WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

FACTORS AFFECTING THE ADOPTION OF IoT AND ITS EFFECTS ON THE GROWTH OF THE FIRM

I. R. Meenakshi [a], M. Praveen [b]

[a] Assistant Professor Department of Business Administration, Kaypeeyes College of Arts and Science, Kotagiri,
[b]. Head, Department of Commerce. Kaypeeyes College of Arts and Science Kotagiri

ABSTRACT :

The study explores the significance of the Internet of Things (IoT) in enhancing the efficiency and effectiveness of business operations, particularly in retail stores. It highlights how IoT applications streamline various processes such as inventory management, order processing, and billing, thereby reducing time consumption and improving overall performance. The research examines the factors influencing the adoption of IoT, including technical aspects, organizational support, complexity, security concerns, regulatory frameworks, and cost considerations. The study also analyzes the demographic profile of respondents, revealing that most participants are male, belong to the 20-30 age group, hold undergraduate degrees, and have less than one year of work experience, though many possess prior work exposure. The findings suggest that implementing IoT significantly reduces the time required for key business processes, with most activities being completed in under 5 minutes. The research concludes that while IoT adoption positively impacts operational efficiency, proper training and awareness about IoT applications are essential for maximizing its benefits. Recommendations include hiring a diverse workforce, providing training on IoT, and ensuring a balanced gender mix to further enhance business performance.

Keywords:

- Internet of Things (IoT),
- Retail Management,
- Billing Efficiency,
- IoT Adoption,
- Factors Affecting IoT.

1. INTRODUCTION OF THE STUDY :

The retail industry has undergone significant transformations in recent years, driven by the advent of Internet of Things (IoT) technologies. IoT solutions have revolutionized retail operations by adapting to evolving consumer preferences and enabling sellers to provide more personalized shopping experiences (Hossain, Ali Chisty, Hargrove, & Amin, 2021). These technologies have improved various aspects of retail management, including customer service, inventory management, and data-driven decision-making, benefiting both businesses and consumers.

IoT applications in retail encompass a wide range of processes, such as inventory management, sales analysis, loss prevention, supply chain optimization, store automation, managing and predicting in-store wait times, predictive maintenance, proximity sensing, and enhancing digital customer engagement (Brown, , Smith,, & Williams, , 2021). By leveraging IoT, retailers can automate operations, track inventory in real time, and optimize decision-making, thereby improving customer experiences through targeted promotions and personalized recommendations (Williams, 2019).

Despite the numerous benefits, IoT adoption in retail also presents challenges. These include high implementation and maintenance costs, security and privacy concerns due to the collection of vast amounts of customer data, integration complexities with existing systems, and the potential for job displacement through automation (Jones & Patel, 2020). Retail stores that fail to implement IoT solutions may experience inefficiencies in inventory management, reduced operational efficiency, diminished customer engagement, poor marketing effectiveness, and increased operational costs due to manual processes (Taylor, Brown, & Harris, 2022).

This study focuses on the implementation of IoT in retail stores, analyzing the factors influencing IoT adoption and its impact on enterprise growth. Additionally, it explores strategies to enable enterprises to successfully implement IoT, thereby maximizing its potential benefits.

1.2 Industry Profile

Supermarkets are large retail establishments that offer a diverse range of products, including food, beverages, household items, and personal care goods, providing convenience by consolidating multiple categories under one roof. Originating in the United States in the 1930s, supermarkets have expanded globally, with major chains such as Walmart, Carrefour, Tesco, and Costco dominating markets in various regions (Smith & Johnson, 2022). These stores have become integral to daily life, offering not only essential items but also additional services like pharmacies, bakeries, and deli sections. With the

advent of e-commerce, many supermarkets now provide digital platforms for online shopping and home delivery, enhancing customer convenience. Supermarkets also adapt to local cultures by offering products that cater to regional preferences and dietary needs, often stocking unique items like exotic fruits and spices. Additionally, they play a critical role in the global supply chain, sourcing products worldwide and adapting to consumer trends such as sustainability, organic products, and ethical sourcing (Brown, 2021).

