

A STUDY ON THE IMPACT OF ARTIFICIAL INTELLIGENCE ON TRADITIONAL GROCERY STORES IN INDIA

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ABSTRACT

In today's world of digitalization technology is evolving at a very high pace. Organizations are making every effort to keep up with this change in order to be prepared to compete in the market. Artificial intelligence is one such technology, that is gaining popularity due to its numerous benefits. One of the first industries to successfully apply this technology to fulfill consumer demands is organized retail outlets. The traditional Indian Grocery Stores although unorganized is gradually modifying the outlook by altering the store layout to make it appear more like a supermarket. The focus has shifted from traditional selling to customer experience, from wastages to LEAN management, manual recording of transactions to software-enabled recording, manual pricing to RFID, paper money to digital money. The journey emphasizes transformation from initial technology resistance to embracing technology. During and post pandemic world, the ubiquitous Indian grocery stores supported the upsurge in demand and witnessed high sales of essential items. Considering the rising demand adaptation of AI will smoothen the process with efficient inventory management and control and real-time data-driven decision making. Artificial Intelligence can help such stores to gain operational efficiency that aspires to provide exceptional customer service and bank upon the range of possibilities.

Keywords Artificial Intelligence, grocery stores, data, operational efficiency, revenue, technology.

Introduction

The world is gradually ascending towards Industry 4.0. The impact of AI is visible in almost every industry sector, while the quantum of impact varies. Artificial Intelligence or AI can be defined as the capability of the machines that enables it to reason, remember information, learn and identify new insights through data discovery. (Alkhaladi, 2021) the traditional grocery stores are an indispensable part of our life, this belief got affirmation during the Covid19 pandemic. A McKinsey report, during pandemic, revealed that 85% of the market share in US was held by physical grocery stores, this shows that despite the rise in online shopping the brick-and-mortar stores cannot be eliminated and will still exist as part of the future of grocery shopping. (Alkhaladi,2021) while AI has made its way in supermarkets it still awaits recognition in the traditional Kirana stores.

The advent of Artificial Intelligence (AI) has revolutionized various industries across the globe, and the retail sector is no exception. One segment of retail that has witnessed significant changes due to AI is the traditional grocery store. In India, where traditional grocery stores, commonly known as kirana stores, play a crucial role in the retail landscape, it is essential to examine the impact of AI on this sector.

Traditional grocery stores in India have long been the backbone of the country's retail industry, catering to the diverse needs of consumers in local neighborhoods. However, with the rapid advancement of technology, including AI, these stores are facing new challenges and opportunities. This study aims to explore the effects of AI adoption on traditional grocery stores in India and shed light on the various aspects that are influenced by this emerging technology.

The application of AI in traditional grocery stores has the potential to enhance efficiency, optimize operations, and improve customer experiences. AI-powered technologies, such as automated inventory management

systems, smart shelving, and personalized recommendations, can streamline the shopping experience for customers while enabling store owners to manage their inventory effectively. Moreover, AI can help traditional grocery stores gain valuable insights into consumer behavior, purchasing patterns, and market trends, enabling them to make data-driven decisions for stocking and pricing.

However, the integration of AI into traditional grocery stores also poses challenges. Small-scale store owners might face barriers related to cost, technical expertise, and resistance to change. Additionally, concerns regarding job displacement and the impact on employment opportunities for traditional store workers need to be examined

By conducting a comprehensive study on the impact of AI on traditional grocery stores in India, this research aims to provide insights into the opportunities and challenges faced by store owners, employees, and consumers. The findings can help stakeholders in the retail industry understand the potential benefits of AI adoption, identify strategies for successful implementation, and address any concerns related to job security and workforce skill development.

In conclusion, the study on the impact of AI on traditional grocery stores in India is vital to understand the transformative effects of emerging technologies on the retail sector. By examining the advantages and challenges associated with AI adoption, this research seeks to contribute to the ongoing discussions on the future of traditional retail in the era of technological advancements. The findings can assist policymakers, store owners, and other stakeholders in making informed decisions to adapt to the changing landscape and ensure the sustainability and growth of traditional grocery stores in India.

Literature Review

The literature emphasizes the importance of conducting comprehensive studies on the impact of AI on traditional grocery stores in India. Such research provides valuable insights into the opportunities and challenges faced by store owners, employees, and consumers in the context of AI adoption. Findings from these studies can inform stakeholders in the retail industry about the potential benefits of AI, assist in developing strategies for successful implementation, and address concerns related to job security and workforce skill development.

