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RFID TECHNOLOGY: STANDARDISATION AND MATURITY OF THE TECHNOLOGY ENABLED BY THE GROWTH TRENDS AND ECONOMIC BENEFITS OF THE RETAIL INDUSTRY

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ABSTRACT

The retail sector has been steering India's growth story. The sector growing from strength to strength and has evolved drastically from traditional village trade fairs, street vendors or hawkers to resplendent malls and plush outlets. According to the (ICRIER), Indian Council for Research on International Economic Relations, India is expected to grow at a CAGR of over 15% till FY15 and is the seventh-largest retail market in the world. In FY17 retail sales reached Rs 15,300 bn and amounting to around 37% of India's GDP at current market prices. The total domestic trade (both retail and wholesale) constituted 1.0% of country's GDP in 1999-2000, which has gone up to 16.1% in FY17, according to the Central Statistical Organization (CSO) estimates. Mega retailers- Crosswords, Shopper's Stop, and Pantaloons and the corporate players – the Piramals, Tatas, Rahejas, ITC, S.Kumar's, RPG Enterprises, compete to revolutionize the retailing sector, and hence retail as an industry in India is growing. Retail sales in India expanded at an average annual rate of 10% during 2010-2014 and amounted to about Rs.15,000 billion in 2015.

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

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1. INTRODUCTION

Retail sales are also expected to expand at a higher pace of nearly 15% with upturn in economic growth during 2015. Retail sales in real terms are predicted to rise faster than consumer expenditure during 2011-15 across the country. In real retail sales, the forecast growth during 2011 - 2015 is 9.5% per year, compared with 8.5% for consumer expenditure. The fast growth in turnover of supermarkets, departmental stores and hyper marts reflects the upgrade of Indian retail sector. According to a latest report by Euro monitor International, a leading provider of global consumer-market intelligence sales from these large-size stores are to expand at growth rates ranging from 27% to 53% per year during 2011-2015. To improve the retail industry in India, multiple actions have been taken by Government of India. For building a retail store in India IKEA, the largest retail player in furniture worldwide, acquired its first lot of land in Hyderabad, which is the capital of Telangana and de jure capital of Andhra Pradesh. The investment of IKEA's single location would be about Rs 500–600 crores (US$ 80.4–96.5 million) and all their retail outlets have a standard design. To the bill introducing Goods and Services Tax (GST) proposed by Rajya Sabha select committee, the Government of India has accepted the changes. It is predicted that the implementation of GST would facilitate faster mobility of goods throughout the nation, to improve retail operations for pan-India retailers.

The Government strives to eliminate the vast disparities among the various categories of foreign investments. A proposal is approved for changing to a single composite limit, which means government approval is not needed for an investment portfolio up to 49 per cent and if ownership transfer and/or control transfer to foreigners of Indian companies are not required, sectoral conditions are not required to be satisfied. Especially in the attractive retail sector, foreign investments are expected to be increase as a result. The unorganized retailers or kirana stores (mom-and-pop stores) that generally cater to the customers within their vicinity give immense competition to the organized retailers. The unorganized retail sector poses a serious hurdle for organized retailer since it constitutes more than 94% of India's retail sector. The 14 million kirana stores which offer individual services such as free home delivery services, immediate credit to customers, apart from the loyalty benefits, compete with the organized retailers. The traditional kirana stores followed various strategies to retain their customers, which directly affected organized retailers during the current economy slowdown. It has been observed

generally that in kirana stores, customers stick to their needs because of the limited variety; however they buy instinctively and end up spending more than their need at organized retail outlets. During a downturn, as is evident from the past few months' trend, shoppers are increasingly switching from organized retail stores to kiranas since many customers may not like to spend more. The emerging key factors in determining the strength and effectiveness of marketing plans and support logistics are the exploitation of information technology and the use of quantitative corporate models. Many hardware vendors and systems houses have created specialized divisions to provide turnkey solutions, products and services in order to exploit these opportunities and many major retailers have developed considerable in-house expertise in this area. However a number of important gaps in retailer usage of systems were noted in this research. In a state of exponential growth the retail market includes all activities involved in selling services or goods to the final consumer. Demand and sales forecasting, inventory management, store management and transportation are the activities involved. Information technology, which plays a very important role in today's business world, is the capability to electronically input, process, store, and output, transmit and receive data and information.

