
RFID TECHNOLOGY: ECONOMIC IMPACT OF RETAIL STORE TYPES AND PRODUCT CATEGORIES IN THE RETAIL INDUSTRY

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ABSTRACT

Since India's economy is booming the growth factors in Indian organized sector are various. In addition to that, the factors for the growth in Indian organized retail sector are the rise in number of young working population, hefty pay packets, more number of nuclear level families in urban areas, rise in the number of working women, increase disposable income and customer aspiration, growth in expenditure for luxury items and western influences. Due to the entry of several new players in the Retail sector in India, it has become one of the rapid growing and the most vibrant industries. The Indian Retail sector contributes to nearly 8.2 % of the employment and above 10.5 per cent of (GDP) Gross Domestic Product in the country. In the retail space, India is ranked as the fifth among the largest international nations in the world. The Boston Consulting Group and The Retailers Association of India published a report titled, 'Retail 2020: Retrospect, Reinvent, Rewrite', highlighting that by 2020, it is predicted that India's retail market will grow to nearly US\$ 1.2 trillion from US\$ 605 billion in the year of 2015, driven by attitudinal shifts, income growth and urbanization.

Key Words: Retailing, RFID, Customers, Supply Chain, Services, Economy

1. INTRODUCTION

It is mentioned further that traditional trade would expand at 11 %, modern trade at 21 % per annum, while the overall retail market is predicted to grow at a rate of 12 per cent per annum. With organized retail penetration at 19.5 % as of 2014, Rs 3.68 trillion (US\$ 58.2 billion) was the spending in Retail in the topmost seven Indian cities. It is forecasted that in online retail in the next five years, will be comparable and at par with the physical stores. Driven by rapid increase in the population of internet users and stronger investment in the sector, it is predicted that India will become one of the rapidly growing e-commerce markets globally. It is forecasted that India's e-commerce market will grow to over

US\$ 105 billion by 2021 from US\$ 3.8 billion in 2015. Stopping Indian retail industry from reaching its full potential, the challenges facing Indian organized retail sector are various. Since the Indian consumer is earning more now, women working force is increasing, western influences, desire for luxury items and better quality there is a major change in the behavior patterns of Indian consumer. All these have made Indian organized retail sector to give more in order to satisfy Indian customer since he now wants to eat, shop, and get entertained under same roof.

Due to increase in demand from the Indian organized retail sector, the real estate prices are escalating and lack of retail space is posing the biggest challenge to its growth. It is affecting the overall profitability in business with Indian retailers having to spend more for the retail space. The foremost challenge that retailers face at the warehouse level as well as at the individual store level is the management of inventory. Excessive amount inventory often leads to hike in inventory costs, and fall of profits, so Retailers like Pantaloons and Shoppers Stop have IT systems for managing inventory better. To plan their stock outs, move stock from warehouse to stores, replenish their stock on time, maintain adequate stock at a store to match consumer preferences etc SCM-IT has helped retailers. However, for efficiently implementing the supply-chain software across stores and integrating it with the central warehouse, the retailer may still face big challenges which can be a time-consuming process, requiring trained personnel etc.,

RFID stands for Radio-Frequency Identification. It consists of a small integrated circuit and an antenna in a small electronic device. The capacity of the chip is of carrying up to around 2 kilobytes of data. The similar functions as a bar-code or a magnetic-strip on the rear of a credit card or ATM card is fulfilled by the RFID device, which provides a unique identifier for that object. And, the RFID device is scanned to read the identifying information similar to a bar code or magnetic strip must be read to get the information. Primarily for inventory tracking the Radio Frequency Identification (RFID) are a system that facilitates the tracking of objects, via a three part technology comprised of a reader, a transponder (RF tag) and a transceiver with decoder. To improve business processes such as inventory management and efficiency in supply chain management RFID works in conjunction with an organization's information technology infrastructure. A radio signal is emitted by the reader that activates tag and reads and writes data to it. Information (encoded on a bar code like tag) can be read and received by the reader, which is attached to a computer, as products are shipped, received or stored.