2. REVIEW OF LITERATURE :

Hessian et al. (2021) highlighted the significant role of the Internet of Things (IoT) in enhancing retail business by enabling real-time, customized, and non-intrusive communication with customers, thereby driving traffic, increasing sales, and elevating the overall purchase experience. Olushola, (2019) identified several factors affecting IoT adoption, including technological, organizational, and environmental determinants such as technological complexity, security concerns, executive management support, firm size, and regulatory support, which have led to delays in IoT implementation by many organizations. In (Lee & Lee, 2015) emphasized essential IoT technologies such as RFID, wireless sensor networks (WSN), middleware, cloud computing, and IoT application software, while also categorizing enterprise applications into monitoring and control, big data and business analytics, and information sharing and collaboration, alongside identifying five key challenges, including data management, privacy, and security. Haddud, DeSouza, Khare, & Lee, (2017) explored the potential benefits and challenges of integrating IoT in supply chains through a survey of 87 university scholars from six continents, revealing that while many benefits contribute to critical success factors, some challenges still act as barriers to widespread IoT adoption. D. Uckelmann et al. (2012) addressed the challenge of evaluating IoT performance, emphasizing the need for continuous improvement in services to meet customer requirements and highlighting that IoT performance depends on various factors such as processing speed, communication speed, device form factor, and cost, with the lack of comprehensive performance evaluation remaining an unresolved issue.

2.1 Research Gap

While existing literature explores IoT adoption, benefits, and challenges across retail, supply chains, and enterprise applications, several gaps remain. Hessian et al. (2021) highlighted IoT's role in enhancing retail experiences, but its long-term impact on customer loyalty is underexplored. Bayo Olushola (2019) identified adoption barriers, yet variations across organizational sizes and industries need further investigation. In Lee et al. (2015) discussed IoT technologies and challenges but lacked empirical evaluation of their effectiveness. Haddud et al. (2017) analyzed IoT benefits in supply chains but did not address scalability for SMEs. D. Uckelmann et al. (2012) emphasized the need for a comprehensive IoT performance evaluation framework, which remains an unresolved issue. Addressing these gaps will enhance understanding of IoT's potential and limitations across sectors.

3. RESEARCH DESIGN :

3.1 Statement of the Problem

The retail industry is undergoing rapid changes, with IoT technologies enhancing efficiency through process automation, personalized recommendations, and real-time inventory management. Without IoT, stores face challenges such as poor inventory management, reduced operational efficiency, and higher costs.

3.2 Need of the Study

The study aims to provide insights and recommendations to improve the efficiency and smartness of retail store operations through IoT implementation.

3.3 Scope of the Study

The study analyzes IoT adoption factors in retail stores, evaluates its impact on business growth, and suggests strategies for successful implementation.

3.4 Objectives of the Study

- To analyze the retail industry.
- To study Hindustan Bakery and Super Stores.
- To identify factors affecting IoT adoption in retail stores.
- To assess IoT's impact on business growth.
- To present findings, suggestions, and conclusions.

3.5 Hypothesis

- **Ho:** No significant relationship between educational qualification and billing time using IoT.
- **Ha:** A relationship exists between educational qualification and billing time using IoT.

3.6 Method of Research

The study follows a descriptive research methodology using qualitative and quantitative data. Primary data was collected through questionnaires, and secondary data was sourced from the firm's website and records. The hypothesis is tested using the Chi-Square method.

3.7 Description of Study Area

The study focuses on factors affecting IoT adoption in retail stores and its impact on enterprise growth.

3.8 Limitations of the study:

The study focuses on the adoption of IoT and its effects on the growth of the firm. The results of the study are confirmed to the firm, and cannot be generalized. The study was conducted with limited number of respondents with a limited time period the output may be perfect to a limited extent.

Table 1

Percentage Analysis

Variables		No. of Respondents	Percentage
Gender	Male	15	75%
	Female	5	25%
	Total	20	100%
Educational qualification	Below 10th	0	0
	SSLC	0	0
	Higher Secondary	1	5%
	UG	13	65%
	PG	6	30%
	Total	20	100%
Years of experience	Less than 1 year	11	55%
	1-2 years	3	15%
	2-3 years	3	15%
	3-4 years	1	5%
	More than 5 years	2	10%
	Total	20	100%
Prior Work Experience of the respondents	Yes	15	75%
	No	5	25%
	Total	20	100%