Radio Frequency Identifier (RFID), Smart Operating Solution Smart Ops, and Point of Sale (POS) etc are the new technologies evolved in retailing. The result indicates that, with the help of Information Technology solutions retail complexities may diminish. Improved productivity and major cost saving through key advantages such as more accurate supply chain, forecasting and better inventory management can be provided by the right solution. To solve major problems related to customer services like customer loyalty and customer satisfaction also Information Technology can help retailers. The information that was available was not being used to plan effective marketing and selling strategies, nor yet to plan for growth though many retailers, including the large multiples, had very sophisticated electronic point of sales devices. There was still concern whether electronic point of sales were cost effective for the medium and smaller companies or whether being without such aids put them at a grave disadvantage vis-a-vis their larger competitors.

Keeping and managing business and financial records is one of the first and largest applications of computers. The employee details of all their workers are kept in large databases by bigger

companies that are managed by computer software. Business functions as billing customers, tracking payments to be made and payments received and tracking supplies needed and items produced, stored, shipped, and sold, use similar programs and databases. In fact, practically the use of computers and information technology provides all the information companies need to do business. Customized point solutions in areas such as seasonality, merchandizing, in-store operations, promotions planning and supply chain management drive much of the retail operations functionality. The IT systems in the background that manage operations also have high complexities is what it implies. A central role is being played by IT system in reducing the pressure points in the retail industry and hence is at the heart of retail operations. The converse also holds true that, over a course of time the IT systems will create more problems than providing a solution to the business challenges, for retailers who do not manage their IT landscape effectively.

The actual technology and functionality deployed within various RFID chips and the syntax and semantics of RFID tags themselves will require standardization and stabilization. Depending on how their intelligent objects are distributed among the regions of Europe and the rest of the world, international organizations have the mandate of having to monitor, analyze and translate between two different signal semantics. It has already stirred up privacy anxieties of RFID technology's potential ability to facilitate automated data collection about after-sale product usage. Both national and regional legislative agencies impose legislation limiting or even preventing the deployment of RFID. Taking into account some of the more recent enhancements previously mentioned RFID signal and reader technology operates at a low semantic level and at the same time there is large volume of signals generated. Vendors will need to develop (and organizations will need to implement) a rich two-dimensional infrastructure to actually make use of much of information contained within the signals. These challenges will need to be effectively addressed by industry in order for the potential benefits of RFID to be realized by the economy,

2. LITERATURE REVIEW

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) speed of retail cycle,

(c) integrated business model, and (d) effectiveness 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 factors and benefits of RFID, but the connection between intrinsic factors and risks of RFID was not explained. They also found that there is a significant relationship between benefits of RFID and the strategic impact on business effectiveness. In particular, two RFID benefit factors, velocity of retail cycle and improved inventory management, had a strong effect on business. Chen Xin (2009) highlighted that as a technological alternative to bar codes, radio frequency identification (RFID) tags are on the verge of introduction in retailing on a large scale. This technology will allow real-time tracking of products based on individual items (instead of the current SKU basis). Retailers and logistics providers will be able to track items any time of the day and accounting inventories will not be necessary. While consumer goods makers, distributors, retailers and customers are benefited with a deep innovation, RFID also faces lots of issues that should be solved before it's used widely.

Cleopatra Bardaki et al. (2010) studied the application of RFID-enabled system supporting promotions management. They device a system that provides both back-end functionality to supply chain managers by measuring marketing effectiveness and front-end functionality to consumers by providing individualized selection of alternative promotional offers. The study reveals that adoption of RFID services in retail sector presents a number of technological and individual challenges that require special attention. 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 store which revealed that shoppers acknowledged more favorably RFID enabled promotional methods 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 level of RFID technology still prevent the service's wide usage by the industry. The results of a cost-benefit analysis indicated that the investment is financially feasible, under certain conditions, and pays back after 3 years.

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 color, 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.

