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A THEORETICAL FRAMEWORK FOR EVALUATING RETURNS MANAGEMENT PERFORMANCE OF ONLINE RETAILERS USING FUZZY ANALYTIC HIERARCHY PROCESS

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Abstract

Purpose- The purpose of the study is to propose a framework to measure the returns management performance of online retailers.

Design/methodology/approach- To assess its performance, returns management's key components are identified. The FAHP approach uses calculated weights to prioritize the criteria and assess performance. When evaluating the performance, the score is determined by the subjective weights of the criteria. Sixteen professionals who work with Indian online retailers in the apparel and footwear sectors provided the data.

Findings- The findings indicate that value orientation, general capabilities, reverse logistics capabilities, and strategic management are critical elements in returns management. The most important variables in evaluating returns management success are general capabilities. Online retailers' returns management performance can be improved by focusing on general and reverse logistics capabilities.

Research limitations/implications- A few elements impacting how effectively online retailers manage returns may need to be included in the framework. The returns management performance may have been affected by the covid-19 pandemic because the study's data were gathered during the pandemic.

Practical implications- The study gives a robust framework to evaluate the returns management performance in the internet retailing of apparel and footwear.

Originality- Evaluation of returns management performance in online retailing is scarce. The study provides a framework for performance assessing returns management in online retailing using the FAHP methodology.

Keywords- Returns management performance, online retailers, fuzzy analytic hierarchy process.

Paper type- Research paper

Introduction

Reverse logistics has grown in importance in emerging economies recently. Since its inception, reverse logistics has been essential to practically all enterprises (Pandian and Abdul-Kader, 2017). Reverse logistics return goods for reuse, recycling, or disposal (Ebenezer and Zhuo, 2019). Because it depletes all organizational resources, the reverse flow of products and materials must be adequately managed (Georgiadis and Vlachos, 2004). Reverse flow is a retail-oriented return in the conventional supply chain, but it involves more than merely returning the item (Ahsan and Rahman, 2016). Due to the lower profit margin for retailers, the reverse flow of materials affects them more than manufacturers. Customers can purchase

products online, test them out, and then return them if unsatisfied (Mukhopadhyay and Setoputro, 2004).

Due to product overstock, returns are made by customers to retailers or retailers to manufacturers (Lee et al., 2012). Internet retailers use flexible and liberal return policies that encourage customers to place larger-than-necessary orders (Schrotenboer et al., 2017). The volume of returns increases as a result of this circumstance. Due to pandemic restrictions after the COVID-19 pandemic, most businesses shifted online. E-commerce companies have been practicing returns management despite its challenges. According to Global Web Index (2019), the most frequently returned product categories are clothing and footwear, with 56% of all returns occurring via e-commerce. Although the perceived product may differ from the real goods, returns in the apparel and footwear categories are trickier than in other categories (Walsh and Brylla, 2017). Customers experience post-purchase dissonance due to the disparity between the perceived and actual products, which may result in dissatisfaction (Walsh and Brylla, 2017; Seo et al., 2016). The dissatisfied customer returns the product and changes their preferred online retailer, adversely affecting them. So, online retailers must have efficient supply chain management to retain their customers. While many other industries have implemented performance measures for returns management, performance assessment still needs to be improved in the e-commerce industry. Performance in returns management may be significantly associated with business performance. Consequently, the key to sustainable development is creating a sustainable firm through an effective system for managing product returns (Thaba, 2017).

Returns management can boost the company's visibility and profitability at a lesser cost (Chiou et al., 2012). Economic, environmental, and social factors affect how a company manages its returns (Agrawal et al., 2015). An adequately managed reverse flow can resolve all the issues with product returns. Online retailers have many challenges regarding returns management, one of which remains to improve returns management performance (Pandian and Abdul-Kader, 2017). Returns management benefits the parties involved, like the customer, retailer, or manufacturer. It offers satisfaction to customers and sustainability to retailers and manufacturers (Abdullah and Yaakub, 2014). Academicians and industry professionals have explored various sectors' returns management performance measures, but e-commerce remains untouched. The current study aims to identify returns management performance-affecting aspects and provide a theoretical framework for performance assessment.

Review of literature

The effectiveness of return management is influenced by a variety of factors that enhance business performance. In the interest of competition, various firms try to increase productivity and efficiency in returns management (Chinda and Ammarapala, 2015). To achieve productivity and efficiency, business processes must be carefully managed. Return management is one of the most important operations to focus on for sustainability. Online business returns management deals with challenges pertaining to competition, the environment, society, and the economy (Neto et al., 2018). Wider distribution channels and networks are required for returns management in e-commerce in order to increase profitability (Biswas and Abdul-Kader, 2018). Online merchants face fierce competition, and the increased customer expectations in return management lower their visibility and profitability (Walsh et al., 2014).

