



INTERNET OF THINGS (IoT's) IN RETAIL INDUSTRY - A STUDY TO TRACE THE FEASIBLE BUSINESS MODEL

P M Rameshkumar

PhD Research Scholar, Department of Commerce,
University of Madras,
Chepauk, Chennai, India

Dr. R. Shanthi

Assistant Professor, Department of Commerce,
University of Madras,
Chepauk, Chennai, India

Abstract: The purpose of this paper is to discuss the IoT's technology practices and performance in retail sector. This internet information technology is vital part of the evolution of retail sector. This paper develops an analytical framework for the assessment of approaches for the measurement of IoT's technology practices and performance in the retail store operation. Methodology used as literature review and conceptual development of framework. Existing approaches also discussed in the improving retail inventory management operation.

Keywords: Internet of Things; Retail Stores; RFID Tags; Market Channels; Innovative Practices and Challenges;

I. INTRODUCTION

With the recent emergence of the retail business marketplace, attention is now focused on the internet of things technology innovation in retail business. The retail environment is enormously changing due to enhancement in Internet technology. This internet information technology is vital part of the evolution of retail sector. This refers to continuously renewing themselves, in a given rapid pace of change in the retail environment. Particularly, in retail sector new ways are emerging with innovation day-by-day to meet customer needs and wants, In fact the innovation not just the array of barcode scanners, point-of-sale (POS) devices and digital signage available in retail business. The real key for retailers is to connect and track these line-of-business assets to improve efficiency and reduce costs; to optimize operational performance with real-time intelligence; and ultimately to transform by interacting with customers in new ways with the internet of things technology innovation.

II. IOT'S TECHNOLOGY IN RETAIL STORE

The internet of things technology refers to the internet, smartphones and other apps essentially reshaping the retail industry landscape. From the earliest website (.com's) vendors to the rise of e-commerce giants, retailers have struggled with the ever evolving ways the consumers search and purchase goods through smart internet objects.

Compared to other sector, the retail sector is one of the largest sectors which have direct engagement with potential customers. Internet of Things (IoT's) is an innovative key driver to reach targeted customers. Internet of things and other apps came as a boon to the retailers. Internet of Things is a lucrative tool to enhance satisfaction in service based retail industry. This Technology includes several tools that enrich the overall shopping experience of the customer by making it more easy, fun, interactive and personal. They are available for various categories (i.e., inventory control, payment, shopping, services etc.,). This innovation helps the retailers to understand individual customer taste and preferences through enhanced micro segmentation. IoT's is an interlinked aspect which connects digital with physical world to integrate physical thing and information via emerging internet infrastructure. Internet of Things is not only a better tool to study the current marketing

trend it also provides various information to analyse the future market growth. IoT's generally helps the retailers to retain their customers through better innovative customer relationship management practices.

According to Cisco survey in 2020 predicted that internet user base will reach as high as 200 billion and there will be roughly 26 smart objects (Smart System Integration) per human. "Internet of Things (IoT's) is drastically adopted in every process of retailing such as advertising and marketing, vending machines, inventory management, and customer payments, smart kiosks and etc.,". The Vertical Market 2014-2018 is forecasted worldwide IoT's provide revenue opportunity to retail sector by 2018 as the US \$326 Billion and it is 19.8% of 2013-2018 revenue CAGR.

According to ComScore and Internet Retailer, as published by Flurry Analytics, the time spent on online retail via mobile apps increased from 52% in 2013 to 66% in 2014. The m Commerce sales grew \$66 billion in 2013 to \$118 billion in 2014, which is a 78% growth. This opportunity was too big to shun and the retailers jumped on the bandwagon quickly. The growth was further categorized with revenues out of apps was at 42% and of browsers was at 58%.

Internet of things technology act has become a retail business trend in recent scenario. Retailers are becoming an early adaptor and are using internet of things (wireless application) technology for their retail business services, IoT provide enhanced customer experience and optimal utilisation of resource in order, to retain the customers and to sustain in perfectly retailers competitive environment. Internet of things has emerged as an impetus for rapid economic growth and people empowerment across the globe. This innovation in retail sectors is central to the economic and social wellbeing of the digital nation, and also a key partner in delivering a modern economic policy of the nation.