3. BACKGROUND OF THE STUDY

3.1 RFID applications in retail operations

RFID is a short form for Radio-Frequency Identification, which represents small electronic devices. A small-integrated chip and an antenna are embedded in those devices. This integrated chip can store up to 2,000 bytes of information though there exists many alternative definitions. AIM Inc., which is the Association for Automatic Identification and Data Capture Technologies, Pittsburgh. As per the definition of AIM Inc., "RFID is an automated method to acquire time, product, transaction, or location data instantly and without any error and the need of manual intervention during the data collection". (www.aimglobal.org). An RFID system consists of a reader, with an inbuilt antenna. It also consists of the transponders (tags, RFID cards), which is used for communication of the data to the reader. The RFID reader through its antenna transmits a low-power radio signal and the tag receives the signal with its own antenna and extracts power from the signal to power the integrated circuit (chip). The tag gains power from the signal only when it is within the radio field of the reader, and it sends information to the reader for verifying the authenticity and then it will start sending the actual tag data to the reader. There will be a control server to which the reader sends data for subsequent processing of the data. The tag used in the RFID system is similar to the magnetic strip attached on the rear of a credit or debit card or

the bar code. The magnetic strip with its data is used to uniquely identify that object and in the same way as a bar code or magnetic strip must be read by a reader to get the information, the RFID tag also must be read to retrieve the unique identifier data.

3.2 RFID Technology – a history

The first development of RFID technology was for military purpose during the Second World War, and after that it was adopted into retail, healthcare, culture, automobile, security and travel industries. In 1946 Léon Theremin invented an espionage device for the Soviet Union, which retransmitted the radio signals incident on it with audio information. A diaphragm gets vibrated by the sound waves, which in turn modified the shape of the resonator, which further modulated the frequency of the reflected radio signal. It is considered to be the precursor to the RFID technology though it is used for passive covert listening and not an identification tag. Another source claims that the technology used in RFID first appeared in the early 1920s. RFID is often considered as the "wireless bar coding" and it has more capabilities than the barcodes. No external power is need for the RFID system and human intervention is not required and can read multiple items at a time, but the barcode system is laborious since the items need to be read individually in close proximity. For example, a bar code just identifies the item as an individual product but RFID tags distinguish a particular product among the other products in the store and are also helpful in tracking the motion of the product from where it is produced to where it is sold. (http://www.integrus.co.uk/references/rfid-04-05-08.php)

3.3 Technological aspects of RFID

Three components are present in the RFID system: a transceiver (with inbuilt decoder), an antenna to send and receive data and a transponder, which is the RF, tag with unique identifier data written electronically on it.

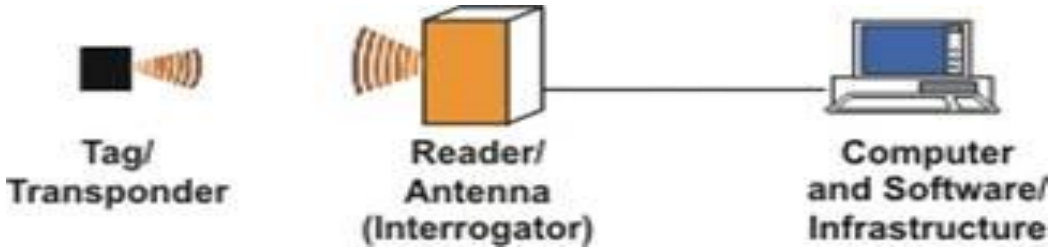

Figure 3.1 Components involved in the RFID system

The antenna sends and receives radio signals for tag activation and to read and write information to it. The reader is capable of transmitting radio signals in the range of an inch to about 100 feet based on the transmitted power of the reader and the transmitting frequency used. When the tag passes through the electromagnetic field of the reader, the reader's activation signal will be powerful enough to be intercepted by the RFID tag. The information is available in the tag's integrated chip and the reader using its antenna reads this information. Upon reading the information is sent to the central server for subsequent transactions. There are three types of RFID tags active, passive, or semi-passive, which have battery power. Passive tags do not have an inbuilt power source (they become active only in the proximity of a reader), while semi-passive and active tags have an inbuilt power source, normally a small battery.