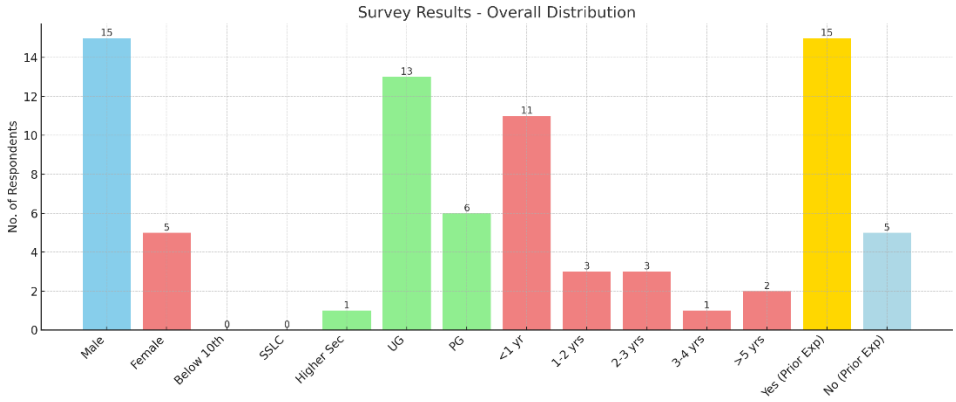

Figure 1

Gender Distribution: The majority of respondents are male, accounting for 75% (15 respondents), while 25% (5 respondents) are female. This indicates that the sample is predominantly male.

Educational Qualification: The educational background shows that 65% (13 respondents) hold an undergraduate (UG) degree, followed by 30% (6 respondents) with a postgraduate (PG) degree. Only 5% (1 respondent) has completed higher secondary education, and no respondents fall under the SSLC or below 10th category. This suggests that most respondents are well-educated, with the majority having a UG qualification.

Years of Experience: Most respondents have less than 1 year of experience (55%), while 15% each have 1-2 years and 2-3 years of experience. Only 5% have 3-4 years of experience and 10% have more than 5 years of experience. This indicates that the majority of the workforce has limited experience, with only a small percentage having extensive experience.

Prior Work Experience: A significant 75% (15 respondents) reported having prior work experience, while 25% (5 respondents) did not have any prior work experience. This suggests that most respondents bring prior knowledge and skills to their current roles.

Table 2

Percentage Analysis

	Processes	Applied	Not Applied	Total
Opinion In Relation to Implementing IOT In Placing Order	Placing order	14	6	20
	Processing order	14	6	20
	Tracking order	13	7	20
	Receipt of goods	14	6	20
	Confirmation of receipt	11	9	20
	Automatic process	12	8	20
	Percentage	65%	35%	100%
Opinion in relation to implementing IoT in inventory management	Receiving	15	5	20
	Recording	9	11	20
	Sorting	16	4	20
	Storing	14	6	20
	Movement	12	8	20
	Percentage	66%	34%	100%
Opinion in relation to implementing IoT in Billing	Barcode Scanning	16	4	20
	Sales bill generation	11	9	20
	Payment gateway	17	3	20
	Dispatch	11	9	20
	Percentage	68.75%	31.25	100%