Customers in this generation are adept at technology. With the use of technology, they may quickly come up with a concept of the characteristics and specifics of a product. Therefore, it is crucial for businesses to comprehend what their target clients want from them. Artificial intelligence (AI) can assist firms in gaining a better knowledge of client expectations. (Agostino & Domenico & Alfonso, 2021) Amazon has changed customers' expectations toward other offline/online retailers, consumer comments on social media are the key triggers for consumers for buy or leave decisions. As a result, from the perspective of the customer, the things they are looking for may be readily available to them, assuring marketing effectiveness. Customers would become more loyal as well as satisfied as a result. There has been a strong prediction that artificial intelligence will transform every aspect of an individual's life including the traditional Grocery stores. Future projections of the intrusion of AI in the retail market are expected to grow exponentially to \$24 billion by 2027, from a meager \$3 billion in 2020. This growth trend shows a growth rate of 29.7% over the period of seven years. AI is emphasizing its indispensable disposition on all aspects of a grocery store, from pricing enhancements to product placements and online order fulfillment. On one side we find AI making its way into every aspect of life on the other side the prominence of Indian grocery stores cannot be ignored.

Singh et al., 2020) India is home to approximately 12- 15 million grocery stores (this number accounts for 90 percent of domestic retail and FMCG sales. Out of which around 8 percent of retail sales come from modern trade, while 2 percent from e-commerce.

During the Covid 19 Pandemic, the focus from luxury and non-essential buying shifted to essential buying. The dependency on these pervasive grocery stores grew. These stores worked hard to make all the required supplies available for the customers, the results of this effort were evident on the accelerating revenues earned by these stores. Pune-based Rahul Agarwal, the owner of Rahul General Stores, has been seeing surge and exponential growth since lockdown. He mentions that the sales of his stores accelerated during the pandemic and almost doubled. However, with the rising demand, procurement issues remained a challenge that consequently impacted the fulfillment of orders. The Indian household is a major contributor to the economy and is estimated to account for around 66 percent of total retail revenue by 2020. The majority of the grocery business happens through the unorganized sector.

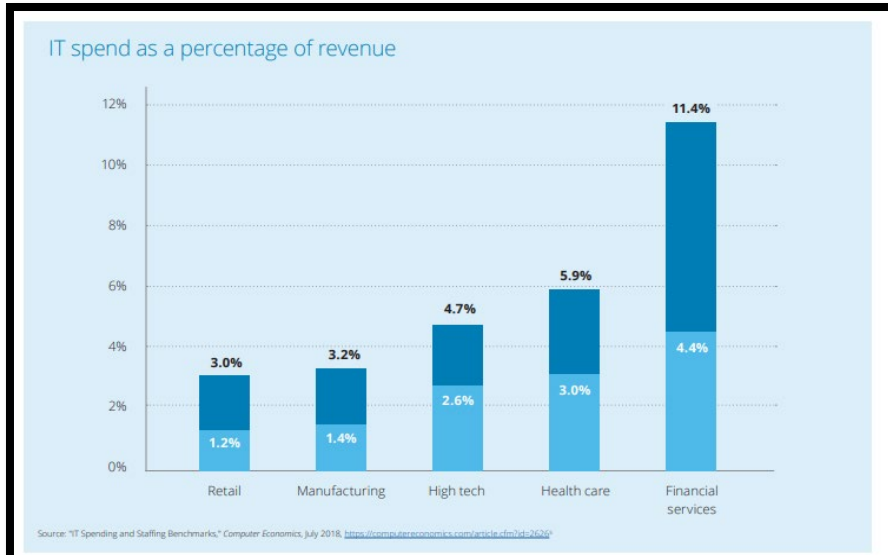


Figure 1. (Deloitte, 2019) <https://www2.deloitte.com>

The Figure 1 graph reveals the lack of IT spend and technology adoption in the retail industry.

Artificial intelligence, automation, IoT, Bots and transformation are the buzz word today. To survive the changing landscape of data, artificial intelligence (AI) based innovation turns out to be part of an indispensable roadmap. The Growth of non-traditional competition from online shopping, the shift from Goods to Services that shifted focus from product to customer experience and the rise in social commerce accelerated the need for AI enabled systems in every aspect of business. (Deloitte, 2019) the study of the literature discloses that on an average the global retail spending on IT was at US\$196 billion in 2019 and is estimated to grow to over US\$225 billion by the end of 2022. However, despite this growth, the retail sector still lags in the required IT investment scale as compared to other industries.