3.3.1 Passive tags

Passive RFID tags do not have an internal power source. The incoming radio frequency signal induces electric current through the antenna and this current just powers the complementary metal-oxide-semiconductor (CMOS) circuitry of the tag for sending a response signal back to the reader. The reader generates a carrier wave and to send a signal back to the reader almost all the passive tags use this wave. The RFID tag's antenna is capable of gathering power from the signal generated by the reader and also transmitting the reflected signal back.

3.3.2 Active tags

There is an inbuilt battery in the active RFID tags, used by the internal circuitry to send the feedback to the scanner. The reliability of the active tags is more than that of the passive tags since active tags are capable of establishing a session with the reader.

3.3.3 Semi-Passive tags

Semi-passive tags are also called as semi-active tags. The inbuilt power source in the active tags is used only by the silicon chip inside and not used for sending the signal.

3.3.4 Application

The benefits of radio frequency identification technology are that helps identifying any item or person it can be used for quality tracking, safety, loss avoidance, and asset tracking for

equipment that is on hire. The technical benefits associated with RFID are it does not require line of sight or close proximity, and can alert people if removed from its intended location, multiple tags can be read concurrently, compatible with data processing and can also contain information like item code. There is yet another classification of RFID tags, read-only and read-write. More technical advantages of RFID are the data stores on the tag is secured since it is encoded and much more tamper proof than barcode, capable of tracking shelf life. Shelf life tracking capabilities of RFID are utilized in food and pharmaceutical industries, while the security features are exploited in making highly secured ID cards for individuals. The RFID tag can be tracked and recovered without much damages even if the ID card is lost.

RFID readers can be read from thirty meters or farther and hence can be used in dangerous environments also. RFID system can also be used for maintenance service tracking throughout the life of the vehicles and also for identifying clothes when displayed in the store or sent for cleaning, which also identifies the cleaning process to be followed. There exists the program, called RFID pilot programs are normally used to identify the challenges, costs, process impacts and required changes and risks associated with implementing the RFID system in the global ecosystem of retail industry today.(http://www.integrus.co.uk/references/rfid-05-05-08.php).

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

Table 5.1: USAGE OF RFID IN RETAIL OPERATIONS

	Percentage of usage				
	< 11	**11 to 20**	**21 to 30**	**31 to 40**	**41 to 50**
PRODUCT RECEIPT AND PROCESSING	69 (25.7)	121 (45.1)	69 (25.8)	9 (3.4)	0
PALLET LEVEL STORE REPLENISHMENT AND CHECK-IN	59 (22.0)	105 (39.2)	93 (34.7)	11 (4.1)	0
MARKETING TO CUSTOMERS WITHIN STORE(CHECK-OUT & INFORMATION)	0	109 (40.7)	95 (35.4)	51 (19.0)	13 (4.9)
ORDER FILLING & REPLENISHMENT IN-STORE (ITEM LEVEL & CASE LEVEL)	141 (52.6)	116 (43.3)	11 (4.1)	0	0
CUSTOMER UTILITY OF EMBEDDED RFID IN HOME BASED APPLICATION	255 (95.1)	13 (4.9)	0	0	0

* The numbers indicated in the brackets are of %

The outcome illustrates that RFID usage is in 11 to 20% of their product receipt and processing operation, by the maximum number (45.1%) of respondents. It is also used in 31 to 40% of

product receipt and processing by 3.4% of the respondents. 4.1% of respondents use RFID to that level that Pallet level store replenishment and check-in is only to the maximum possible range of 31 to 40%. RFID is used in the range of 11 to 20% for pallet level replenishment by maximum number (39.2%) of respondents. The usage of RFID is to the maximum possible extent of 41 to 50% by a minimum of 13 respondents in store checkout. 40.7% respondent stores have 11 to 20% usage of RFID in checkout applications. Usage to the maximum possible extend of 21 to 30% by a minimum of 11 stores is done in Item level in-store replenishment of the product. The usage of RFID is in the range of up to 10% and from 10 to 19% by equal number of respondents (47.4%). There is very minimal application of RFID in home appliances. Usage of RFID is less than 11% of embedding RFID in home applications by the majority of the stores (95.1%) .

