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A Study on the Operational Management Practices in the Indian Fashion Retail Merchandising Sector

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Abstract : *This study investigates the operational management practices in Indian fashion retail merchandising (IFRM) and evaluates the effects of various technological interventions on operational performance efficiency, cost optimization, and Supply-Chain (SC) integration. The mixed-method research design was taken in the form of quantitative surveys and qualitative literature analysis. A questionnaire was conducted to 300 industry professionals who comprise managers, merchandisers and operational staff in a structured form. Descriptive statistics, correlation analysis, and ordinal regression in SPSS were used to analyze the data in order to determine the relationships and the influence of technology-enabled processes on the outcomes of operations. According to the findings, the perceptions of technological adoption are moderate to strong and the largest ratings are associated with last-mile delivery solutions, warehouse efficiency, and real-time inventory management. The correlation analysis has shown that there are strong interrelations between distribution cost reduction, warehouse efficiency, and real-time inventory management ($r = 0.337$, $p < 0.01$). The regression that was done using ordinal showed that production efficiency ($\beta = 1.069$, $p < 0.001$), purchasing efficiency ($\beta = 1.014$, $p < 0.001$) and distribution efficiency ($\beta = 0.767$, $p = 0.004$) increase operational performance significantly. The research supports the claim that the uptake of new technologies will make a significant impact on increasing the efficiency of operations in IFRM. Digital solutions are built-in facilitators and not a selectable instrument in that they enhance accuracy, speed, cost savings and the general optimization of the SC.*

Keywords: Indian Fashion Retail, Operational Efficiency, Emerging Technologies, AI, IoT, Robotics, Real-Time Inventory, Warehouse Automation, Last-Mile Delivery, Digital Transformation..

I. INTRODUCTION

In India, fashion retail merchandising has experienced a transformation where traditional innate methods have been substituted by modern digitally and data-driven decision-making methods [1][2]. The trends of quick urbanization, the rise in disposable income, and the widespread use of e-commerce have all conspired to create a situation where demand is not only more volatile but also more complex. In response to this dilemma, retailers are looking towards high-tech methods to assist them in handling the various aspects of product mix that includes planning [3], development, and control of the inventory besides pricing decisions.

The flow in consumer expectations, the proliferation of e-commerce platforms, and the rising rivalry are pushing retailers to rely on state-of-the-art solutions like data analytics, virtual design, automation, and real-time inventory systems, which help them to make faster and more accurate merchandising decisions. The aforesaid innovations are facilitating the brands to match the products with the consumers' needs, to cut down their operational costs, and to improve the entire shopping experience. The increasing use of technology in retail strategy day-to-day operations is being the case in India, where it would be justified for one to consider the role of technology as well as its effect on merchandising operations to decipher how the modern fashion business carries out its operations efficiently and grows rapidly [4].

The increased pace of technology adoption, namely, artificial intelligence (AI), machine learning (ML), Internet of Things (IoT), robotics, and high-level automation is an indicator of a structural transformation in the IFR ecosystem [5]. The current retailers are dependent on virtual design tools, predictive analytics to plan demand, automated warehouse systems and real-time inventory management platforms to optimize their merchandising processes [6]. It allows making decisions faster, increasing the accuracy of stocks, minimizing wastage, making processes of replenishment more efficient, and facilitating the execution of last-mile deliveries [7]. Digitization of merchandising operations is further justified by the growing use of web tools by consumers, the increasing demands of fast delivery and growing price sensitivity which compel retailers to focus on the constant improvement of the efficiency of the fashion supply chains [8][9]. This change complies with the tendencies of the global market, where data-driven retailing is accepted as the driving force of organizational perfection and customer focus [10].

