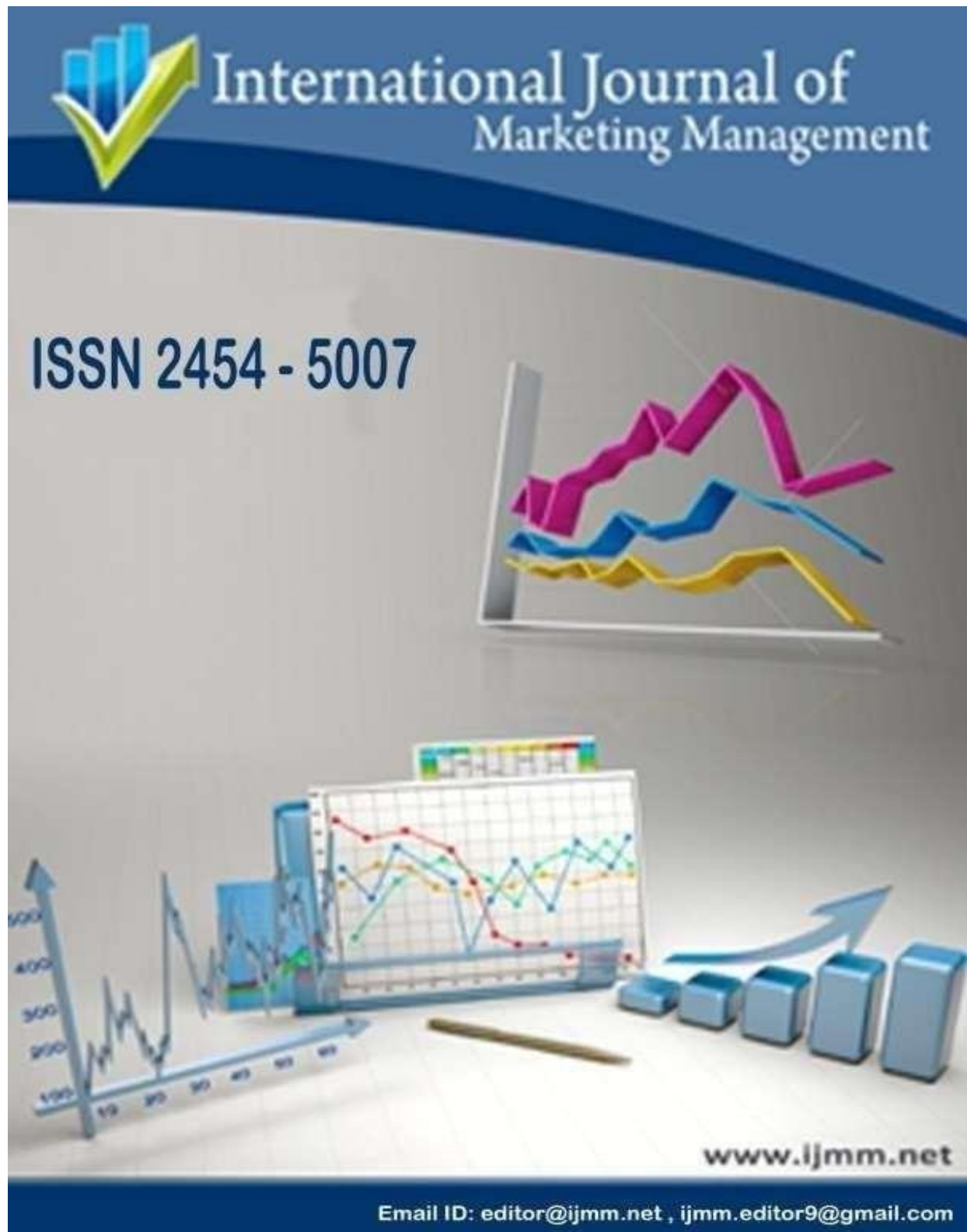




OPTIMIZING E-COMMERCE RETURNS - THE TECHNOLOGICAL LINK BETWEEN REVERSE LOGISTICS AND CUSTOMER EXPERIENCE By Dr.

