assimilation.

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. They 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.Ravi (2010) discussed on the methods for efficient Supply Chain management (SCM) to improve core expertise while assuring efficient handling of material and products. He elaborated the basic structure of SCM taking into consideration its six main parameters which are Geographical Location of SCM stake holders, Logistic Dimensions, Inventory and Prediction, 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 Mitigation strategies to minimize the possibility of fraudulent activities in the retail sector.

3. BACKGROUND OF THE STUDY

How big an organization is and how dispersed it is determine the information technology requirements of the retailer. Small shops and retailer could manage the selling process manually and could get details about customers by phone calls or a physical store visit. But when there are more stores and more products are sold managing information and its access for the appropriate people is complex and critical. (Sree Rama Rao, 2010). Bespoke strategies in different facets of merchandizing, supply chain operations, store processes, managing seasonal demands and product marketing are vital for Retail operations which make the processes difficult because of the following parameters:

a) Product complexity. The product complexity is very high in the retail business, with the huge quantity of SKUs in stores ranging from ten to hundred thousands, diverse seasonal and fashion goods, and non-standard product families.

b) Supply chain challenges. Supply chain management in retail is highly challenging since the number of outlets and channels are very high, there are multiple hand-offs, and replenishing stock is quite often.

c) Scale complexity. The scale of retail operations is highly complex since it handles a huge volume of transactions per day, done by millions of customers who buy goods through the huge number of outlets.

d) Process complexity. The business processes in retail are also highly complicated because of the multiple participants in the supply chain(producer, wholesaler, retailer, customer), and the collaboration between them for the various stages of business processes and spatially distant.

IT could help the retail players minimize the complications of operations and bring refinements: Merchandizing systems impact the top-line sales and are influenced by the merchandizing systems and hence should be setup, personalized and handled efficiently to enhance the performance. Retailers will have to perform data mining of huge volumes of data and leverage on that to arrive at insights and predictions, managing merchandise, and vendor coordination for the retail activities to be successful. From a bottom line point of view also supply chain systems are critical because they have a vital role in managing the product, location and timing appropriately and in a cost-effective way which in turn affects the stock levels and flow of goods across the stores (SYNTEL, 2013).Recently Information technology (IT) is involved in all the facets of our lifestyles and cultures. IT helps in managing information security and data processing and analytics delivery to the top management. The future way of doing businesses will be determined by IT, which will be a vital factor for the integration of computers and communication. The application of information technology in managing logistics, merchandise and marketing is very vital today for the success of retail business wherever it is either in the head offices or warehouses or store. Not as a standalone component but tightly linked with innovation, technology could optimize and refine the processes both horizontally and vertically.
For the success of retail business, technology has a more crucial role. IT systems manage customer data, stock levels, loss minimization, supply chain and workforce management and business analytics and hence improve the efficiency and effectiveness of the business. Retailers who do not adopt the IT technology are not likely to be successful in their businesses. Due to the imbalance of focus on Product/Merchandising, even retailers who have understood the 6 facets of Retail Success: People, Price, Product, Promotion, Place and Pixel, are also not very successful. Technology encompasses both front-end and back-end components and integrates retail stores and chains to business platforms across the enterprise. Retail technology aims at enhancing the effectiveness of customer experience levels of the business (Neil Kokemuller, 2013).

In the front-end of a retail store Point-of-sale (POS) terminals plays a vital role. It comprises of computing systems for automating the sales and associated equipment like (scanners, wands). Card readers are used for handling payment in the POS. Inventory scanners for stock management, security equipment like closed-circuit TV cameras and time management systems are also part of the POS. The equipment that is used for the post sales processing in retail business comprises the back-end which is mostly used in retail chains. Inventory stock levels and reordering are taken care by the Inventory control systems. Warehouse systems manage the dispatch, receipts and order fulfillments. Customer relationship management (CRM) and supply chain management (SCM) systems have evolved and are used across the enterprise, which optimize and improve the effectiveness of retail operations. A CRM system collects customer information from the POS and stores it in databases and analyzes the data to derive customer-buying patterns for providing customer incentives and promotional offers. SCM solutions, in conjunction with CRM, integrate the retailers to vendors and associates to enable early stock fulfillments and hence improving the operational efficiency.