Though these developments have been made, the fashion retail climate in India has its unique challenges that should be explored further. The ineffective deployment of end-to-end technological solutions is caused by fragmented supply chains, a very heterogeneous consumer preference, and the lack of uniform digital coverage of the regions, as well as different organizational preparedness [11][12]. Despite the fact that previous studies acknowledge the role of technology in retailing, most of them consider consumer behaviour, human resource, or overall industry trends, and empirical studies regarding the effect of emerging technologies in operational fashion merchandising are scarce [13][14][15]. Considering the rapid rate of technological transformation, the revised instance on a scholarly level is required in order to evaluate the influence of tools like real-time inventory system, last-mile optimization platform, and warehouse automation in determining operational performance within the Indian environment.

To fill this need, this research analyses the effects of new technology on distribution management, efficiency, and cost reduction as well as the operational management strategies used by fashion retail merchandising organizations in India [16].

II. LITERATURE REVIEW

This section examines the evolution of fashion retail merchandising in India, the ways in which technology is influencing modern retail practices, and the key operational challenges that have come to define the sector. Digital technology (DT) adoption trends, H) and SC issues, and upcoming developments (such as smart manufacturing and AI-driven retail systems) are all highlighted in this literature review. Understanding the effect of technology on operational efficiency in India's fashion retail sector is the theoretical goal of this research.

A. Evolution of Fashion Retail Merchandising in India

Estimates put the retail market consumption in India at USD 672 billion in 2017 [17] and put it at USD 1,200 billion in 2021, demonstrating the country's remarkable development in the retail sector. As a result, experts predict that the e-commerce business will reach USD 60 billion by 2020, having grown at a staggering pace of 31%. In the 2017 A.T. Kearney Global Retail Development Index: India, India supposedly dominated, as reported in the IBEF: India Retail Industry Report. More progressive regulatory reforms, such as permitting 51% FDI in multi-brand retail and 100% in single-brand retail under the 2017 FDI policy, have helped the retail sector grow become the country's largest employer, contributing over 10% to GDP and almost 8% to total employment. Unstructured retail accounts for 92% of India's retail business and is a key component of the industry, which is itself a unique blend of modern and traditional forms [18].

B. Importance of Technology in Modern Retail Operations

In the current retail environment, technology has evolved to be the major factor that increases productivity, accuracy, and even competition among enterprises. Besides, consumers also expect more and more from retailers, speedy deliveries, personalized products, and utmost care during the entire buying process [19]. That is why retailers still apply the above-mentioned technologies and numerous others such as real-time inventory system, automated warehouses, digital payment services, AI-powered demand forecasting, and data analytics to simplify and streamline their activities. These inventions can minimize operational bottlenecks, enhance accuracy of stocks, lower distribution expenses, and others such as procurement, production, and delivery functions. Hence, a quicker reaction to market dynamics by the retailers and at the same time, the provision of an emergency response during the very competitive environment in which they reside.

Nevertheless, high service quality and customer satisfaction are also largely supported by technological assistance to the efficiency of operations. The application of intelligent logistics, last-mile delivery, omnichannel integration, and digital customer contact tools, as an example, can assist retailers to give their customers excellent service that is timely, convenient, and consistent. Technologies such as RFID, IoT-enabled tracking, and predictive analytics enable companies to know what customers would want even before they make an order, and stock accordingly, and hence, offer better delivery performance. Technology is thus the savior of not just the internal workload improvement in company operations but also the company's ability to create stronger customer relationships, increase sales, and have a long-term advantage over the competitors in the market.

Isharyani et al. (2024) examines In order to stay competitive, conventional merchants must swiftly accept and adapt new technologies due to the changing client expectations and purchasing habits caused by the rapid expansion of retail technology. Up to this study, the "Technology-to-Performance Chain" (TPC) probably hadn't been used to discuss how conventional retailers are adjusting to new technologies in a rapidly expanding industry. The study was qualitative in nature, examining traditional merchants in a developing nation. Adaptation, which involves integrating preexisting technologies to meet local conditions or advances in technology uptake, is the primary driver of most current technologies in traditional retail. Some examples of technological adaptations include "electronic data capture" (EDC) for digital product transactions, a combination of mobile apps and point-of-sale system software to simulate "mobile Point-of-Sale" (mPoS), and the use of printers and barcode scanners to replace modern retail cash registers. Managing company procedures and the expansion of conventional retail, which has fewer resources and offers fewer distinctive extra services, is the goal of this technological adaption. Therefore, existing technology should be modified to be simple, compatible, and reliant on technology that people in underdeveloped nations already know and use. The expected performance, which includes improved visibility into higher retail revenue, inventory data, and reduced processing times, can only be achieved with the help of conventional retailers' knowledge of the importance of "task-technology fit" (TTF), strong relationships with technology providers, and their perceptions of their technical competence [20].