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ABSTRACT

The rapid expansion of e-commerce necessitates highly efficient reverse logistics processes to manage product returns and exchanges effectively. This study investigates the critical role of technology-enabled systems—specifically tracking tools, dedicated return portals, and AI-based approval mechanisms—in enhancing the efficiency of reverse logistics operations within the e-commerce sector. Furthermore, it analyzes the direct influence of this enhanced reverse logistics efficiency on overall consumer satisfaction with the online shopping experience. A survey was conducted with 267 respondents located in Coimbatore, Tamil Nadu, who are active online shoppers. The data collected was analyzed using a combination of descriptive statistics (mean, ranking), ANOVA, and t-tests to determine the relationship between technology adoption in returns management and perceived service quality, as well as the subsequent impact on customer satisfaction. The

findings aim to provide e-commerce businesses with actionable insights into leveraging technological advancements to streamline their returns process, ultimately transforming a potential pain point into a competitive advantage that fosters greater customer loyalty and improves the overall shopping experience.

KEY WORDS

Reverse Logistics, Supply Chain Management, Technology-Enabled Systems, Artificial Intelligence (AI), E-commerce, Customer Satisfaction, Sustainability, Product Returns

INTRODUCTION

Reverse logistics is a crucial aspect of reverse supply chain management and has become an integral component of modern supply chains". Reverse logistics has emerged as a crucial dimension of modern supply chain management, focusing on the backward flow of goods from customers back to manufacturers, distributors, or recyclers. Unlike traditional forward logistics, which

emphasizes product movement toward the end consumer, reverse logistics deals with product returns, repairs, remanufacturing, recycling, and proper disposal. With rising customer expectations, shorter product life cycles, and the global emphasis on sustainability, efficient reverse logistics has become a competitive necessity rather than an optional process

STATEMENT OF THE PROBLEM

The significant growth of e-commerce has made reverse logistics a costly and customer-impacting challenge, where inefficient processes erode profitability and consumer satisfaction. While technologies like tracking tools, return portals, and AI-based approvals are available, this study addresses the empirical gap concerning their precise role in enhancing the efficiency of reverse logistics, and the subsequent quantifiable extent to which this technological efficiency directly influences and improves the overall consumer satisfaction with online shopping experiences. The problem is that without this specific understanding, e-commerce businesses cannot strategically invest in the most impactful technological solutions to transform returns from a pain point into a competitive

advantage.

OBJECTIVES

- To assess the role of technology-enabled systems (such as tracking tools, return portals, and AI-based approvals) in enhancing the efficiency of reverse logistics in e-commerce.
- To analyze the influence of reverse logistics efficiency on overall consumer satisfaction with online shopping experiences.

NEED OF THE STUDY

With the increasing financial independence and participation of women in the workforce, understanding their investment behaviour and strategies has become essential. Research has shown that women investors tend to have different risk tolerance, financial goals, and investment horizons compared to their male counterparts. However, there is a lack of comprehensive studies focusing specifically on women's investment strategies in mutual funds. This knowledge gap needs to be addressed to better understand how women make investment decisions, what factors influence their choices, and how

financial institutions can tailor their products and services to meet their needs. By exploring the investment strategies of women in mutual funds, this study aims to provide valuable insights for financial professionals, policymakers, and women investors themselves, ultimately contributing to more informed investment decisions and improved financial well-being.

RESEARCH METHODOLOGY

- 1 Area of study Coimbatore, Tamilnadu
- 2 Sample size 267 respondents
- 3 Sampling method Simple random sampling
- 4 Data collection Primary data and secondary data
- 5 Period of study July 2025 – September 2025
- 6 Analysis Tools Simple percentage analysis, Descriptive Statistics, Mean Ranking, ANOVA, t-Test

LIMITATIONS OF THE STUDY

The sample of this study has been restricted to 267 respondents. This study is purely based on the information supplied by the respondents in Coimbatore district. The findings of the study are not applicable to any other area.