4. METHODOLOGY

Fundamentally, the study is designed as descriptive research. The phenomenon of study are not controlled or modified. They are just measured and reported to highlight the facts. As descriptive research mainly uses interview or survey technique to collect the data, it is proposed to use a self administered questionnaire. Before research instrument is developed, a thorough review of literature and series of interview was conducted among the subject experts and possible respondents to find the items that need to be measured. Multi item constructs that measures phenomenon are framed. Proper scales such as five point agreeableness likert scales, importance scale and satisfaction scales are used. The sources of data include both primary and secondary. The primary source includes opinions of top management of the respondent retail stores and the opinion of customers visiting retail stores. The secondary source includes reports, standard textbooks, journals, magazines, web sites, newspapers etc. The population consists of retail outlets, which are operating in India. For convenience the sample framework was created limiting samples to the major cities in south India, Bangalore, Chennai, and Coimbatore. Though Indian retail sector has majority of retail stores in unorganized sector, the application of technology was found relevant in the organized retailing. Therefore, sampling framework

restricted to retails stores of various product categories of modern format. 300 stores were randomly selected for collecting data. However, only 268 stores responded the survey.

5. ANALYSIS AND DISCUSSIONS

5.1 ANOVA on prominence of technology among the various store formats.

ANOVA test is used to investigate the difference on prominence of technology among the various store formats.

5.1.1 Hypothesis

The null hypothesis is formulated as follows.

Ho1: There will be no significant difference on the prominence of technology among the various store formats.

The table 5.1 presents the outcome of the test. The table reveals that there is significant difference on opinion of the importance of Software usage for Customer Relationship Management (CRM) (F=3.571, P=0.005), Usage of Electronic Data Interchange (EDI) (F=2.635, P=0.031), Adoption of Kiosk Technology(F=2.873, P=0.025), RFID (F=2.385, P=.0321), Usage of Plan-o-gram (F=2.282, P=0.04), Usage of Hand Held Computing devices and Portable Data Terminals (PDT) (F=2.815, P=0.023), Shopping Carts & Websites (F=3.024, P=0.015) and Usage of Store Traffic Counters (F=2.435, P=0.041) among the various store formats.But there is significant difference on viewpoint of the importance of Use of Bar Code Scanning and UPC Codes (P= 0.745), Usage of Electronic Point of Sale (EPOS) (P=0.646), Usage of Digital Signage on store (P=0.425), Usage of Inventory Control Software (P=0.259), Usage of software for Retail Accounting (P=0.236) and Measures of Security & Surveillance (P=0.501) among the various store formats. Hence it leads to the rejection of the null hypothesis and the conclusion arrived at that there is significant difference on viewpoint of the importance of technology among the various store formats from the outcome of the test.

Table 5.1: PROMINENCE OF TECHNOLOGY AMONG VARIOUS STORE FORMATS

ANOVA					
BY FORMAT	**SUM OF SQUARES**	**DF**	**MEAN SQUARE**	**F**	**SIG.**

USE OF BAR CODE SCANNING AND UPC CODES	BETWEEN GROUPS	3.672	8	0.73	0.585	0.745
	WITHIN GROUPS	130.795	133	1.15		
	TOTAL	134.467	141			
SOFTWARE USAGE FOR CUSTOMER RELATIONSHIP MANAGEMENT (CRM	BETWEEN GROUPS	24.685	7	4.123	3.571	0.005
	WITHIN GROUPS	146.93	135	1.163		
	TOTAL	171.615	142			
USAGE OF ELECTRONIC DATA INTERCHANGE (EDI)	BETWEEN GROUPS	20.392	7	3.3993	2.635	0.031
	WITHIN GROUPS	164.493	134	1.29525		
	TOTAL	184.885	141			
USAGE OF ELECTRONIC POINT OF SALE (EPOS)	BETWEEN GROUPS	5.885	5	0.973	0.687	0.646
	WITHIN GROUPS	178.447	139	1.417		
	TOTAL	184.332	144			
USAGE OF DIGITAL SIGNAGE ON STORE	BETWEEN GROUPS	9.034	7	1.517	1.035	0.425
	WITHIN GROUPS	186.829	135	1.471		
	TOTAL	195.863	142			
USAGE OF INVENTORY CONTROL SOFTWARE	BETWEEN GROUPS	9.623	7	1.615	1.285	0.259
	WITHIN GROUPS	156.996	138	1.245		
	TOTAL	166.619	145			