Role Of AI In Traditional Grocery Stores

In the current scenario, organizations in retail and consumer products are using intelligent automation to perform varied internal processes that depend on existing rich-data sets, such as demand forecasting and customer intelligence. But going forward in the next three years, these organizations aspire to incorporate intelligent automation into more complex processes that would require broader sets of data, external collaboration, and additional system integrations. With the growing awareness about automation and AI it is projected that the penetration of AI could be more than 70 percent across organizational areas including the value chain. Considering the huge market of the traditional grocery stores AI can play a revolutionary role in transforming the way traditional grocery store’s function.



Figure 2. (Deloitte, 2019) <https://www2.deloitte.com>

Figure 2. justifies the proliferation of intelligent automation in the retail sector and traditional grocery stores cannot be an exception. Starting from customer preference to procurement then to supply chain all the aspects are data intensive So AI predictive analytics with machine learning is the best solution. Identification of key areas for improvements in grocery stores with small investments is important from feasibility point of view. Considering the above data from the viewpoint of a traditional grocery store the role of AI can be assumed in the following areas.

Inventory Management, forecasting and food waste reduction for accurate inventory projections thereby minimizing wastages. (Sharma, 2022) According to a report published in Financial express in 2019 up to 10 percent of oilseeds, pulses, and cereals are grown in India are completely wasted along with 16% of fruits and vegetables being wasted every year. One of the major reasons for this wastage is the lag in the supply chain system in the country. An AI-enabled solution that provides both demand forecasting and inventory replenishment solutions for grocers, can help proper inventory forecasting and consequently result in reduction of wastages.

Theft Management One of the major pain areas of the traditional grocery stores is the loss suffered due to thefts. Such thefts can occur at the warehouse or as a result of shoplifting customers. This can be avoided by the use of AI-enabled software that tracks every movement of the inventory and helps maintain a record of it and identify the theft.

There is a positive association between the use of artificial intelligence and the production of effective and high-quality decision-making. (Saleh and Abdullah, 2009) since many different factors must be taken into account in order to reach a firm choice, managers must apply artificial intelligence tools and procedures while making decisions. Additionally, in order to make the right decisions, administrative officials need to be emotionally strong. Artificial intelligence therefore eliminates this mistake because it allows for the application of human intelligence to decision-making without taking into account the intricacies of human emotions, which could increase the probabilities of error. As a result, using artificial intelligence would result in higher-quality decision-making as compared to more conventional approaches like seeking the counsel of subject-matter experts. However, it is important to keep in mind that timing is everything, and frequently, a quick decision is required. In these circumstances, artificial intelligence can be utilized as a decision-making tool to assist firms increase their profitability. Artificial intelligence is particularly useful in identifying trends in data produced by user content used by businesses. The organizations specify the issue for which they wish to collect data as well as how the data will be analyzed.

Additionally, it will greatly facilitate their hassle-free, frictionless buying experience. The Statista report reveals that the year 2020 witnessed extensive use of AI in the consumer goods and retail sectors for various purposes. (May et al., 2021) the retail business has many stakeholders that include the supply chain ecosystem; the consumer-packaged goods industry and most important stakeholders are the Consumers, equipped with varying purchasing power, consumers who are loyal to brands while some are adventurous while seeking and making choices. These different functions served by the stakeholders emphasize their importance as key decision-makers that will guide the way in which and to what extent artificial intelligence will be incorporated into their retail shopping experience. (Srivastava,2021) this means that the future of AI in retail rests on the benefits AI provides to these stakeholders.

A report published by Deloitte in 2019 stressed that the growing competition, ever changing customer expectations, and the continuous development of technology are the accelerators primarily reshaping every aspect of the retail business. Hence, sustaining performance and remaining relevant in the market demands effective response to the changing landscape and make the best of the available opportunity. The report identified four major trends that enabled the namely, growth of nontraditional competition, a shift from goods to services, hyper-personalization, and a push to modernize technology.