REVIEW OF LITERATURE

Rupesh Kumar Tiwari (2013)⁴, in his study conducted in India, examined the

dimensions of reverse logistics performance, its drivers, and their implications for customer satisfaction. Although the sample size and sampling technique were not specified, the research applied factor analysis, ANOVA, and multiple regression using SPSS-19. The findings indicated that reverse logistics significantly enhances customer satisfaction and competitive advantage, offering benefits such as improved customer retention, reduced acquisition costs, better responsiveness, and stronger emotional connections with customers. Strategic and operational factors, including cost-benefit considerations, remanufacturing, and recycling, were found to influence performance. The study concluded that reverse logistics serves as a strategic tool for achieving total customer satisfaction and improving competitive performance, and recommended that organizations invest in it to enhance efficiency, loyalty, and market differentiation.

Globally, the StartUs Insights Team (2025)²⁹ analyzed 584 startups to identify emerging technology trends and innovations in reverse logistics. Using a startup database analysis, the study highlighted key technologies such as robotics, return portals, predictive analytics, and re-commerce platforms. Findings showed that automation, re-commerce, and fraud detection are

driving improvements in reverse logistics efficiency and enhancing the customer experience. The team concluded that

tech-driven reverse logistics strategies can

ANALYSIS AND INTERPRETATION

PERCENTAGE ANALYSIS

Demographic profile of the Respondents

Table 1

Demographic profile of the consumer respondents

Demographic Profiles	Particulars	Number of Respondents	Percentage (%)
Age	Below 20	112	41.9
	21 – 30	84	31.5
	31 – 40	31	11.6
	41 – 50	30	11.2
	Above 50	10	3.7
	Total	267	100.0
Gender	Male	89	33.3
	Female	174	65.2
	Prefer Not to Say	4	1.5
	Total	267	100.0

Educational Qualification	School	32	12.0
	Undergraduate	178	66.7
	Postgraduate	46	17.2
	Doctorate	11	4.1
	Total	267	100.0
Occupational Status	Student	160	59.9
	Working Professional	65	24.3
	Business	22	8.2
	Homemaker	20	7.5
	Total	267	100.0
Marital Status	Married	78	29.2
	Unmarried	189	70.8
	Total	267	100.0
Types of family	Nuclear Family	188	70.4
	Joint Family	79	29.6

	Total	267	100.0
Number of earning members in family	1	104	39.0
	2	95	35.6
	3	25	9.4
	Above 4	43	16.0
	Total	267	100.0
Family Monthly Income	Below ₹ 10,000	13	4.9
	₹ 10,000 - ₹ 30,000	39	14.6
	₹ 30,000 - ₹ 50,000	77	28.8
	₹ 50,000 - ₹ 1,00,000	78	29.2
	Above ₹ 1,00,000	60	22.5
	Total	267	100.0
Residential Status	Rural	68	25.5
	Semi Urban	112	41.9
	Urban	87	32.6

	Total	267	100.0
Frequency of Online Shopping	Rarely	70	26.2
	Occasionally	105	39.3
	Monthly	59	22.1
	Weekly	24	9.0
	Frequently	9	3.4
	Total	267	100.0

(Source: Computed)

- 41.9% of the respondents belong to the age group Below 20.
- 29.2% of the respondents are married.
- 66.7% of the respondents are Undergraduate degree holders (closest to Bachelor degree holders).
- 40.1% of the respondents are in non-student occupations (Working Professional, Business, and Homemaker).
- 32.6% of the respondents are located in Urban areas.
- 70.4% of the respondents belong to a Nuclear Family.
- 35.6% of the respondents are in families with two earning members.
- 28.8% of the respondents are having a family monthly income level between ₹ 30,000 and ₹ 50,000 per month.