5.1 Validity and reliability tests

The study and analysis of the principal component was conducted leveraging the rotation of varimax on multiple item constructs to validate the instrument and its constructs. First, the benefit variables were analyzed. The Table 5.9 presents the un-rotated principal component extraction and the Table 5.10 presents the varimax-rotated matrix. The Sampling Adequacy is indicated by the Kaiser-Meyer-Olkin value of 0.973. The factors are adequately explained by items as indicated by the Bartlett's Test of Sphericity found to be significant at 0.000. Hence the instrument's discriminant validity (The constructs that are extracted constructs are not similar to others) and the convergent validity (the construct reflected by the items and which are not cross loading) are interpreted as good.

Table 5.2: Principal Component Analysis for RFID Advantages Variables

KMO and BARTLETT'S TEST					
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.973			
Bartlett's Test of Sphericity	Approx. Chi-Square	3605.856			
	df	186			
	Sig.	.007			
Component Matrix[a]					
	Communalities		**Component**		
	Extraction	**1**	**2**	**3**	**4**

VISIBILITY OF SUPPLY CHAIN IS BETTER	.897	.941	-.093	.033	-.123
ASSET TRACKING POSSIBLE IN REAL TIME	.875	.917	-.059	.009	-.135
COUNTERFEITING PROTECTION	.843	.938	.097	.077	-.035
EFFICIENCY OF OPERATIONS IMPROVED	.892	.932	-.042	.045	.185
INVENTORY VISIBILITY IS BETTER	.756	.919	-.079	-.002	-.168
INVENTORY LEVEL REDUCTION POSSIBILITY	.862	.935	-.041	-.071	.192
WORKER EFFICIENCY IMPROVEMENT	.771	.932	-.071	-.083	.191
THEFT REDUCTION OR ELIMINATION	.899	.895	.091	-.372	-.091
PRODUCT TAMPERING PREVENTION	.881	.883	.117	.048	-.083
LEVERAGE UPON BUSINESS INTELLIGENCE IN REAL-TIME	.878	.879	-.135	.159	.149
	Communalities		**Component**		
	Extraction	**1**	**2**	**3**	**4**
BETTER RETURN PROGRAMS (CLAIMS) ARE IMPLEMENTED	.765	.879	-.090	.112	.002
SHELF INVENTORY AND STORE SALES IS BETTER	.865	.893	-.215	.042	-.132
FASTER BUYING OPTIONS	.812	.872	.384	.171	.035
DATA ENTRY ERRORS REDUCTION	.923	.863	.137	-.447	-.132

STAFF WILL BE FREED FOR OTHER OPERATIONS BY TECHNOLOGY	.919	.863	-.152	.161	-.023
COST OF OPERATIONS IS REDUCED	.881	.845	.025	.072	-.253
COLLABORATE WITH REGULATORS FOR COMPLIANCE	.841	.842	-.263	.054	-.032
NO STOCK SITUATIONS ARE REDUCED	.961	.831	.451	.173	.061
COST OF GOODS IS DECREASED	.961	.817	-.041	-.181	.423
Eigenvalues		7.579	2.363	1.937	1.378
% of Variance		39.94	12.56	10.25	7.217
Cumulative %		39.94	52.50	62.75	69.97
Method of Extraction: Analysis of Principal Component.					
a. Extraction of 4 components.					

The extractions of 19-items, which are attributed to the advantages of RFID, were done. We have taken into account the components having eigen value greater than 1. There were four components with greater than 1 of eigen value. For the precise identification of the factors (Table 5.10) using varimax technique, the factors were rotated even more. 4 items contributed to 22.51% of the variability in the entire 19 items and the first component is loaded with them. 5 items contributed to 19.7% of the variability in the entire 19 items and the second component is loaded with them. 4 items contributed to 18.15% of the variability in the entire 19 items and the third component is loaded with them. The other 6 items contributed to 11.5% of the variability in the entire 19 items and the fourth component is loaded with them. A contribution of 69.97 of variability of the items is from the four factors. The items included in each of the component are studied further to recognize the factors.