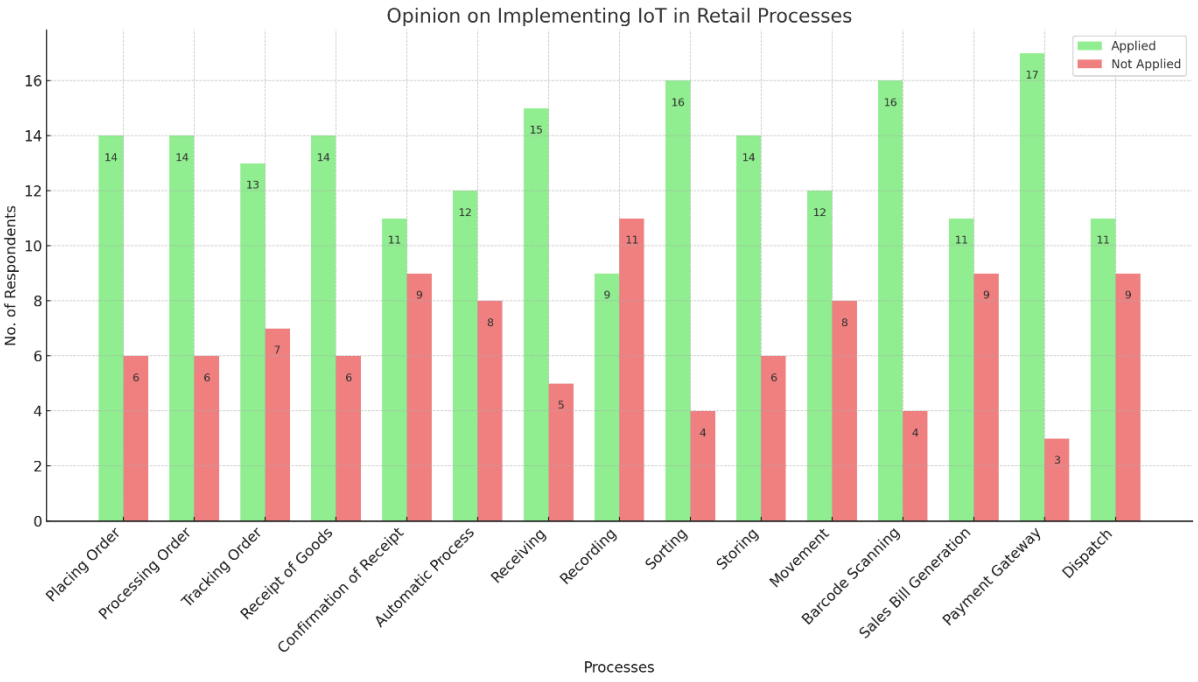

Figure 2

IoT in Placing Orders: The adoption of IoT in placing orders shows that 70% of respondents (14 out of 20) have applied IoT in processes such as placing orders, processing orders, and receipt of goods. However, only 55% (11 respondents) use IoT for confirmation of receipt, and 60% (12 respondents) have adopted automatic processes. Overall, 65% of respondents have implemented IoT in order management, while 35% have not adopted it.

IoT in Inventory Management: In inventory management, IoT is most commonly applied in receiving (75%) and sorting (80%). Around 70% (14 respondents) have implemented IoT for storing, while 60% (12 respondents) have adopted it for movement of goods. However, recording shows lower adoption, with only 45% (9 respondents) applying IoT. Overall, 66% of respondents have integrated IoT in inventory management, leaving 34% without its implementation.

IoT in Billing: The highest adoption of IoT is seen in billing processes, particularly barcode scanning (80%) and payment gateway (85%). However, IoT implementation in sales bill generation and dispatch is relatively lower, with only 55% (11 respondents) utilizing IoT in these areas. Overall, 68.75% of respondents have adopted IoT in billing processes, while 31.25% have not implemented it.

Table 3

	Proccesses	**Less Than 5 Min**	**5-10 Min**	**10-15 Min**	**15-20 Min**	**Total**	**Sum**	**Mean**	**Rank**
Time consumption using Internet of Things	Order placement	12	5	2	1	20	68	3.4	2
	Inventory management	5	9	5	1	20	58	2.9	4
	Billing	8	5	6	1	20	60	3	3
	a) Barcode scanning	7	5	7	1	20	58	2.9	4
	b) Sales bill generator	11	1	6	2	20	61	3.05	1
	c) Payment gateway	11	2	4	3	20	61	3.05	1
	d) Dispatch	8	4	6	2	20	58	2.9	4
	Percentage	44.2%	29.85%	34.2%	7.85	100%			
Time Consumption when internet of Things is not used	Order placement	9	6	5	0	20	64	3.2	1
	Inventory management	4	6	8	2	20	52	2.6	6
	Billing	4	9	6	1	20	56	2.8	5
	a) Barcode scanning	6	6	6	2	20	56	2.8	5
	b) Sales bill generator	7	7	6	0	20	61	3.05	2
	c) Payment gateway	6	8	5	1	20	59	2.95	3
	d) Dispatch	5	8	7	0	20	58	2.9	4
	Percentage	29.2%	35.71	26.42	5.71	100%			
	Factors	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Sum**	**Mean**	**Rank**
Factors affecting adoption of Internet of Things	Technical factors	06	12	01	01	0	83	4.15	6
	Organizational factors like executive management, support, firm size.	06	11	04	01	0	88	4.4	4
	Complexity of IOT	09	11	02	0	0	95	4.75	1
	Security concerns	05	11	05	0	0	84	4.2	5
	Regulatory support	10	08	04	0	0	94	4.7	2
	Intention to adopt	07	10	05	0	0	90	4.5	3
	Cost of implementation	06	11	04	1	0	88	4.4	4
	Percentage	47.2%	52.8	17.85	2.14%	0%			