RFID uses the EPC (Electronic Product Code) and has been integrated into EPC global network. The EPC stored on a RFID tag, is a unique number that identifies a specific item in supply chain, which combines a silicon chip and a reader. It can be associated with vital data such as the source of an item or

date of its manufacture once EPC is retrieved from tag. EPC is the key that unlocks power of information systems that are part of EPC global Network much like a Global Trade Item Number (GTIN) or Vehicle Identification Number (VIN). RFID technology is deployed in its stores by Wal-Mart, world's second largest company. In an inevitable technological revolution, Wal-Mart is positioning itself at the front. Companies which recently made product enhancement announcements in this area like Microsoft, IBM Global, and Philips Electronics division are also participants in the industry. "Philips, in Amsterdam and IBM, in Armonk, New York will collaborate on RFID for retail and asset management, supply chain aspects, as well as smart card technology for e-government, finance, transportation and event ticketing".

2. LITERATURE REVIEW

David C. Wyld (2010) examined the unique value proposition presented by RFID (radio frequency identification) for jewellery retailers' inventory management. The article provides a general overview of RFID technology. The author then presents conclusions on its use in jewellery retail business to date by creative companies around the world. The research establishes that RFID based inventory tracking is exceptionally well-suited to the jewellery industry due to a variety of factors, including the values, origins, sizes and form factors of jewellery items. Early adopting jewellery retailers have found that RFID based inventory tracking can address their needs for better inventory management and control, heightened security, and improved business intelligence. David W Pierson (2006) in his thesis titled "An Investigation of the Relationship between Manufacturing Organizations and Computer Aided Design", examined the question of whether the size of a given manufacturing organization influenced the extent to which CAD was used. In all categories, low to no correlation was found between the size of manufacturing organizations and the extent to which they use CAD. The researcher concluded that other influencing factors, unrelated to organizational size or CAD cost, training or expertise contributed to the extent to which CAD is used within manufacturing organizations.

Deepak Jakate (2007) argued that the rapid growth of the Indian retail industry & lower prevalence of organized retail are enticing a large number of players and large investment. There is immense competition due to major global & 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. Gaukler (2011) presented a model to help analyse the effect of introducing item level radio frequency identification (RFID) in a retail business environment where stock-out-based replenishment is common. First, the effect of RFID in a centralized environment, where retailer and producer are studied as one entity. This is concerned with calculating the profitability of RFID and analysing which product

properties are helpful for an RFID implementation. Second, the effect of RFID in a decentralized environment, where retailer and producer independently increase their profits is studied. The issue of sharing the costs of RFID, of both 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 take into account substitution effects when considering potential item-level RFID implementations in the retail sector.

3. BACKGROUND OF THE STUDY

3.1. Retail ownership type

There are differences in Retail outlets based on their type of ownership like Individuals, corporate entities, or contractual systems. Further, the service levels describe the quality and extent of service provided to the consumer. Finally the type of merchandise line describes the different product types a store carries and in what assortment. The independent store owns a single retail unit. Detailed specification can be worked out for the best location and can be easily searched, since there is only a single location. It also lowers leases, fixtures, employees, and merchandise investment costs. An independent can always be a amicable, personalized retailer. Chains consist of multiple retail units commonly owned, which has the advantage of making centralized purchase decisions. Competitive advantages for chain stores include bargaining power, wholesaling advantages, multi-shop economies, computerized processes, easily accessibility to media, clearly defined processes, and long-term planning. Chains have many disadvantages also: lack of flexibility, huge investments, lesser control over the processes, and high dependencies.

Franchising means a contract agreement between a franchisee and a franchisor. When the contract is made the franchisee can do certain business using the established brand provided by the franchisor and as per a predefined business model. The franchisor benefits are control over the franchisee and more growth potential. The franchisee benefits are a popular name can be made use of and shared costs are reduced to economical rates prevailing in the industry. The retail store department can be sometimes rented to a third party, which will be called as a leased department. The third party who has leased the department is external to the retail store. The proprietor of a leased department usually pays a fraction of sales as rent to the store and is responsible for all its operational aspects (including fixtures). The store provided various restrictions and guidelines to the leased department in order to achieve overall consistency and collaboration. Vertical marketing systems are in which the production firm, the wholesaler, or the retailer or any two of them own the later stages of manufacturing and distribution. A vertically integrated company can accomplish many targets such as

self-reliance, cost reduction due to absence of brokers, dealing directly with the customers, higher bargaining potential when handling external vendors or retail entities, greater accomplishment, and effectiveness in deliveries and order management. A consumer cooperative is a particular type of retail entity that is invested and promoted by its consumers, managed and profit shared among the consumers.