The factors need to be labeled. The first component had 'Better Store Sales and Shelf Inventory us better', 'Helps in Collaborate with regulators for compliance', 'Leverage upon Business Intelligence in real-time' and 'Cost of goods is decreased'. They are about the sales, cost and business intelligence as revealed by the close analyses of the items. Hence the label of strategic benefits can be given to the construct. The analysis is done on the items which are loaded on the second component. Visibility of Inventory, Visibility of Supply Chain, Levels of inventory, tracking of assets and stock situations reflects on the construct. Hence, the label of Inventory and Supply chain benefits can be given to the factor. Return program, product tampering, counterfeiting, and theft reflect the third component. Control benefits can be the name given to this factor. Staffs required for operations, cost of operations, labour and operational effectiveness, Check-out, and errors of data entry are reflected by the fourth component. Hence, operational benefits can be the name given to this factor.

Table 5.3: ROTATED COMPONENT MATRIX FOR RFID ADVANTAGE VARIABLES

	COMPONENT			
	1	**2**	**3**	**4**
SHELF INVENTORY AND STORE SALES IS BETTER	**.742**	.272	.331	.352
COLLABORATE WITH REGULATORS FOR COMPLIANCE	**.684**	.200	.395	.264
LEVERAGE UPON BUSINESS INTELLIGENCE IN REAL-TIME	**.685**	.354	.278	.426
COST OF GOODS IS DECREASED	**.687**	.379	.325	.383
INVENTORY VISIBILITY IS BETTER	.385	**.675**	.300	.409
NO STOCK SITUATIONS ARE REDUCED	.362	**.691**	.393	.228
INVENTORY LEVEL REDUCTION POSSIBILITY	.395	**.661**	.423	.265
VISIBILITY OF SUPPLY CHAIN IS BETTER	.384	**.651**	.542	.173
ASSET TRACKING POSSIBLE IN REAL TIME	.435	**.657**	.163	.395

	COMPONENT			
	1	**2**	**3**	**4**
BETTER RETURN PROGRAMS (CLAIMS) ARE IMPLEMENTED	.317	.293	**.763**	.342
COUNTERFEITING PROTECTION	.525	.363	**.615**	.383
PRODUCT TAMPERING PREVENTION	.515	.392	**.607**	.385
THEFT REDUCTION OR ELIMINATION	.565	.425	**.571**	.305
STAFF WILL BE FREED FOR OTHER OPERATIONS BY TECHNOLOGY	.325	.315	.273	**.815**
COST OF OPERATIONS IS REDUCED	.391	.325	.293	**.772**
FASTER BUYING OPTIONS	.373	.335	.342	**.791**
EFFICIENCY OF OPERATIONS IMPROVED	.435	.342	.381	**.735**
WORKER EFFICIENCY IMPROVEMENT	.542	.383	.364	**.574**
DATA ENTRY ERRORS REDUCTION	.551	.302	.393	**.563**
Eigen values	4.263	3.693	3.245	2.045
% of Variance	22.56	19.51	17.12	10.83
Cumulative %	22.56	42.07	59.19	70.02
Method of Extraction: Analysis of Principal Component. Method of Rotation: Kaiser Normalization with Varimax.				
a. Convergence of rotation in a number of 8 iterations.				

6. CONCLUSION

To summarize, in the efficient operation of the stores, the retail players encounter many setbacks. Streamlined process in products allocation, shelf level and back room inventory management, managing technology and workforce, technology and management of store infrastructure is lacking. The retail players, leveraging upon Information Technology, can achieve optimization of resources and effectiveness improvement by appropriate forecasting, supply chain and logistics management, inventory overheads minimization, product movement visibility, vendor coordination etc., Input and tracking devices such as RFID will enable optimal inventory and

providing a better customer experience, combined with IT. Streamlining and integrating the RFID technology with the supply chain and various other technologies, is a high priority need since the state of the technology today is isolated and living in islands. Technology can give the necessary competitive advantage to the retail players, only if this kind of collaboration and coordination is possible and the standards across various processes and platforms need to be worked upon to achieve this.

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