(Chao.G, Cheung.J Haller.K, Lee.J, 2019), furthermore it is predicted that in the next three years retail and consumer products industries are projected to grow from existing 40 percent of companies to more than 80 percent. However, it is anticipated that AI will majorly penetrate in the supply chain planning aspect of the retail businesses.

(Malviya, 2021) an in-depth study also discloses that kirana stores orders (including grocery and daily essentials) worth \$4 billion were sourced directly through online apps, thereby completely avoiding the distributors. Besides, large companies like P&G, ITC and Marico have created their own in-house apps and

connected various indigenous grocery stores. This move resulted in accelerating sales by about \$1 billion dollars in the last fiscal year.

In conclusion, this literature review highlights the transformative effects of AI on traditional grocery stores in India. By examining the advantages and challenges associated with AI adoption, future research can contribute to the ongoing discussions on the future of traditional retail in the era of technological advancements. Policymakers, store owners, and other stakeholders can utilize the findings to make informed decisions, adapt to the changing landscape, and ensure the sustainability and growth of traditional grocery stores in India.

Research Gaps

During the research it was observed that the traditional grocery stores face similar issues like the big stores of order fulfillment, customer preferences and its dependency of manual methods of data gathering and using similar data for procurement, which can lead to inaccuracies.

In 2020, most businesses experienced a shift in customer behavior as consumers were forced to shop online, irrespective of their previous shopping habits, due to global lockdowns. The traditional grocery stores although have embraced technology but the acceptance is at the basic level. Considering the level of competition they face with the big players, to remain relevant in the competition they need to cater to two key stakeholders, firstly the consumer and secondly supply chain management. Adoption of artificial intelligence initially for these two key stakeholders, will not only accelerate their growth but will lead to the efficient functioning of the traditional grocery stores by minimizing wastage and understanding the actual consumer requirement based on real-time data.

Objectives

1. To study acceptance of AI adoption within traditional Indian retail grocery segment.
2. To study effect of supermarkets on retail grocery store sales and supply management.
3. To study of technology adoption across traditional retail grocery stores.

Research Design

The research focuses on the adoption of Artificial Intelligence in traditional grocery stores. The research methodology used is Descriptive research. To understand the existing technology usage, inventory management, wastage elimination and theft management, questionnaire was shared with the respondents. The respondents were the owners of the grocery stores in and around Nigdi Pradhikaran, Pune. The questionnaire was prepared using Google forms. The data collected is based on the responses received on the questionnaire and secondary data collected through an extensive search on the websites of articles and research papers written on the said topic.

Sample Design: For understanding the adoption of technology samples were selected based on the convenience of the researcher in the designated area.

Data Analysis

Sl. No	Survey Questions	Variables and Results		
		Yes	No	Maybe
1.	Do you think Big Super Stores like DMart had any impact on your sales	76.9%	15.4%	7.7%
2.	Do you think Covid 19 has revived your sales graph	73.1%	26.9%	
3.	Do you manage stock-in & stock out efficiently	42.3%	57.7%	
4.	Do you use a software that gives you proper data about the inventory	30.8%	69.2%	
5.	Do you face inventory wastage annually	69.2%	30.8%	

6.	Are you using Digital money	84.6%	15.4%	
7.	Do you think Digital money is helpful in knowing the actual revenue	69.2%	30.8%	
8.	Are you accurately able to project demands for products in your shop	76.9%	15.4%	7.7%

Table 1 Impact of Supermarkets on traditional grocery stores

Question	Software App	Manual recording & Observation	Intuition	Others
How Stores inventory	Kirana forecast 18%	68%	11%	3%

Table 2 Methods adopted by grocery stores for inventory forecasting

Table 2, reveals 18% use Software apps, while 68% resort to intuition or manual records for inventory forecasting.