3.2. Retail Product Categories

Widely, retail products are categorized and classified as below:

1. Food items or eatables
2. Hard goods or durable goods (“hard-line retailers”) –consumer appliances and electronics, furniture items, sports goods, etc. Goods that last for long and are useful for their lifetime.
3. Soft goods or consumables – clothes and dress materials, apparel, and other fabrics. Goods that have a lifetime of about 3 years or lesser.

Major Market Retail Report (MMRR 2012) classified the products into 33 categories. The retailers who are listed in the product types include both types of retailers like specialty stores and mass merchants. Specific product categories in Major Market Retail Report are discussed below:

Fast Moving Personal Care Products like baby products, deodorant, toilet soap, shampoo items, toothpaste. More products like hair and skin conditioner, cosmetic tissue, lotions, etc. Cosmetics & Fragrances type of products like eyeliner, moisturizer, mascara. More products like perfumes and colognes, lipstick, cleansing creams, toiletries, etc. Non-Prescription Health Products like cold and stomach ailments, aspirin and other analgesic drugs, medicines for cough. More products like bandages, contact lenses and eye care, etc., that can be bought directly from a pharmacy without a doctor’s advice. Prescription Drug products like medicine that are prescribed by a doctor and sold by a qualified pharmacist with educational qualifications like B.Pharm, M.Pharm etc., Photography & accessories products like camera cases, digital cameras, camcorders. More products like memory cards, photo albums, etc., Jewellery, Watches types of products like pendants, bracelets, and ring. More products like earrings, wristwatches, etc. are purchased either for self-usage or as a compliment. Greeting Cards & Gift Wrap type of products like Birthday cards, Christmas cards, invitations, gift wrappers, bows, ribbons, etc. Books & Magazines types of products like magazines and periodicals, hardcover and paperback books of all types, etc., Music & Videos types of products like pre-recorded music CDs. More products like pre-recorded movie Blu-ray, DVDs, etc. Video Games and Play Equipment types of products like games, Nintendo, GameBoy, consoles. More products like accessories for Playstation, Xbox, GameCube, PC, etc.

Children's Toys & Games types of products like bikes and trikes for children, construction kits, dolls, model cars, board games, activity toys, kid's books, etc. Sporting Goods baseball gloves, soccer balls, fishing tackle, hockey stick, skis, camping equipment, etc., not including footwear and clothes. Athletic Footwear & Clothing goods like team jackets, court shoes, jogging shoes. More products like jerseys, , caps, ski outfits, etc. Men's Dress Wear types of products like dress slacks, suits, and jackets. More products like coats, ties, dress shirts etc. Men's Casual Wear types of products like sweaters, jeans, t-shirts, socks, outdoor clothing and underwear. More products like shorts, sweat shirts, etc. Lingerie, Hosiery types of products like nightgowns, pantyhose, pajamas and bras. More products like intimate apparel, slippers etc. Women's Dress Wear types of products like gowns office wear, coats, suits, evening dresses, blazers, etc. Women's Casual Wear types of products like outdoor jackets, shorts. More products like t-shirts, sweaters, jeans etc. Children's Wear types of products like baby clothes, jackets, kid's tops and pants. More products like snowsuits, underwear and socks, sweaters etc. Footwear types of products like sandals, boots, shoes etc., for children, women or men.