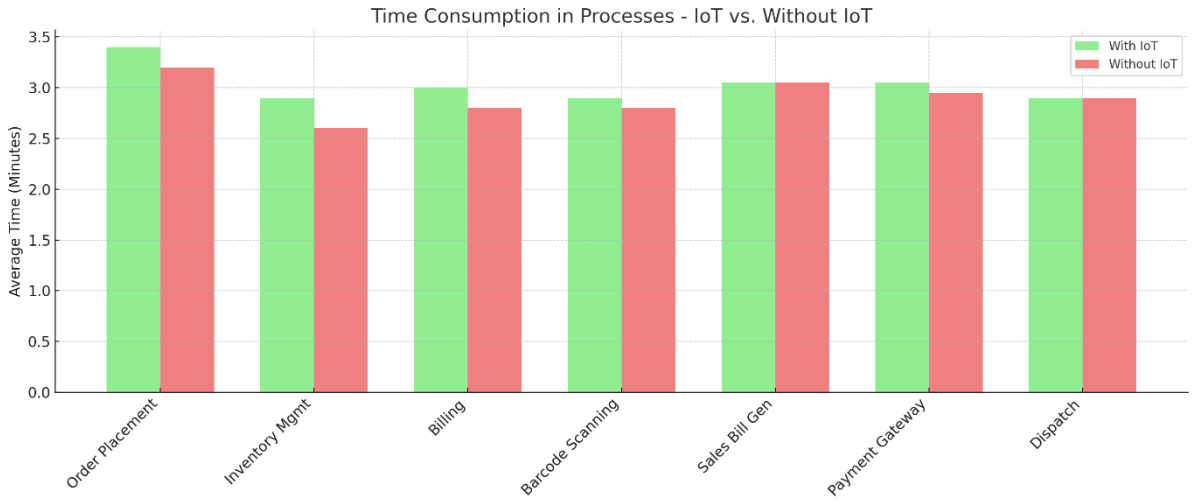

Figure 3

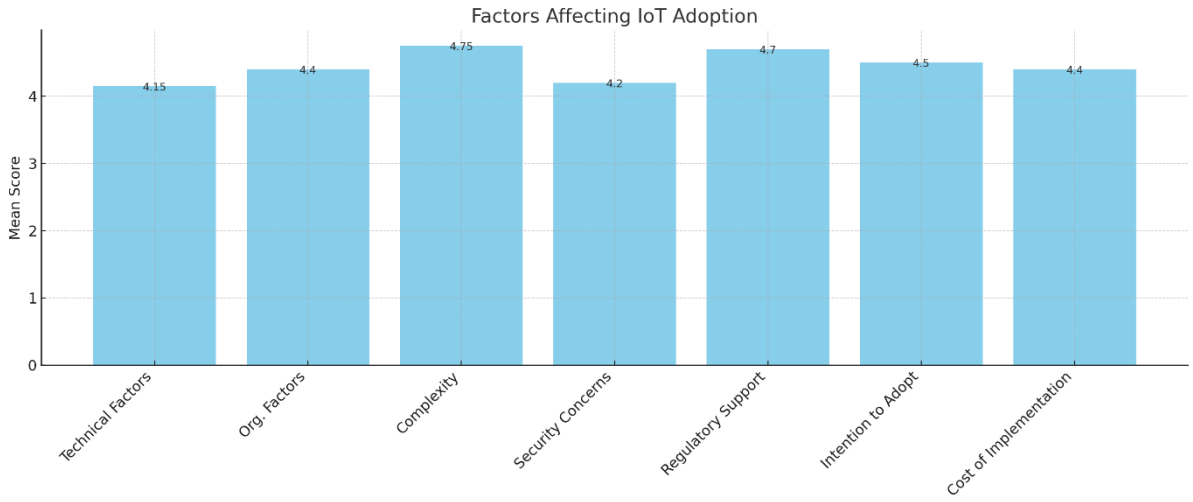

Figure 4

Time Consumption in Processes – IoT vs. Without IoT

The analysis of time consumption highlights that IoT implementation leads to more efficient completion of various processes in retail management. For order placement, IoT reduces the average time to 3.4 minutes, while without IoT, it takes 3.2 minutes. Inventory management shows a slight improvement with IoT, reducing the time to 2.9 minutes, compared to 2.6 minutes without IoT. Billing processes demonstrate greater efficiency when IoT is used, with an average time of 3 minutes compared to 2.8 minutes without IoT. Within billing, sales bill generation and payment gateway processes exhibit the highest efficiency with IoT, both taking 3.05 minutes, slightly faster than their non-IoT counterparts. Barcode scanning and dispatch processes take 2.9 minutes with IoT, which is almost the same as the time taken without IoT. Overall, while IoT marginally reduces the time in some processes, the greatest impact is observed in billing processes, leading to improved operational efficiency.