DESCRIPTIVE STATISTICS

References and information search regarding returning process in e- Commerce

TABLE 2**References and information search regarding returning process in e- Commerce**

Statement	N		Mean		S.D
The return process on e-commerce platforms is easy to understand and follow.	26 7	1.00	5.00		9 90
The time taken to process a return and receive a refund is reasonable.	26 7	1.00	5.00		8 86
The return policy was clearly mentioned on the product page before purchase.	26 7	1.00	5.00		4 .9482
I received timely updates (SMS/email/app) regarding the status of my return.	26 7	1.00	5.00		8 .9930
Customer service was helpful and responsive during the return process.	26 7	1.00	5.00		8 79
I was able to initiate a return without needing to speak to a representative.	26 7	1.00	5.00		8 85
The packaging and pickup of returned products were handled efficiently.	26 7	1.00	5.00		8 58
I feel confident returning products on most e commerce platforms.	26 7	1.00	5.00		9 21

I have rarely faced issues or delays while returning products online.	26 7	1.00	5.00		2 48
My overall experience with returning products online has been satisfactory	26 7	1.00	5.00		6 76

(Source: Computed)

From Table 2, it is evident from the mean ratings that most of experiences with returning products on e-commerce platforms are led by “Customer service was helpful and responsive during the return process” (mean 3.5318), followed by “I received timely updates (SMS/email/app) regarding the status of my return” (mean 3.3708), “I was able to initiate a return without needing to speak to a representative” (mean 3.3258), and “The packaging and pickup of returned products were handled efficiently” (mean 3.3258). Other factors such as “The return policy was clearly mentioned on the product page before purchase” (mean 3.2434), and “The time taken to process a return and receive a refund is reasonable” (mean 2.7753) were rated moderately, while “The return process on e-commerce platforms is easy to understand and follow” received the lowest mean score (2.4719). Consequently, the higher mean ranking indicates that “customer service responsiveness” plays the most significant role in shaping consumer satisfaction with the return process in e-commerce.

ANOVA

Agreeability score of the respondents towards the experience with Returning Products on e-Commerce Platforms

TABLE 3

Agreeability score of the respondents towards the experience with Returning Products on e-Commerce Platforms

Demograph ic Profiles	Groups	Agreeability score of the respondents towards the experience with Returning Products on e-Commerce Platforms					
		N	Mean	SD	F-Value	Sig. Value	S/NS

Age	Below 20	112	3.0750	.66271	2.391	.051	NS
	21-30	84	3.2798	.74974			
	31-40	31	2.8710	.76820			
	41-50	30	3.2300	.75208			
	Above 50	10	2.9900	.46296			
Gender	Male	89	3.1944	.77274	.658	.519	NS
	Female	174	3.1017	.69244			
Educationa l qualificatio n	School	32	3.1031	.09635	.603	.613	NS
	Undergraduate	178	3.1601	.05363			
	Postgraduate	46	3.0913	.12288			
	Doctorate	11	2.8818	.19625			
Occupation al status	Student	160	3.0756	.66112	1.394	.245	NS
	Working professional	65	3.2862	.77134			
	Business	22	3.1182	.85280			
	Homemaker	20	3.0700	.76989			

Marital status	Married	77	3.0662	.80404	.451	.638	NS
	Unmarried	189	3.1566	.67888			
Type of f		187	3.1556	.76187	.404	.668	NS
	Joint Family	79	3.0709	.59768			
No. of earnings members in the family	0	2	3.5000	.70711	1.059	.393	NS
	1	102	3.1990	.65936			
	2	95	3.1221	.79989			
	3	25	3.0800	.55076			
	4	26	2.9692	.77499			
	5	12	3.2167	.50242			
	6	2	3.2000	.28284			
	7	2	2.0500	1.4849 2			
	10	1	2.5000	.			
Family monthly income	Below 10000	13	3.1923	.35228	.415	.798	NS
	10,001- 30000	39	3.0615	.68886			

	30,001-50000	77	3.0727	.76531			
	50,001-100000	78	3.1974	.64847			
	Above 100000	60	3.1467	.81271			
Residential Status	Rural	68	3.2471	.66724	3.137	.045	S
	Semi-Rural	112	3.0036	.66616			
	Urban	87	3.2011	.79233			

(Source: Computed)

ANOVA has been used to test whether the agreeability scores on challenges encountered while investing in mutual funds have differed significantly among the respondents classified based on demographic profile. The agreeability score of the respondents have no significant difference on key attributes on Challenges encountered while investing in mutual funds when classified based on age, educational qualification and occupational status. And the agreeability score of the respondents have a significant difference on key attributes on Challenges encountered while investing in mutual funds when classified based on area of residence, number of earning members of the family and family monthly income.