However, the research brings forward important aspects of technology changeover in old-fashioned retailers, however, the qualitative character of the research limits the transferring of results to different retail settings with diverse characteristics. Moreover, the use of small samples and technologies specific to the context may also limit the TPC framework's applicability in the quickly modernizing markets to a broader extent.

C. Smart Manufacturing in Fashion Retail

As mentioned by Rahman (2021) the textile industry has recently employed DT, including computer vision, 3D printing, digital printing, and "radio frequency identification" (RFID), more frequently to enhance SC operations and boost customer satisfaction. In addition to lowering product lead times, these technologies aid in sustainability and allow for faster responses to market demand from both producers and retailers. Nevertheless, there is a dearth of literature providing a comprehensive analysis of these technologies' potential uses in textile industry and fashion retail sector. Current publications on the use of 3D printing, digital printing, RFID, and AI in the textile sector are the subject of this study's extensive literature assessment. Studies show that these technologies can increase revenues by decreasing production costs. The writers went on to provide models for the aforementioned innovation that may be used in the fashion and textile sectors [21].

According to Mohammadi and Kalhor (2021) a combination of the ever-increasing need for e-commerce platforms and the lightning-fast development of computer vision, ML, and AI offers tremendous opportunity for FI. This has led to a plethora of research into cutting-edge fashion apps, such as virtual try-ons and fashion synthesis, from universities all around the globe. The rapid development of the area, however, makes it difficult to keep tabs on all of these subfields within a coherent framework. By categorizing 110 articles into different types of assignments and subcategories, this study provides a high-level overview of the subject. To do this, we employ a tabular format that is both user-friendly and instructive. The area is promoted, research directions are provided, and access to relevant studies is made easier using this hierarchical application-based multi-label study classification [22].

Retailers around the globe have been re-evaluating the future of their brick-and-mortar store network in light of growing popularity of omnichannel tactics. The evolution of traditional brick-and-mortar stores into a "smart store," enhanced with a range of digital services, is a viable strategic choice for numerous merchants. If smart store services are to be successful, however, the data used to track products and consumer behavior must be of a high enough quality. The retail FI uses RFID as a technological infrastructure for product tracking. This study uses RFID as an example to explore how ML might improve data quality. They reference automated checkout and electronic item surveillance as viable applications of a classification model which is capable of tracking the movement of products in a store. They derived a complementary model of service operations in such a way that you are able to calculate the individual cost effect to find the economical optimum configuration of the classifier. Thus, the study does not only provide a solution to the use cases, which were studied, but it also suggests a novel and innovative prescriptive analytics approach [23].

Although the research suggests an effective analytical framework formed on ML to help improve the quality of RFID data, it narrows down its scope to controlled use and provides minimal evidence on its effectiveness in real, busy retail settings. The cost-impact model is useful, yet it may not fully capture the complexity and variation of operations of various retail formats in Table I

Table 1: Summary of Key Literature Relevant to Technology Adoption and Operational Efficiency in Fashion Retail