Figure 3: Mega mart impact on Kirana store sales

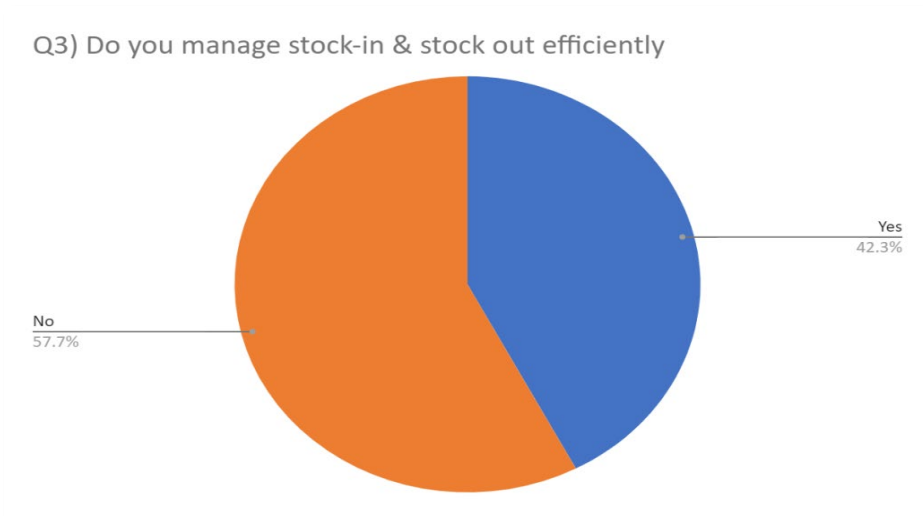
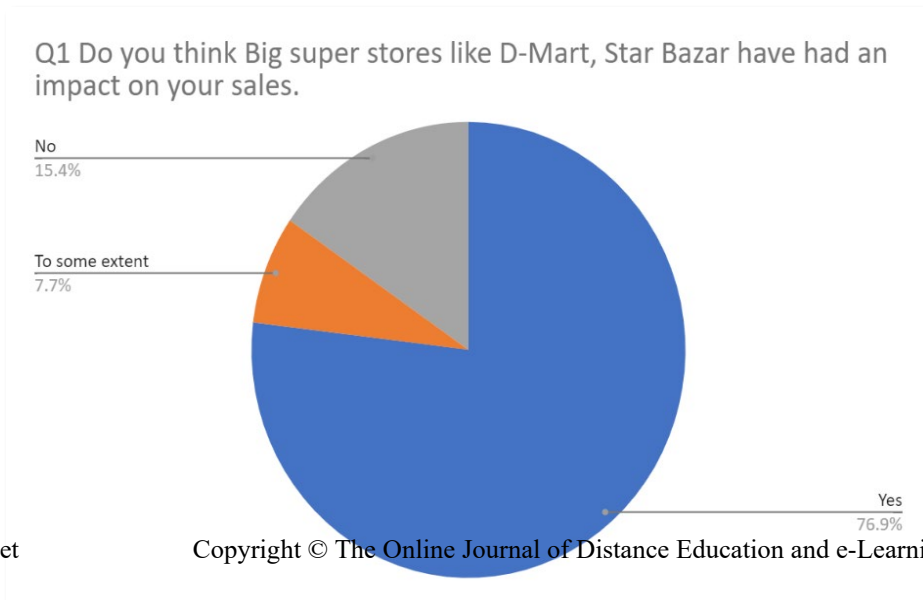


Figure 4: Covid Impact of Kirana store sales.

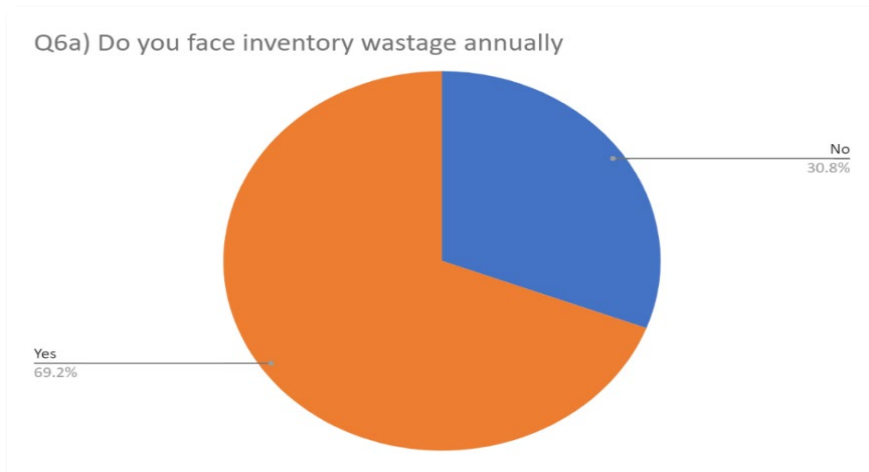


The above two figures, Figure 3 & 4 express the threat faced by traditional grocery stores and the effect of Covid19 pandemic on their sales.