More products like exclusive sports footwear, running shoes, Linens, Towels, Bedding types of products like pillowcases, bath and hand towels, duvet covers, and face cloths. More products like placemats, napkins, tablecloths, bed sheets, comforters etc. Home Decor & Accessories types of products like mirrors, floor mats, clocks, artwork, candles and holders, lamps and lighting. More products like curtains and blinds, cushions, vases baskets, etc. Furniture types of products like tables, dressers, chairs, sofas, desks, beds etc. House-wares types of products like food storage containers, dishes, and carving knives. More products like cutlery, kitchen gadgets, serving trays etc. Small Appliances types of products like blow dryers, electric kettles, and toasters. More products like blenders, mixers, shavers, etc. Major Appliances types of products like dishwashers, refrigerators, dryers, stoves, washers etc. Entertainment Electronics types of products like stereo components, televisions, MP3 player and DVD players. More products like CD players, car audio, iPod, etc. Communications Electronics type of products like chargers, telephones, smart phones, cell phones, Bluetooth, cases, etc. Computer Hardware & Software types of products like monitors, Desktop or laptop computers, blank CDs and DVDs. More products like iPad or other tablet, printers, cables, software, etc. Home Office & School Supplies type of products like binders, pens, file folders, paper, calculators etc. Paint & Decorating Supplies type of products like painting brushes, stencil kits, More products like paints for building interior and exterior stain removers, wallpaper etc. Hardware & Home Improvement types of products like nails and screws, door locks, plumbing and electrical supplies, hand and power tools, mail boxes, outdoor equipment etc. Lawn & Garden types of products like sidewalk salt, garden hose, soil, fertilizer, and patio furniture. More products like gardening tools, snow shovels, seeds, lighting kits, rakes etc.

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 viewpoint on the retail sector among the chain and independent stores.

Retailers differ in their viewpoint on the retail sector. ANOVA is performed on the groups of retail ownership and product area to test the difference.

5.1.1. Hypothesis

The null hypothesis is formulated as follows.

Ho1: There is no difference on the viewpoint on retail sector with the ownership type.

The outcome of the analysis of ANOVA on viewpoint on retail sector considering the store types of independent and chain stores are illustrated in Table 5.1.

There is significant difference on viewpoint among the independent and chain stores that use of similar technology as foreign retailers ($F = 8.395, P = 0.007$), foreign players are not rivals ($F = 5.656, P = 0.023$) and that they are capable of facing the competition ($F = 7.363, P = 0.005$). There is no difference of viewpoint on other factors among the independent and chain stores.

Hence the rejection of the null hypothesis is done and arrived at the conclusion that there is difference among viewpoint on retail sector with the ownership type based on the outcome of the study.

Table 5.1: VIEWPOINT ON THE RETAIL SECTOR AMONG INDEPENDENT AND CHAIN STORES

ANOVA						
BY TYPE		SUM OF SQUARES	DF	MEAN SQUARE	F	SIG.
ECONOMIC CONTRIBUTION	BETWEEN GROUPS	.176	1	.176	.125	.748
	WITHIN GROUPS	196.779	144	1.487		
	TOTAL	196.955	145			
HUGE GROWTH POTENTIAL	BETWEEN GROUPS	.055	1	.055	.034	.885
	WITHIN GROUPS	231.845	143	1.763		
	TOTAL	231.9	144			
SIMILAR TECHNOLOGY AS FOREIGN PLAYERS	BETWEEN GROUPS	10.337	1	10.337	8.395	.007
	WITHIN GROUPS	162.463	145	1.23085		
	TOTAL	172.8	146			
FOREIGN PLAYERS ARE NOT RIVALS	BETWEEN GROUPS	8.533	1	8.533	5.656	.023
	WITHIN GROUPS	199.362	143	1.5115		
	TOTAL	207.895	144			
NEEDED PROTECTION FROM GOVERNMENT	BETWEEN GROUPS	1.374	1	1.374	.985	.337
	WITHIN GROUPS	185.487	141	1.417		
	TOTAL	186.861	142			
BETTER SUPPLY CHAIN AND TECHNOLOGY ARE ADOPTED BY FOREIGN PLAYERS	BETWEEN GROUPS	.935	1	.935	.668	.425
	WITHIN GROUPS	186.334	143	1.425		
	TOTAL	187.269	144			
FOREIGN RETAILERS ARE BENEFICIAL TO SUPPLIERS AND FARMERS	BETWEEN GROUPS	.295	1	.295	.224	.663
	WITHIN GROUPS	186.115	141	1.423		
	TOTAL	186.41	142			

BY TYPE		SUM OF SQUARES	DF	MEAN SQUARE	F	SIG.
CAPABLE OF FACING COMPETITORS	BETWEEN GROUPS	9.415	1	9.415	7.363	.005
	WITHIN GROUPS	168.715	143	1.2836		
	TOTAL	178.13	144			
VERY DYNAMIC	BETWEEN GROUPS	.056	1	.056	.041	.875
	WITHIN GROUPS	181.845	143	1.385		
	TOTAL	181.901	144			

5.2. ANOVA on viewpoint on the retail industry among the selling units dealing with various product areas

ANOVA is used to test the difference on viewpoint on the retail industry among the selling units dealing with various product areas.