This study is intended to suggest guideline and conceptual framework and also aims to know the performance of IoT's on retail sector and to find out opportunities and challenges in the retail sector. These research works suggest strategies to the retailers to reduce cost and improve revenues, and it also improves the shopping experience of the customers. This study is intended to trace theoretical framework from the retail stores



and frame theory for future research in the IoT's implementation for the retail industry and to motivate and inspire further developments and economic growth.

III. LITERATURE REVIEW

Rajan Varadarajan (2010) discussed interactive technologies and Internet in retail sector transformed the market and how retailers compete in the marketplace. In a similar vein, emerging interactive technologies can be expected to significantly alter the retailing landscape through their impact on retailing strategy and supply chain operations. Furthermore, this study converse it is possible that certain emerging interactive technologies will be perceived by some retailers as enablers (tools to more effectively compete in the marketplace) and by other retailers as disruptors of the present ways of doing business. Interactive technologies can either be generic, a technology that is readily available from an information technology (IT) vendor and is widely adopted by retailers, or proprietary. An interactive technology that is proprietary can enable a firm to generate economic rents from the innovation for an extended duration of time. This researcher suggested Investing in a generic interactive technology, however, may be perceived as a cost of doing business for a retailer, and not a potential source of sustainable competitive advantage. However, the researcher recommended the retailer's complementary resource endowments may enable the retailer to more effectively leverage a generic technology relative to its competitors and thereby achieve a sustainable competitive advantage.

Borislav Kolarić et al., (2011) the authors in this study made an attempt to examine the efficiency of e-business application in Serbia companies. Basis of the research were the employees in public companies in Serbia, in the region of Srem. The purpose of the paper consisted of the identification of familiarity with the significance of e-business, as well as the level of efficient application of Internet technology in present conditions of Serbian public enterprises' functioning. Research and analysis of the results obtained have indicated that besides solid familiarity of employees with the significance of e-business, the current functioning of electronic communication does not provide full support to the operation of public enterprises in Serbia. The fact that Serbia is a country in transition and that market liberalization largely reflects itself on public services' operation. Scientific information obtained by research on the title subject could be purposeful to the management of public services in Serbia, as well as other countries in transition.

Sebastián Bruque and Jesús Hernández (2002) are concerned about the link between Information Technology investment and performance. Indicators like productivity, profitability and market share could be improved by these tools. Among these tools, firms can now use Internet technologies for competitive purposes but, until now, their real effects are unclear. In this study, researcher attempted to explore some evidence about the impact of the Internet on competitive advantage in a Western European Industry. Also,

researcher explained why the use of internet was not always lead to competitive improvements in modern firms.

Lu et al., (2008) authors examined the impact of the Internet, firm-specific characteristics, market characteristics, and export marketing strategy on export marketing performance. The unit of analysis was an individual product/market export venture. The study indicated that when the Internet was used for communication purposes and to provide the firm with a competitive advantage it had a significant impact on export marketing performance. Firm-specific characteristics and export marketing strategy also had a significant impact on export marketing performance.

Duke Hyun (2009) author discuss the internet retail stores (IRS) is increasing explosively with the growing popularity of the e-commerce. Researchers developed a research model for a deeper understanding of the linkage between antecedents and behavioural consequences of customer's satisfaction on internet retail stores. An empirical study used a sample of 159 shoppers who had experiences of purchasing products from internet retail stores was conducted to test the model. Researchers found that four internet retailing performance factors were developed from the perspectives of information technology, customer service, and retailing exert significant influence on customer satisfaction. It also examines that customer satisfaction mediates the relationship between internet retailing stores performance and customer behavioural intentions.

Nam & Pardo, (2011) investigated IoT technology solutions used by retailers. The researcher found the retailers equipped with smart technology i.e., Cloud Base Inventory control through RFID tag, GPS, Barcode Scanner, I-PoS, etc., and also equipped with a multitude of "things", mobile terminals and embedded devices as well as connected sensors and actuators and use of smart computing technologies.