Factors Affecting IoT Adoption

The evaluation of factors affecting IoT adoption indicates that complexity is the most significant challenge, with a mean score of 4.75, suggesting that the technical intricacies involved in implementing IoT remain a substantial hurdle. Regulatory support follows closely with a mean score of 4.7, highlighting the importance of compliance with government regulations and policies. Intention to adopt IoT reflects a positive attitude toward IoT adoption, with a mean score of 4.5, but factors such as cost and organizational readiness continue to pose challenges. Cost of implementation and organizational factors are equally important, with a mean score of 4.4, indicating that financial and structural considerations play a critical role in IoT adoption decisions. Security concerns hold a mean score of 4.2, suggesting that while organizations are mindful of potential security risks, they do not view these concerns as the primary barrier. Technical factors rank the lowest, with a mean score of 4.15, indicating that technical difficulties, although present, are not the most pressing concern when compared to other factors**.**

Table 4

Observed Values (O)

Educational Qualification / Billing	Below 10th	SSLC	Higher Secondary	UG	PG and Above	Total
Less than 5 min	0	0	0	5	3	8
5-10 min	0	0	1	5	1	7
10-15 min	0	0	0	3	1	4
15-20 min	0	0	0	0	1	1
Total	0	0	1	13	6	20

Table 5

Expected Values (E)

Educational Qualification / Billing	Below 10th	SSLC	Higher Secondary	UG	PG and Above	Total
Less than 5 min	0	0	0.4	5.2	2.4	8
5-10 min	0	0	0.35	4.55	2.1	7
10-15 min	0	0	0.2	2.6	1.2	4
15-20 min	0	0	0.05	0.65	0.3	1
Total	0	0	1	13	6	20

Chi-Square Value

Chi-Square Calculated Value: 0.2505

Chi-Square Tabulated Value: 21.026

As the calculated value is less than the tabulated value, H0 is accepted, meaning there is no significant relationship between educational qualification and time consumption for billing using IoT.

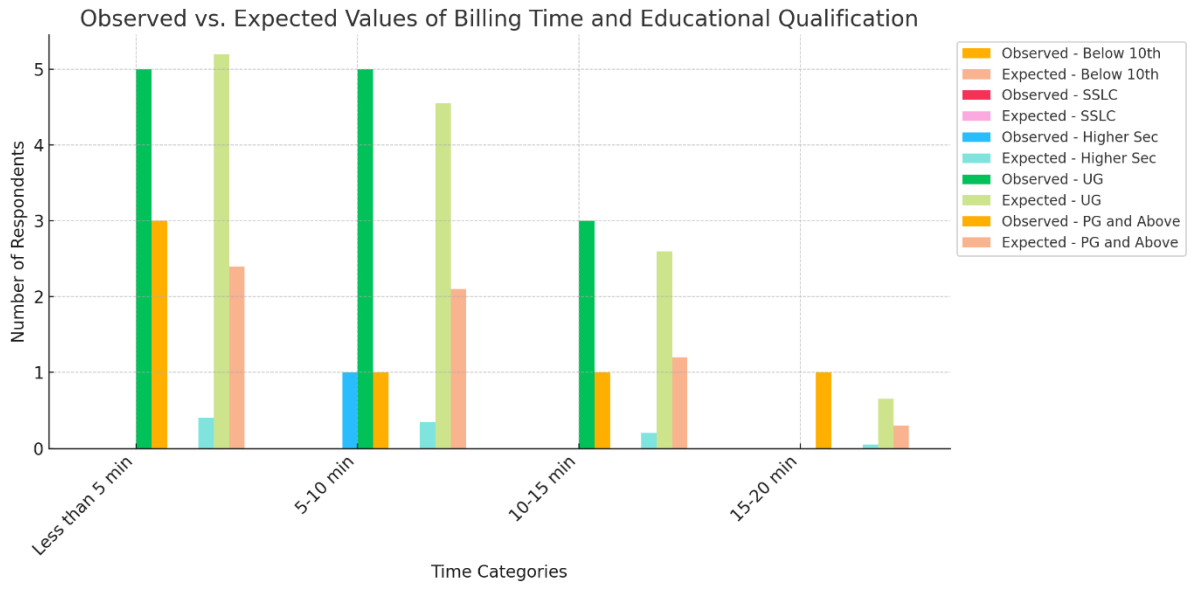

Figure 5

Suggestions :