Figure 5: Kirana store manages stock efficiently



Figure 6, Whether Kirana Store use Software for managing inventory



Figures 5, 6 and 7 seek to understand the inventory management done by the traditional stores and the wastage suffered by them. Also if they take help of any software application to efficiently manage the stock.

In the next section, Figure 8 & 9, the researcher seeks to understand the level of adoption and comfort in using digital money. 84.6 % of researchers entioned that they were using Digital money, while 69.2% felt digital money helped them to estimate actual revenue.

Figure 7, reflects the inventory wastage suffered by the grocery stores annually

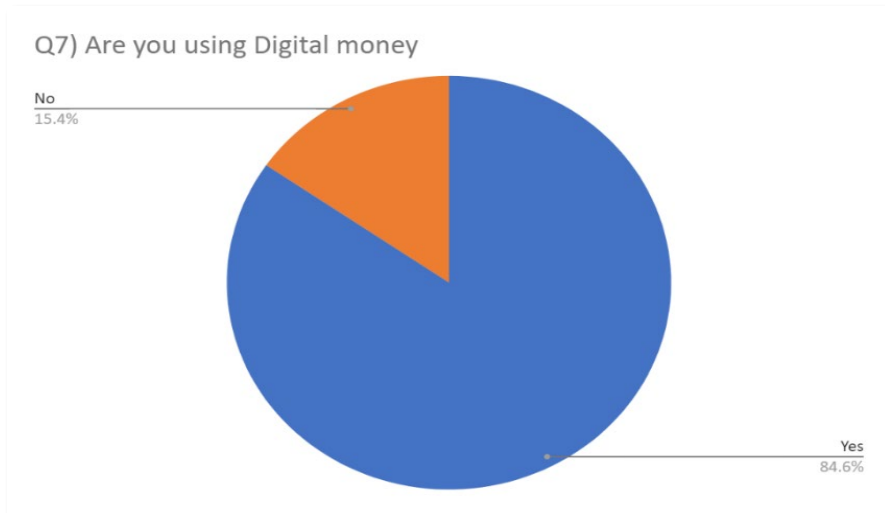


Figure 8: Kirana Store adoption of Digital Money

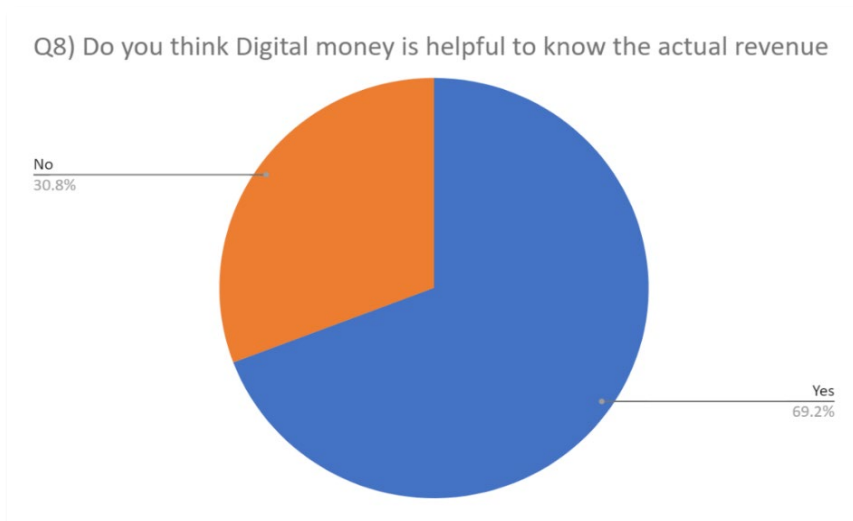
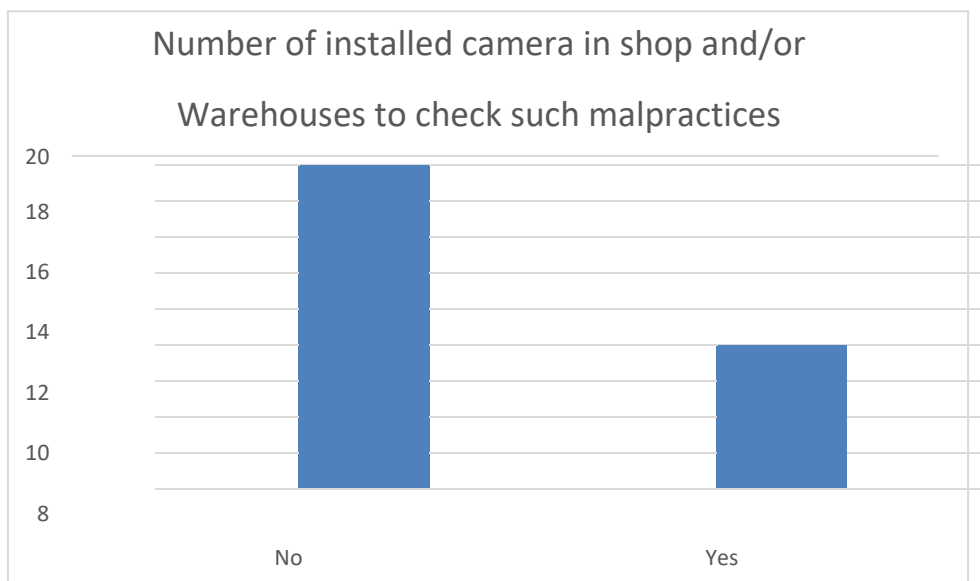