Thematic Area	Key Insights from Literature	Operational Implications	Supporting Studies
Real-Time Inventory Management	RFID, barcode integration, IoT sensors, automated stock-tracking technologies enhance inventory-visibility, curb stockouts and ameliorate the accuracy of replenishment. Advanced ML-based systems and forecasting assist retailers to match their demand and supply effectively.	Higher stock accuracy, lower shrinkage, improved planning, and faster response to customer demand; supports integrated retail operations.	Rahman (2021); Hauser, Flath & Thiesse (2021); Koteswara Rao (2023); Mohammadi & Kalhor (2021)
Warehouse & Distribution Efficiency	Digital warehousing, automation, real-time monitoring of distribution and robotics make the storage more organized, decrease the number of human errors, and make the processes more reliable. The literature singles out the advantages of predictive analytics, coordination at the system-wide level, and digital dashboards.	Reduced distribution costs, faster throughput, improved warehouse productivity, and enhanced supply chain transparency.	Chandani et al. (2024); Isharyani et al. (2024); Hofmann & Rüsch (2017); Büyüközkan & Göçer (2018)
Last-Mile Delivery Technologies	The digital fulfilment systems, real time tracking of deliveries, route optimisation tools and mobile logistics platform increase customer satisfaction and accuracy in deliveries. The use of modern technologies is used to overcome any delays and urban logistic restrictions.	Faster deliveries, improved customer experience, reduced delivery errors, and more efficient transport utilisation.	Zrelli et al. (2024); Chandani et al. (2024); Rahman (2021)
Digital Transformation in Retail	The Indian retail market is changing fast and is becoming more and more digitised, yet is plagued by fragmentation, unequal technology	Highlights need for integrated tech adoption, workforce upskilling, and	Paliwal & Jha (2025); Upadhyay et al. (2024);

Ecosystem	implementation and readiness levels. Adoption barriers and enablers are explained by such frameworks as TPC (Technology People Context) and TTF (Task Technology Fit).	ecosystem-wide digital alignment.	Isharyani et al. (2024)
Human Resource & Organizational Readiness	The availability of skilled labor, the unwillingness to use digital technology, and skill gaps contribute to the technology implementation performance of the retail setting. The adoption speed and operational success depends on the HR capability.	Better training, digital literacy, and organisational support increase efficiency gains from technology.	Kumar et al. (2023); Chandani et al. (2024)
Technology-Driven Operational Performance	Studies consistently show that technology adoption in retail and supply chains leads to measurable improvements in cost efficiency, operational accuracy, responsiveness, and process integration.	Establishes technology as a core driver of operational performance, supporting modern retail competitiveness.	Büyüközkan & Göçer (2018); Hofmann & Rüsch (2017); Hauser, Flath & Thiesse (2021)

III. METHODOLOGY

This section presents the research framework that was employed to study the influence of emerging technologies on operation efficiency within the IFRM. It outlines the research design, sampling method, the selection of participants, data collection methods, and the use of statistics that would be used to warrant reliability and analytical rigor of the study.

A. Research Design

The study employs mixed-method research design which is a combination of quantitative and qualitative data collection methods which are capable of exploring the impact of new age technologies in the field of operations management in the IFRM organizations. This strategy is an illustration of the suggested methodology of the analysis of a balanced combination of numerical results and published literature [24].

B. Population and Sample

Because of its reputation for quickly recruiting fashion RI participants, convenience sampling was the sample method used in this study. In order to ensure statistical dependability and in order to represent a range of the industry opinion, 300 respondents are believed to be an adequate amount of sample in the study. A big but manageable sample was employed in the study to obtain various views about how new technology impacts operational efficiency in IFR.

Researchers targeted the survey to managers, operational personnel, and staff who are in close contact with the fashion retail industry and use or considering technology of AI, IoT, robotics, and GenAI in India. It was limited to those respondents who had prior experience or knowledge of retail processes and were able to communicate in English or any of the approved local languages. Those without operational roles, not being technologists, or sending in their responses after the data collection window had closed were excluded.

C. Data Collection Procedures

Self-developed structured questionnaires were adopted in this study on fashion retail merchandising operations management in India. The participants in the study included customers, merchandisers, shop executives and retail managers. To diversify the respondents within IFRI, they work with a “convenience sample” of 300 participants. Some of the surveys hope to gain insight into the use of AI tools, which are modern advancements in the market. Data collecting is done both online and in person to make it easier for people to take part and get rid of some geographical

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restrictions.