Besanc et al., (1998) discussed technological components of the IoT framework that include: a smart interface which is a dash board and a common operational platform of integrated web services, smart control systems, which consist of interconnected automatic control network in a smart home and smart database resources to store real time data. An IoT network is a multi-hop network of "things" that are interconnected through RFID following wireless communication standards such as Wi-Fi (IEEE 802.11) and the third generation (3G) and fourth generation (4G LTE) of mobile telephony.

Li et al., (2011) discussed the IoT is a cyber physical system, where retail stores are multifunction sensors continuously monitoring the store environment from various aspects and automatic virtual feedback is input to improve safety, security, service quality, and emergency response abilities. This study is to understand the process of adoption of the technology and to identify the critical success factors for the successful implementation of the IoT applications in retail sector.

IV. STATEMENT OF THE PROBLEM

The retail sector is fundamentally reshaping through the internet technology. The earliest dot - com (.com) dealers to

the rise of e-commerce gigantic, retailers have struggled to know the ever-evolving ways consumers find and purchase goods. They are now many businesses are coming to terms with Internet-enabled retailing; adopt omnichannel models that provide seamless shopping with greater choices and lower prices across online, in-store, and mobile platforms. Through the deployment of internet of things technology applications and the collection and analysis of the data they generate, the IoT application opens new avenues to influence and augment actions, from urging to get up from the desk and move, to replenishing inventory when a store shelf empties. While dimension of the Internet of things, such as product level Radio Frequency Identification Detector (RFID) sensors and other innovative applications technology, have long been used to overcome specific challenges in retail sectors, the convergence of current technological advances cheaper and smaller sensors, omnipresent wireless networks, increased computing power, more sophisticated machine learning makes the Internet of Things technology poised to have a broader and more transformational impact on retail business Tracie Kambies et al., (2016).

The retailers have taken an incremental approach in adopting the Internet of Things technology, using it to address specific problems, create targeted efficiencies, or twist the customer experience. A test to effective strategy will be to allow a company to familiarize itself with IoT capabilities while keeping costs in check. It can also lay the groundwork for development into new areas of the retail business.

V. OBJECTIVE OF THE STUDY

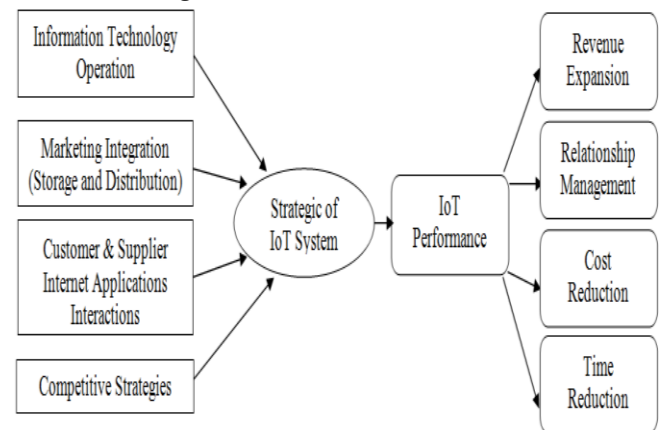
- To identify the business model for the better implementation of IoT in Retail Industry

VI. CONCEPTUAL MODEL AND FRAMEWORK

There are diverse conceptual models and frameworks, which provides everyone to better understand the IoT's technology practices and performance in the retail store operation. Well- established conceptual framework such as a conceptual framework of RFID adoption in retail store using, Theory of supply chain management and theory of internet technology strategic imperative action have been used by researchers to predict and examine the innovative technology practices in retail store performance (Rogers, 1995; Mithu Bhattacharya et al., 2015; Injazz J. Chen et al., 2004). Mithu Bhattacharya et al., (2015) framed "a conceptual framework of RFID adoption in retail sector using technology organisation environment" this conceptual to explores the retailers to understand the using any innovative technology in their retail operation process. On the other hand, Charles H. Apigian et al., (2005) developed a model to understand the internet technology with strategic imperative of retail organisation. This model includes internet driven market channels, internet enhance distribution, supplier & customer, technology operation, internet performance such as relationship enhancement, revenue expansion, time and cost reduction. Elliot Bendoly et al., (2007); Kinsalla (2003) & Trnatky et al.,