ADOPTION OF KIOSK TECHNOLOGY	BETWEEN GROUPS	19.795	7	3.289	2.873	0.025
	WITHIN GROUPS	146.045	137	1.163		
	TOTAL	165.84	144			
BY FORMAT		**SUM OF SQUARES**	**DF**	**MEAN SQUARE**	**F**	**SIG.**
USAGE OF PLAN-O-GRAM	BETWEEN GROUPS	16.543	7	2.762	2.293	0.07
	WITHIN GROUPS	153.356	133	1.213		
	TOTAL	169.899	140			
USE OF HAND HELD COMPUTING DEVICES AND PORTABLE DATA TERMINALS	BETWEEN GROUPS	21.983	8	3.675	2.815	0.023
	WITHIN GROUPS	166.125	133	1.315		
	TOTAL	188.108	141			
USAGE OF SOFTWARE FOR RETAIL ACCOUNTING	BETWEEN GROUPS	10.625	8	1.772	1.393	0.236
	WITHIN GROUPS	162.173	134	1.283		
	TOTAL	172.798	142			
RFID	BETWEEN GROUPS	17.873	8	2.983	2.385	0.0321
	WITHIN GROUPS	157.693	136	1.242		
	TOTAL	175.566	144			
USAGE OF STORE TRAFFIC COUNTERS	BETWEEN GROUPS	20.45	7	3.393	2.435	0.041

	WITHIN GROUPS	177.517	135	1.386		
	TOTAL	197.967	142			
MEASURES OF SECURITY AND SURVEILLANCE	BETWEEN GROUPS	7.086	7	1.185	0.885	0.512
	WITHIN GROUPS	167.38	136	1.321		
	TOTAL	174.466	143			
AVAILABILITY OF SHOPPING CARTS AND WEBSITES	BETWEEN GROUPS	23.185	8	3.874	3.024	0.015
	WITHIN GROUPS	162.535	132	1.295		
	TOTAL	185.72	140			

5.2 ANOVA on prominence of technology among the stores of various product areas.

ANOVA test is used to study the difference on prominence of technology among the selling units of various product areas. The null hypothesis is formulated as follows.

5.2.1 Hypothesis

Ho2: There is no significant difference of prominence of technology among the selling units of various product areas.

The table 5.2 presents the outcome of the test. The table reveals that there is significant difference on viewpoint of the importance of Software usage for Customer Relationship Management (CRM) (F=0.842, P=0.553), Usage of Electronic Data Interchange (EDI) (F=2.531, P=0.035), Adoption of Kiosk Technology (F=3.732, P=0.005), Usage of Plan-o-gram (F=4.485, P=0.006), Use of Hand Held Computing Devices and Portable Data Terminals (PDT) (F=2.515, P=0.034), Usage of software for Retail Accounting (F=2.714, P=0.025) and RFID (F=3.289, P=0.008) among the selling units of various product areas. But there is no significant difference on opinion of the importance of Use of Bar Code Scanning and UPC Codes (P=0.445), Software Usage for Customer Relationship Management (CRM) S (P=0.553), Use of Electronic Point of

Sale (EPOS) (P=0.514), Use of Digital Signage on store (P=0.532), Use of software for Inventory Control (P=0.285), Use of Store Traffic Counters (P=0.859), Measures of Security & Surveillance (P=0.513) and Availability of Websites & Shopping Carts (P=0.547) among the stores of different product area. The null hypothesis can be rejected and it can be concluded that there is significant importance of technology among the selling units of different product area does vary, from the outcome of the test.