D. Instrumentation

Using a 5-point Likert scale, with 1 representing Strongly Disagree and 5 representing Strongly Agree, data were obtained using a standardized questionnaire. This questionnaire takes into account the following variables:

- Demographic Details of Respondents
- Operational Management Process (Including purchasing, production and distribution).
- Production cost efficiency and waste reduction.
- Distribution cost reduction and warehouse operational efficiency.
- Operation performance efficiency

E. Data Analysis

The statistical package SPSS ("Statistical Packages for the Social Sciences") was utilized for the purpose of "data analysis". In modern statistical analysis, its intuitive graphical user interface has made it a popular tool. Amos and Clementine are only two of the many available add-on modules and packages that expand its functionality [25].

The research utilized a variety of analytical methods to guarantee the data's accuracy and dependability. One of the methods used was Cronbach's Alpha to measure the internal consistency of the questionnaire where a value of 0.70 and above was considered to have acceptable reliability.

Frequency analysis was used to represent the demographic characteristics and response patterns in a way that making it easier to spot the key trends in the data set.

Relationships among the variables were then examined using Spearman's rho correlation a non-parametric technique since the distribution of data was non-normal, which made it possible to evaluate the strength and direction of the associations.

Also, the regression was run to find out how much the independent variables impacted the dependent ones; this allowed us to see how well the technologies could predict the operational and behavioral results. With all these methods together, it has a data interpretation that is both thorough and important.

IV. RESULTS

The results section presents the demographic traits of the participants, the core statistical conclusions on the effect of technology on operational efficiency. As indicated in the reliability test, it has been proved that internal coherence is very solid as the Cronbach's Alpha equals 0.900 in the range of 49 items, which implies that the measurement scale of the research is extremely reliable and robust.

A. Demographic Details of Respondents

The demographic analysis has expounded the key characteristics of the three hundred participants therefore showing their age, sex, qualification, experience, and organizational role. The diversity of the participants makes the findings of the research more reliable in its operational outcomes

TABLE 2: DEMOGRAPHIC PROFILE OF RESPONDENTS

Factors	Category	Frequency	Percent
Age Group (Years)	18-25	54	18
	26-35	112	37.3
	36-45	99	33
	46-55	25	8.3
	56 and above	10	3.3
Gender	Male	153	51

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	Female	90	30
	Non-binary/Prefer not to say	57	19
Occupation	Retail Manager	47	15.7
	Buyer	97	32.3
	Merchandise Planner	94	31.3
	Production Manager	26	8.7
	Supply Chain/Distribution Manager	17	5.7
	Marketing/Sales	8	2.7
	Other	11	3.7
Years of Experience in Fashion Retail	Less than 1	40	13.3
	1-3	120	40
	4-6	91	30.3
	7-10	35	11.7
	More than 10	14	4.7
Type of Company You Work For	Fashion Retailer (Brick & Mortar)	41	13.7
	Fashion Retailer (E-commerce)	93	31
	Manufacturer/Wholesaler	89	29.7
	Distributor	33	11
	Consultant/Service Provider	21	7
	Other	23	7.7
Company Size (Number of employees)	Small (1-50)	37	12.3
	Medium (51-200)	133	44.3
	Large (201-500)	87	29
	Very Large (501+)	43	14.3
Primary Area of Focus in Fashion Retail	Purchasing/Buying	43	14.3
	Production/Manufacturing	118	39.3
	Distribution/Logistics	88	29.3
	Marketing/Sales	23	7.7
	Operations/Management	19	6.3
	Other	9	3

The population composition of the 300 respondents as indicated in the above Table II represents a well-distributed and diversified representation of the workforce in the IFR segment. The majority of the participants are aged between 2635 (37.3) and 3645 (33) which shows that mostly the population is composed of young and mid-career individuals. This is inclusive with the gender composition being 51% men, 30% women, and 19% not specified/prefer not to say. Regarding job roles, buyers (32.3) and merchandise planners (31.3) constitute the biggest group with others being the retail managers and production managers. The majority of respondents (70.3%) have 1 to 6 years industry experience and this will guarantee that they have become acquainted with the working process. The organizational representation is dominated by e-commerce retailers (31%) and manufacturers/wholesalers (29.7) as the structure of the Indian fashion industry is. The biggest category is medium-sized firms (44.3) and the functional areas of the participants were production, distribution, and purchasing, which guarantees a complete range of insights in the functioning, which will be used in the study.