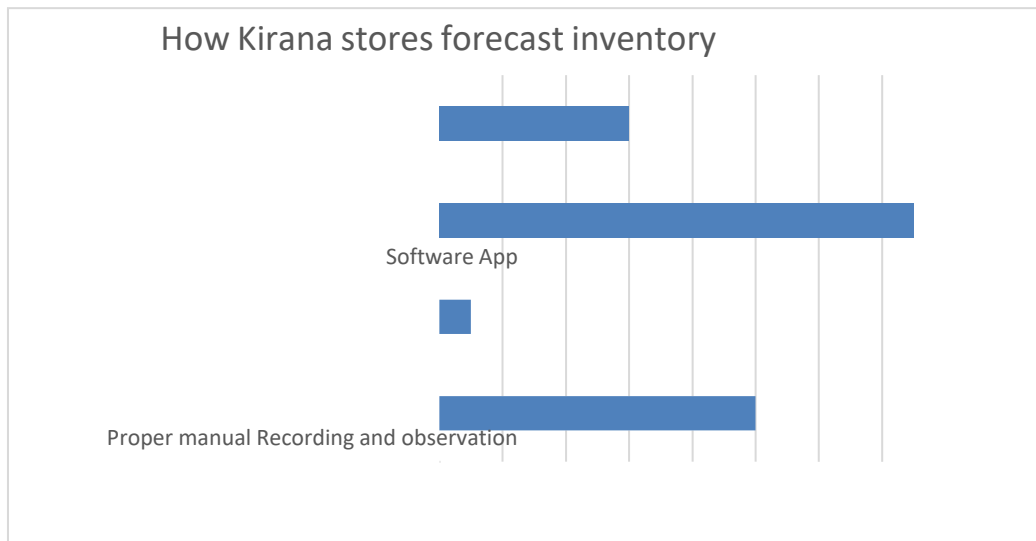
Figure 9: Is Digital Money adaptation helps Kirana stores



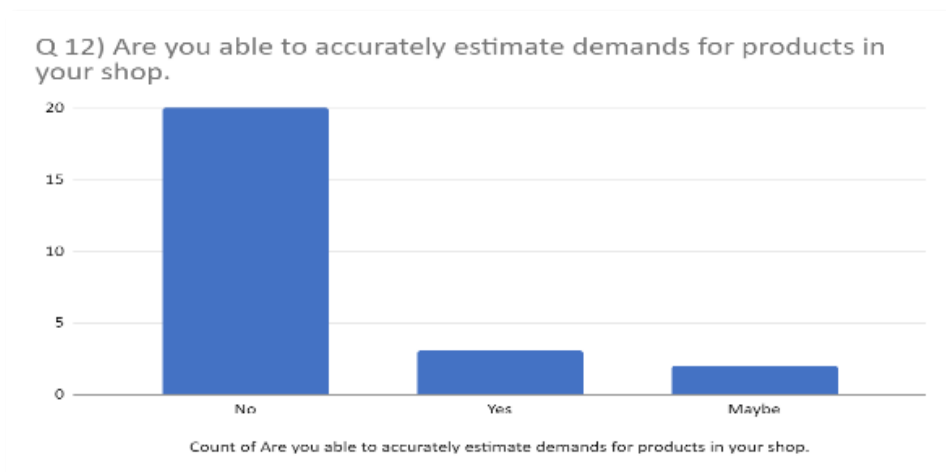
Graph 1: Equipment used to Curb Theft

Graph1 depicts that although the grocery stores do suffer from thefts and malpractices, yet most of them have not installed cameras to keep a check on such practices.