Table 5.2: PROMINENCE OF TECHNOLOGY AMONGVARIOUS PRODUCT AREAS

ANOVA						
BY AREA		**SUM OF SQUARES**	**DF**	**MEAN SQUARE**	**F**	**SIG.**
USE OF BAR CODE SCANNING AND UPC CODES	BETWEEN GROUPS	6.035	5	1.015	0.987	0.445
	WITHIN GROUPS	128.428	136	1.025		
	TOTAL	134.463	141			
SOFTWARE USAGE FOR CUSTOMER RELATIONSHIP MANAGEMENT (CRM)	BETWEEN GROUPS	6.495	8	1.095	0.842	0.553
	WITHIN GROUPS	164.894	136	1.285		
	TOTAL	171.389	144			
USAGE OF ELECTRONIC DATA INTERCHANGE (EDI)	BETWEEN GROUPS	19.681	7	3.283	2.531	0.035
	WITHIN GROUPS	165.215	134	1.315		
	TOTAL	184.896	141			
BY AREA		**SUM OF SQUARES**	**DF**	**MEAN SQUARE**	**F**	**SIG.**
USAGE OF ELECTRONIC POINT OF SALE (EPOS)	BETWEEN GROUPS	7.493	8	1.253	0.883	0.514

	WITHIN GROUPS	176.853	134	1.385		
	TOTAL	184.346	142			
USAGE OF DIGITAL SIGNAGE ON STORE	BETWEEN GROUPS	7.693	5	1.293	0.874	0.532
	WITHIN GROUPS	188.171	136	1.493		
	TOTAL	195.864	141			
USAGE OF INVENTORY CONTROL SOFTWARE	BETWEEN GROUPS	9.171	7	1.535	1.242	0.285
	WITHIN GROUPS	157.435	135	1.251		
	TOTAL	166.606	142			
ADOPTION OF KIOSK TECHNOLOGY	BETWEEN GROUPS	24.793	8	4.142	3.732	0.005
	WITHIN GROUPS	141.057	138	1.122		
	TOTAL	165.85	146			
USAGE OF PLAN-O-GRAM	BETWEEN GROUPS	29.645	7	4.945	4.485	0.006
	WITHIN GROUPS	140.262	135	1.115		
	TOTAL	169.907	142			
USE OF HAND HELD COMPUTING DEVICES AND PORTABLE DATA TERMINALS	BETWEEN GROUPS	19.915	5	3.324	2.515	0.034
	WITHIN GROUPS	168.190	135	1.335		
	TOTAL	188.105	140			
USAGE OF SOFTWARE FOR RETAIL	BETWEEN GROUPS	19.576	7	3.272	2.714	0.025

ACCOUNTING	WITHIN GROUPS	153.225	137	1.213		
	TOTAL	172.801	144			
RFID	BETWEEN GROUPS	23.625	8	3.945	3.289	0.008
	WITHIN GROUPS	151.948	139	1.185		
	TOTAL	175.573	147			
USAGE OF STORE TRAFFIC COUNTERS	BETWEEN GROUPS	4.078	8	0.683	0.456	0.859
	WITHIN GROUPS	193.779	134	1.537		
	TOTAL	197.857	142			
MEASURES OF SECURITY AND SURVEILLANCE	BETWEEN GROUPS	6.985	4	1.157	0.875	0.513
	WITHIN GROUPS	167.464	138	1.324		
	TOTAL	174.449	142			
AVAILABILITY OF SHOPPING CARTS AND WEBSITES	BETWEEN GROUPS	7.162	7	1.185	0.856	0.547
	WITHIN GROUPS	178.552	138	1.412		
	TOTAL	185.714	145			

5. CONCLUSION

This emphasizes the critical nature of the current scenario and the necessity for technology implementation in the Indian retail sector. Nevertheless the unorganized nature of the retail business is the major setback in the technology adoption in the retail sector in India. Technology implementation has already been initiated by the organized sector, to deal with the competition from internal as well as the foreign retail players. Organized retailers are continuously enhancing their IT infrastructure to improve the buying environment for the customers, to mitigate

operational setbacks and to improve profits. They have also implemented important and strategic technology advances like handheld computing terminals, POS systems and tablet PCs. Also innovations in digital signage, mobility, social engagement, E-retailing and payment processing are implemented across the industry, to provide a competitive edge to the selling.

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