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B. Descriptive Statistics

The descriptive type of analysis provided a detailed description of the respondents in terms of their demographic characteristics and their perceptions of the primary technological aspects influencing the operations in retail. This section of the research summarizes the data as the mean of data and its heterogeneity in order to establish a solid foundation on the next statistical tests.

TABLE 3: DESCRIPTIVE STATISTICS

Factor	Mean	Std. Error	Std. Deviation
Age Group	2.42	.057	.986
Gender	1.68	.045	.774
Occupation	2.79	.083	1.433
Years of Experience in Fashion Retail	2.54	.059	1.016
Type of Company You Work For	2.90	.080	1.390
Company Size	2.45	.051	.885
Real-Time Inventory Management	2.95	.044	.763
Last Mile Delivery Solutions	3.21	.043	.748
Distribution Cost Reduction and Warehouse Operational Efficiency	3.13	.039	.669
Production Efficiency	2.91	.047	.815
Purchasing Efficiency	3.10	.046	.805
Distribution Efficiency	3.10	.054	.949
N = 300			

According to the descriptive statistics presented in Table III of the sample (N = 300), it is possible to state that the characteristics of the participants in the sample and their difference average in relation to demographic and operational variables is moderate. The average for the age group (M = 2.42), and years in the industry (M = 2.54) tells us that the respondents constitute a heterogeneous group in terms of the fashion retail industry. The operational variables reflect the respondents' moderately positive attitudes, among which the highest mean scores are found for the following areas: last-mile delivery solutions (M = 3.21), distribution cost reduction and warehouse efficiency (M = 3.13), and real-time inventory management (M = 2.95), which suggest a consensus on the issue of making efficiency improvements through the use of technology. The standard deviations show that watching respondents' answers closely is commendable, as there is already a good spread in their answers.

The results obtained in this study are in closely related with the research conducted by [26], who also obtained high mean scores for technological effectiveness in the areas of inventory tracking, warehouse automation, and logistics optimization among IF and e-commerce retailers with mean score from 3.0 to 3.3. They claimed that the implementation of technology markedly enhances operational precision and delivery efficacy, a finding corroborated by the current investigation. The report indicates an increasing trend in drone-related logistics and SCM research, underscoring the escalating importance of this technology.

C. Relationship Between Distribution Cost Reduction And Warehouse Operational Efficiency, Real-Time Inventory Management, And Last-Mile Delivery Solutions

This section outlines the correlation study performed to investigate the links among factors related to technology-enabled operational efficiency. The findings emphasize the interconnection of distribution cost reduction, warehouse efficiency, real-time inventory management, and last-mile delivery solutions in fashion retail operations.

TABLE 4: CORRELATION MATRIX OF TECHNOLOGY-ENABLED OPERATIONAL EFFICIENCY VARIABLE

S.N.	Variables	1	2	3
1	Distribution Cost Reduction & Warehouse Efficiency	1.000	0.337**	0.311**
2	Real-Time Inventory Management	0.337**	1.000	0.114*

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3	Last Mile Delivery Solutions	0.311**	0.114*	1.000
Sample Size (N)		300	300	300
** = P-Value = <0.01				
* = P-Value = <0.05				

In Table IV above, the correlation analysis indicates that the reduction of distribution costs and the efficiency of the warehouse have moderate, important relationships with both the real-time inventory management ($r = 0.337$, $p = 0.000$) and the last-mile delivery solutions ($r = 0.311$, $p = 0.000$). There is also a small but significant correlation between real-time inventory management and last-mile delivery ($r = 0.114$, $p = 0.048$). In general, the technology-enabled distribution components are positively linked, which in turn supports the improvement of operational efficiency.