(1982) developed a theoretical framework that shows the relative advantage of technology adoption in the retail business and factors such as information technology practices, technology integration distribution, customer and suppliers interaction, integrated inventory management operation, adoption challenges, organisational learning, strategic planning and technology adoption performance as determinants provides retail stores innovative inventory management operation.

Information Technology: The IoT's information technologies application provides retail store to make links the suppliers through the innovative manner and this IT create them inter organisational coordination. This advance



information technology practices of retailers using IoT's enhance the transaction processing - transfer of purchase orders and funds.

Figure 1. Conceptual Framework for IoT's adoption in Retail Store Operation.

Marketing Integration (Distribution & Storage): The practices of IoT's application in the retail store operation, it provides to reach the new customers, track the new market location and it helps in better integration of new & existing distributors. This technology adoption in retail store it helps to share the information with the distributors about the stock requirement. Such technology helps to improve the visibility of inventory management in the store and it also scrutiny security against thefts, fraud, counterfeiting and replenish stock in the retail store operation.

Supplier and Customer Internet Application Interaction: This IoT's applications practices technologies provide the prospect to improve the retailer's operational performance, both in terms of internal and external activities with the suppliers and customers. Improved performance efficiency means, such as facilitate to share the inventory requirement information to suppliers, integrated design plan of operational procedures and improve the relationship with customer's innovative approach.

Competitive Pressure: The pressure of competition is an important factor in the determination of IoT's technology application adoption in retail business. As the level of market competition grows, retail organisations gradually more seek to realize a competitive benefit through innovative technology. By adopting IoT's application technology retail store can benefit



from greater inventory visibility, operational productivity, and increased accuracy in data collection.

IoT's Performance: IoT's technology performance indicates four aspects of how the Internet of Things technology can enhance a retail organisation. However, an organisation cannot expand revenues, reduce costs and time, or enhance relationships by accident. There is a strategic driver that must be in place prior to success Charles H. Apigian et al., (2005). The mixture of IoT's performance indicates three types of inputs: investment, strategy, and management Dehning and Richardson's (2002). Most of the IoT's and Internet literature on performance has measured investment as an initial input or antecedent. Investment as an input is similar to a technology-driven approach to Internet of Things strategy and is more applicable to mature technologies and not the introduction of new and innovative Internet application technologies. Therefore, the best type of input for this research is a strategic view of input, which was measured through the retail Business Internet of things application technology use.

VII. CONCLUSION

The study adopted a conceptual model from the various study has clarified and systematized what are the major reason retail sector to the adoption of the Internet of things application in customer-supplier relationships; marketing integration; competitive strategies; application information service quality IoT's performance such as enhance the relationship, cost and time reduction. Such reasons are different, but not mutually exclusive. Firstly, (WWW.dot Com's web and applications based technologies provide the opportunity to increase the retailer's supply process efficiency, both in terms of internal activities and in terms of external activities with the suppliers and customers. Improved efficiency means, such as time reduction, costs reduction of operational procedures. Secondly, this IoT's technologies distribution and storage integration practices in the retail store might allow reducing procurement costs by increasing market efficiency in terms of suppliers' search and selection, contract negotiation, and purchase price. Increase competitiveness among suppliers for high volume purchases. Finally, the Internet of Things application technology adoption might increase supply process effectiveness in terms of service quality, the degree of innovation, time-to-market, and service level to the final consumer.

The study finally concludes the most important Both analytical and exploratory of existed literature studies prove the influence of the Internet of Things technology adoption in retail stores it helps to enhance the customer-supplier relationships, distribution and storage integration. On the other hand, the Internet of Things (IoT's) application technology provides retail stores higher transparency and standardization, thus improve market efficiency.

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