Graph 2: Kirana Stores software adaptation forecast inventory



Graph 2 depicts the methods adopted by grocery stores for inventory forecasting. Around 18% use Software apps, while a majority either use intuition or manual records for inventory forecasting



Graph3, Accuracy for estimating demands for products.

Graph 3 emphasizes on the fact that despite several available methods for estimating demands yet majority of shop owners were not sure about accurately estimating demands for the products in their shop.

Findings

The retail industry is becoming more organized, with all products being sold under one roof. Due to their hectic schedules, consumers find it more expedient to frequent supermarkets or department stores rather than several shops. However, as the organized retail sector has grown, marketing strategy planning has become vital for them. By gathering and analyzing the data from the thousands of clients who visit the organized retail establishments, artificial intelligence aids the businesses in the development of various marketing tactics. Customers benefit from this since they may choose the product they wish to purchase based on their needs after viewing the thousands of options that are displayed.

1. The adoption of technology is gradual and happening at good pace
2. Observations reveal that data reliability for inventory or procurement is weak and respondents acknowledge it.

3. So, the trend will be adaptation of new technologies, AI products, theft detection systems camera's etc. Most of early adapters have overcome the problems of forecasting demand, supply chain and improving consumer digital experience.

Conclusions

The adoption of AI in traditional grocery stores can result in two major benefits for the grocers: Customer Experience and Operational Efficiency. AI can make use of the business's existing data and transform it into information that is easy to understand. This information can provide valuable insights into consumer behavior and purchase decisions. With the shift in focus from sales to customer experience, AI applications can help improve the customer experience and customer service. Implementation of AI applications in these stores are plagued by high costs and willingness to embrace AI and convincing these grocers over the long-term benefits of AI is a challenge. Their acceptance of technology is restricted to RFID or accounting software due to ease of use. Lack of technical knowhow could add to the resistance to AI adoption.

References

- Alkhaladi, (2021), "Supermarket of the Future: Deploying AI in your grocery store, Iterex
- Agostino, Domenico, Alfonso. (2021)" Exploring the role of the Amazon effect on customer expectations: An analysis of user-generated content in consumer electronics retailing" *Journal of Consumer Behaviour*
- Giri & Paul (2019) "Determining the Impact of Artificial Intelligence on 'Developing Marketing Strategies' in Organized Retail Sector of West Bengal, India, *International Journal of Engineering and Advanced Technology*, Volume-8 Issue-6
- Hines M. (2020) "How Costco, Walmart and Whole Foods Use Tech to Reinvent Grocery Shopping" *BuiltIn*
- Malviya (2021) "Kiranas took to apps to shop products worth \$4billion in FY21" *Economic Times* September 2021 Issue
- Mandel P. (2021) "Putting the AI in Grocery Aisles", *Food Logistics* report
- Prasad & Ghoshal (2021) "Forecasting Buying Intention Through Artificial Neural Network: An Algorithmic Solution on Direct-to-Consumer Brands" *SAGE Journals*, Volume 11, Issue 4.
- Saleh & Abdullah, F. (2009). *The Effect of Applying and Using the Methods of Artificial Intelligence and Emotional Intelligence on Decision Making*. Unpublished M. A. Middle East University, Amman, Jordan.
- Sharma (2019), "India wastes up to 16% of its agricultural produce; fruits, vegetables squandered the most" *Financial Express* July 2019 Issue
- Singh. A. (2020)." The Indian Kirana store: Crouching tiger, hidden dragon of the Covid era" *SME Futures*
- Srivastava, M, M, (2021)" AI the future of retail", *Food Logistics* report
- Chao,G, Cheung,J Haller,K, Lee,J, (2019), "The coming AI revolution in retail and consumer products", *IBM Institute of Business Value* Report
- Weintraub.M, Pany.S, Booth.J (2019)"The age of Leveraging AI to connect the retail enterprise of the future", *Deloitte*.