Similarly, Hofmann and Rüsch (2017), through a study, stated that by introducing digital warehouse technologies and real-time tracking systems, there would be a significant increase in inventory accuracy and a decline in distribution costs, thus outlining the connection between warehouse efficiency, inventory visibility, and logistics performance very clearly. Their empirical findings have proved that technology-driven warehouse and delivery systems facilitate the reduction of operational bottlenecks and offer enhanced cost-effectiveness, which is very much in line with the pattern reflected in this study [27].

D. Impact Of Various Technologies On Operational Performance Efficiency

This section examines the impact of various technologies on operational performance efficiency using ordinal regression analysis. It highlights the model fit, explanatory power, and the statistically significant effects of key technological factors on improving efficiency in fashion retail operations.

TABLE 5: MODEL FITTING AND GOODNESS OF FIT

Model / Statistic	-2 Log Likelihood	Chi-Square	df	Sig
Model Fitting Information				
Intercept Only	224.009	–	–	–
Final Model	122.607	101.402	3	0.000
Goodness-of-Fit				
Pearson	–	83.668	105	0.938
Deviance	–	64.979	105	0.999

The data used to fit the models in the ordinal regression investigation is displayed in Table V. The addition of the predictor variables significantly improved the model fit by lowering the "-2 Log Likelihood value" from 224.009 (the "intercept-only model") to 122.607 (the final model). The statistically significant ($p = .000$) "Chi-Square value" of 101.402 with three degrees of freedom indicates that the final model fits the data much better than the "intercept-only model."

The fit statistics for the "ordinal regression model" are displayed in the Goodness-of-Fit Table. The "Pearson Chi-Square value" is 83.668 with 105 df ($p = .938$), while the deviation value is 64.979 with 105 df ($p = .999$). These two numbers are not noteworthy.

TABLE 6: PSEUDO R-SQUARE

Cox and Snell	.287
Nagelkerke	.347
McFadden	.193

The "pseudo-R-squared values" for the "ordinal regression model," which show the model's explanatory strength, are shown in Table VI above. "Cox and Snell," "Niekerk," and "McFadden" had R2 values of 287.347 and.193, respectively. The "Niekerk R2" indicates that the predictors in the model explain around 34.7% of the variation in the dependent variable, indicating a respectable level of model fit

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TABLE 7: PARAMETER ESTIMATES

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	*Upper Bound*
Threshold	[OPE = 1.00]	2.648	1.320	4.023	1	.045	.060	5.235
	[OPE = 2.00]	6.004	.935	41.245	1	.000	4.172	7.836
	[OPE = 3.00]	10.694	1.061	101.528	1	.000	8.614	12.774
	[OPE = 4.00]	13.256	1.261	110.531	1	.000	10.784	15.727
Location	Production Efficiency	1.069	.248	18.531	1	.000	.582	1.556
	Purchasing Efficiency	1.014	.267	14.458	1	.000	.491	1.536
	Distribution Efficiency	.767	.264	8.407	1	.004	.248	1.285

The above Table VII, parameter estimate reveals significant impacts of various technologies on operational performance efficiency. The results show that all three technological factors—Production Efficiency ($p = 0.000$), Purchasing Efficiency ($p = 0.000$), and Distribution Efficiency ($p = 0.004$)—demonstrate statistically significant positive effects on operational performance efficiency, as shown by their p-values being less than 0.05. Production Efficiency has the strongest effect with an estimate of 1.069, followed by Purchasing Efficiency (estimate = 1.014) and Distribution Efficiency (estimate = 0.767). The evidence suggests that different technologies have a considerable impact on operational performance efficiency, as all technical parameters have statistically significant effects ($p < 0.05$).