5.2.1. Hypothesis

The null hypothesis is formulated as follows.

Ho2: There is no difference on the viewpoint on retail among the selling units in various product areas.

The table 5.2 presents the outcome of the ANOVA test. The table reveals that there is significant difference on viewpoint among stores grouped on product area in usage of similar technology as foreign retailers (F= 2.584, P= 0.034), Indian retail sector needs protection from the government (F= 2.285, P= 0.054) and better supply chain and technology are adopted by foreign retailers (F= 4.823, P= 0.005). But there is no significant difference on the other factors. Hence it leads to the rejection of the null hypothesis and arrived at the conclusion that there is significant difference on the viewpoint on the retail sector among the selling units in various product areas, from the outcome of the test.

Table 5.2: OPINION ON RETAIL SECTOR AMONG RETAIL STORES OF DIFFERENT PRODUCT AREAS

ANOVA						
BY AREA		SUM OF SQUARES	DF	MEAN SQUARE	F	SIG.
ECONOMIC CONTRIBUTION	BETWEEN GROUPS	10.156	8	1.685	1.164	.345
	WITHIN GROUPS	186.795	134	1.483		
	TOTAL	196.951	142			
HUGE GROWTH POTENTIAL	BETWEEN GROUPS	12.674	9	2.125	1.232	.287
	WITHIN GROUPS	219.225	134	1.733		
	TOTAL	231.899	143			
SIMILAR TECHNOLOGY AS FOREIGN PLAYERS	BETWEEN GROUPS	19.263	8	3.223	2.584	0.034
	WITHIN GROUPS	158.272	134	1.253		
	TOTAL	177.535	142			
FOREIGN PLAYERS ARE NOT RIVALS	BETWEEN GROUPS	9.385	5	1.574	1.015	0.434
	WITHIN GROUPS	198.515	139	1.575		
	TOTAL	207.9	144			

NEEDED PROTECTION FROM GOVERNMENT	BETWEEN GROUPS	18.135	7	3.035	2.285	0.054
	WITHIN GROUPS	168.732	135	1.333		
	TOTAL	186.867	140			
BETTER SUPPLY CHAIN AND TECHNOLOGY ARE ADOPTED BY FOREIGN PLAYERS	BETWEEN GROUPS	34.685	8	5.785	4.823	0.005
	WITHIN GROUPS	152.595	134	1.219		
	TOTAL	187.28	142			
FOREIGN RETAILERS ARE BENEFICIAL TO SUPPLIERS AND FARMERS	BETWEEN GROUPS	11.545	8	1.935	1.387	0.235
	WITHIN GROUPS	174.875	136	1.385		
	TOTAL	186.42	144			
CAPABLE OF FACING COMPETITORS	BETWEEN GROUPS	8.084	7	1.355	1.017	0.434
	WITHIN GROUPS	170.035	138	1.345		
	TOTAL	178.119	145			
VERY DYNAMIC	BETWEEN GROUPS	5.235	8	0.885	0.634	0.725
	WITHIN GROUPS	176.665	136	1.387		
	TOTAL	181.9	144			

6. CONCLUSION

The possible effect on the data warehouses, supply chain, logistics, store management, point of sale etc., will be substantial with the RFID technology implementation, the advantages of which are its ability to scale up and deal with the market dynamics and the business environment and to improve their profit margins and strengthen up further for the challenges ahead. The Indian retailing picture will be changed by technologies such as GPS, Video Analytics that are smart, shopping carts with integrated sensors and point-of-sales terminals, etc., The setbacks need to be addressed for better adoption of the RFID technology so that the whole of the industry could simultaneously leverage upon it to increase the efficiency, though some retail players have already started the implementation. A sizable difference in the contribution to the country's economy would be brought about by this collective effort.

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