To enhance the effectiveness of business operations, it is recommended that the organization recruit individuals from diverse age groups, ensuring a balanced and dynamic workforce. A balanced mix of both genders should also be maintained to foster inclusivity and leverage different perspectives in decision-making. Additionally, hiring individuals with more experience and prior work exposure can contribute to improving operational efficiency and decision-making processes.

To maximize the benefits of IoT, employees should be provided with adequate knowledge and hands-on training on its application in day-to-day business activities. Regular training sessions should be conducted to familiarize employees with IoT technologies and ensure that they can utilize these systems effectively. This will not only help employees complete tasks more efficiently but also reduce the time required for various business processes, ultimately contributing to improved overall performance.

Conclusion :

The study provided valuable insights into the significance of IoT, its applications, and its role in enhancing the efficiency of organizational processes. It highlighted how IoT contributes to the smart functioning of businesses by automating processes and improving decision-making. The research focused on identifying the factors influencing the adoption of IoT and evaluating its impact on the growth of the firm.

Key findings indicate that all respondents belong to the 20-30 age group, with a majority being male. Most of the respondents hold an undergraduate degree and have less than one year of work experience, although many have prior work experience. The study revealed that IoT is widely implemented in processes such as inventory management and billing, significantly reducing the time taken for these activities, with most processes being completed in less than 5 minutes.

Furthermore, the study identified several critical factors influencing the adoption of IoT, including technical factors, organizational factors, complexity of IoT, security concerns, regulatory support, intention to adopt IoT, and the cost of implementation. These factors collectively play a significant role in determining the success and efficiency of IoT adoption in retail operations.

The results of the study underscore the importance of integrating IoT in business operations to enhance efficiency, reduce operational costs, and improve customer satisfaction. Future studies could further explore the long-term impact of IoT adoption on overall business performance and customer engagement.

REFERENCE :

1. Brown, , A., Smith,, J., & Williams, , L. (2021). IoT in Retail: Enhancing Operational Efficiency and Customer Experience. *Journal of Retail Innovation,, 15*(3), 45-60.
2. Brown, L. (2021). Impact of globalization on supermarket supply chains. *Journal of Consumer Studies, 38*(2), 112-126.
3. Haddud, A., DeSouza, A., Khare, A., & Lee, H. (2017). Examining potential benefits and challenges associated with the Internet of Things integration in supply chains. *journal of manufacturing technology management*.
4. Hossain, M., Ali Chisty, N., Hargrove, D., & Amin, R. (2021). Role of Internet of Things (IoT) in Retail Business and EnablingSmart Retailing Experiences. *Asian Business Review, 11*, 75-80. doi:https://www.researchgate.net/deref/https%3A%2F%2Fdoi.org%2F10.18034%2Fabr.v11i2.579?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIiwicG9zaXRpb24iOiJwYWdlQ29udGVudCJ9fQ
5. Jones, p., & Patel, R. (2020). Challenges in IoT Implementation: Addressing Security and Integration Concerns. *International Journal of Technology Management, 12*(4), 89-104.
6. Lee, I., & Lee, K. (2015). The Internet of Things (IoT): Applications, investments, and challenges for enterprises. *Kelley School of Business, Indiana University., 58*, 431-440. doi:http://dx.doi.org/10.1016/j.bushor.2015.03.008
7. Olushola, B. (2019). Factors affecting IoT adoption. *IOSR Journal of Computer Engineering (IOSR-JCE), 21*(6), 19-24.
8. Smith, J., & Johnson, R. (2022). he evolution of supermarkets: A global perspective. *Retail Studies Journal,, 45*(3), 45-60.
9. Taylor, M., Brown, C., & Harris, P. (2022). Adoption of IoT in Retail: Barriers and Opportunities. *International Journal of Business and Innovation,, 14*(1), 25-39.
10. Williams, L. (2019). Personalized Shopping Experiences through IoT: A Case Study in Retail. *Journal of Consumer Technology,, 11*(2), 78-92.