But as demonstrated by Šyüközkan and Göçer (2018), the supply chain's accuracy, responsiveness, and cost-effectiveness might be significantly improved by using DT features like automation, advanced planning, and real-time tracking. The results also showed that technology-supported operations consistently improve the organization's performance, which is consistent with the main parameter estimations in this study. The results' consistency suggests that, when it comes to increasing operational efficiency in retail settings, technology adoption is unquestionable and objectively evaluated [28].

V. DISCUSSION

The results presented in the study indicate a positive, significant relationship between technology-enabled practices (real-time inventory management, warehouse/distribution efficiencies, and last-mile delivery solutions) and changes in operational performance, particularly, decrease in distribution cost and efficiency in a warehouse. The moderate correlations between real-time inventory management and warehouse/distribution efficiency between the last-mile delivery solutions and warehouse/distribution efficiency) confirm the hypothesis that these technological aspects have co-operations to improve the overall effectiveness of operations.

These results are in line with and support previous research regarding the beneficial effects of digital transformation on SC and warehouse operations [29][30]. On a case-by-case basis, the empirical data pertaining to the use of RFID and IoT-based tracking demonstrates that real-time inventory level monitoring, automated monitoring, and fewer manual errors can significantly improve warehouse productivity, order delivery speed, and inventory management accuracy [31][32].

On the same note, systematic reviews of Industry 4.0 warehouse implementations indicate that the combination of technologies, including RFID, IoT, and automation helps to save money, improve flexibility, and efficiency of processes [33].

To put it more realistically, the increase in average scores of the last-mile delivery solutions and warehouse efficiency in the dataset corresponds to the general benefits outlined in previous research-studies, namely, expedited order processing, reduction of shipping mistakes, and enhanced delivery systems. These dimensions are imperative in the retail of fashions where the volatility of demand, the urgency of styles and the demand of speed and trustworthiness among consumers are high. The interplay between reduction of distribution costs, real-time monitoring of inventory and last-mile logistics implies that in the case retailers embrace an integrated technology stack (instead of a dissimilar platform) they can achieve greater efficiency benefits.

Further, the research builds on the present body of literature by offering empirical data on the situation of IFRM, a situation in which unorganized retail, discontinuous supply chains, and differences in technology readiness present unique challenges to technology implementation. By demonstrating statistically significant correlations between technology and operational efficacy variables, the study confirms the conceptual assumption that digital solutions are not optional additions to operations, but are operational excellence facilitators in the situation of emerging-market retailing.

According to these findings, fashion retailers in India might consider fully investing in inventory management system, automation of the warehouse, and logistics systems. The latter investments could be employed to reorganize the fragmented and labor-intensive supply chains into data-driven and agile operations that would respond to the modern demands of the customers and competitive pressures.

VI. CONCLUSION

The findings made in this paper collectively have revealed that in fashion retail market, technology has enormous and positive impact on efficiency of operations. The descriptive findings indicate that the respondents maintain a stable and positive attitude towards the use of digital tools in the task to make the operations more efficient, and the largest support is provided to the key processes including the last-mile delivery, warehouse efficiency, and real-time tracking of the inventory. This is a pointer of a sector that not only is considering the implementation of technology as an outcome but also as a clear channel of obtaining accuracy, speed, and cost reduction within the supply chain. This argument has also been supported by the correlation analysis that has shown that there are strong interrelationships between the various key components of the technology that means that these systems are operating as interconnected and not disconnected mechanisms and therefore combine to influence better integration of workflow and operational speed.

The operations provided by the sophisticated statistical methods and the analysis of the information have supported the initial findings and proved that the operational performance is strongly positively and statistically significantly influenced by technology-based interventions. The goodness of fit indicators and estimates of the parameters confirm the fact that digital solutions are directly engaged in the process of organizational efficiency improvement, which prompts further evidence of modern research in SC and retail management. Overall, the results affirm that the introduction of technology has become one of the primary elements of performance enhancement in fashion retail operations, therefore offering strong empirical evidence that digital transformation is not a side role but it is a core facilitator of performance excellence across the industry.

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