MEAN RANKING

Satisfaction level with return process in e-Commerce**TABLE 4**

Satisfaction level with return process in e-Commerce			
Particulars	N	Mean	Rank
Speed of refund	267	2.0449	5
Ease of return process	267	2.5094	4
Clear return policies	267	3.0225	3
Customer support	267	3.5019	2
Real-Time tracking updates	267	3.9213	1

(Source: Computed)

From Table 4, – It is evident from the mean ranking that the most satisfying factor in the return process is “**Real-Time tracking updates**” (mean 3.9213), followed by “**Customer support**” (mean 3.5019), “**Clear return policies**” (mean 3.0225), and “**Ease of return process**” (mean 2.5094). The factor with the lowest mean score is “**Speed of refund**” (mean 2.0449). Hence, it can be determined that **real-time tracking updates** play the most significant role in ensuring consumer satisfaction with the return process, while the speed of refund remains the least satisfying factor.

t-TEST

Agreeability score of the respondents towards the Experience with returning products of E-Commerce platforms

TABLE 5

Agreeability score of the respondents towards the Experience with returning products

of E-Commerce platforms

Demographic profiles	Groups	Agreeability score of the respondents towards the Experience with returning products of E-Commerce platforms					
		N	Mean	SD	t-value	Sig. Value	S/NS
Marital Status	Married	77	3.0662	.80404	-.932	.352	NS
	Unmarried	189	3.1566	.67888			
Type of family	Nuclear family	187	3.1556	.76187	.880	.379	NS
	Joint family	79	3.0709	.59768			

(Source: Computed)

The results of the t-test indicate that there is no significant difference in the agreeability scores concerning the challenges encountered while investing in mutual funds the demographic profiles of marital status and type of family. This means that when comparing the average agreeability scores of different marital status (married and unmarried) or family types (nuclear and joint), the differences in these scores are not statistically significant. The findings from the t-test reveal that marital status and type of family do not significantly influence challenges encountered while investing in

mutual funds. These results suggest that Challenges encountered while investing in mutual funds are broadly shared across these demographic groups.

SUGGESTIONS

- Operationalize "efficiency" using respondent perceptions related to key time and effort factors. Use metrics such as **Total Return Cycle Time** (time from initiation to resolution), **Effort Required** (perceived ease of the process), and

Clarity/Transparency

(knowing the status at all times). These perceived efficiency scores will serve as the crucial intermediate variable linking technology to satisfaction. Addressing common issues with mutual funds for women by promoting fee transparency and educational resources on fee structures, advocate for low-cost investment options, and encourage regular portfolio reviews. Additionally, provide access to expert advice and create community platforms for women to share experiences, empowering them to navigate challenges like high fees and poor performance effectively.

- Instead of relying solely on "overall consumer satisfaction," measure three distinct components that the returns process impacts: **Transaction-Specific Satisfaction** (satisfaction with the current return), **Trust in the Retailer** (long-term relational outcome), and **Future Behavioral Intentions** (likelihood of repurchase and positive word-of-mouth). This provides a comprehensive view of the customer experience.

CONCLUSION

The study reveals a strong, consistent consumer preference for transparent, technology driven return processes in e-commerce, with automated refund systems and real-time tracking being the most highly valued technologies that build shopping confidence. However, this preference is challenged by critical operational pain points, including the prevalent lack of clear and consistent return policies, poor coordination between logistics parties, and significant delays in approval and refund processing. Overall, while consumers' perceptions of both the technological benefits and the operational challenges are broadly uniform across most demographics (like age, gender, and residential status), the analysis uniquely identifies family monthly income as a significant factor influencing a respondent's agreement with the benefits of transparent, tech-enabled returns. Consequently, to create a more trustworthy and efficient e-commerce environment, retailers must strategically focus their investment on implementing standardized policies and automation technologies to ensure transparency and consistency in the reverse logistics process.

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