The majority of the decision-making in the firms' reverse supply chain is still based on returns management, which is still an essential and crucial element (Rubio and Jimenez-Parra, 2014). Online retailers include returns management decision-making in their competitive strategy to achieve operational excellence (Larsen et al., 2018). To increase the sustainability of the company, the returns management process involves controlling the returned goods (Chan, 2010). Due to their lack of expertise, retailers were hesitant to spend resources on returns management (Krumwiede and Sheu, 2002). Due to the rise of e-commerce and the availability of liberal return policies, returns have become a daily occurrence for online retailers (Zaarour et al., 2014). Sustainability and value creation are crucial to controlling returns and gaining a competitive edge (Ye and Zhenhua, 2014).

Returns management performance

Performance in returns management includes environmental effects, profitability, and sales growth, which may improve business performance (Khor and Udin, 2012). To maintain the customers ' interest returns management reintroduces the product into the same channel in the opposite direction (Rogers and Tibben-Lembke, 1999). All retailers' operations, performance, and productivity are impacted by returns management (Fernández and Rajagopal, 2018). Wise return management lowers return expenses and enhances the company's reputation (Li G and Li W, 2015). Value orientation, general and reverse logistics capabilities, and strategic management are all impacted by returns management performance (Larsen et al., 2018). Recognizing and measuring returns management performance is essential for evaluating business performance. The factors affecting them are depicted in the below Figure I.

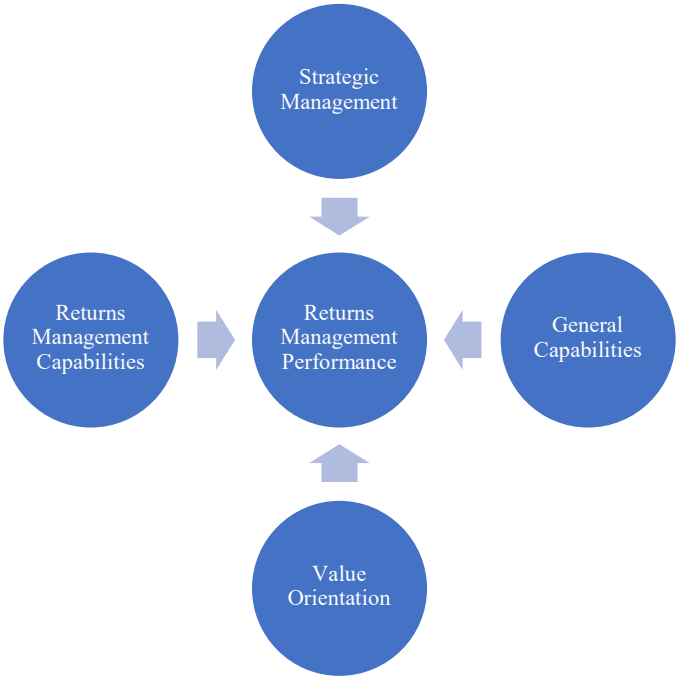

Figure I- Factors affecting returns management performance

The performance evaluation factors determine the overall returns management performance (Chiou et al., 2012). Businesses must now place greater emphasis on social and environmental responsibilities in order to be sustainable (Mills, 2007). All of these variables affect the performance of the entire business. Since that reverse logistics' beginning point differs from forward flow's, reverse logistics may prove to be more difficult (Dowlatshahi, 2012). Due to product returns' environmental and social responsibility, returns management has integrated into sustainable development (Prakash and Barua, 2016). Evaluation of returns management performance benefits from analysis of general and reverse logistics capabilities. Managing products strategically enhances the company's performance (Agrawal et al., 2018).

To compete effectively, online merchants integrate returns management into their business strategies (Daher et al., 2006). Closed-loop supply chain management improves returns management productivity and enhances business performance (Herbert-Hansen, 2019). Lean management, various inventory management strategies, and other methods could be used to improve returns management performance (Abdul-Kader et al., 2015). Returns management is customer-oriented. Online retailers strive to balance the company's capabilities and customer expectations (Chen J and Chen B, 2015). An efficient returns process acquires the product from the customer for resale, reuse, or disposal (Baz et al., 2017). The firm's overall capabilities include elements that directly impact the efficiency of returns management. Returns management capabilities can help gain a competitive edge over competitors (Larsen et al., 2018). The efficiency of returns management can be improved by focusing on the value chain. To get a competitive advantage, the strategic goal must align with the company's returns strategy (Dowlatshahi, 2005). The performance of returns management is influenced by the firm's strategic management, value orientation, general capabilities, and reverse logistics capabilities. The performance of returns management is impacted by the variables listed in the following Table I, along with their sources.

Sr. No.	Main-criterion	Sub-criterion	References
1.	General capabilities	Low working capital requirement	Larsen *et al.* (2018), Prakash *et al.* (2015), Prakash and Barua (2016)
		Reduced inventory investment	
		Higher product quality and innovation	
2.	Reverse logistics capabilities	Customer orientation	Larsen *et al.* (2018), Ilgin M. A. (2017), Prakash *et al.* (2015), Jack *et al.* (2009)
		Resource Commitments	

		Contractual Arrangements	
3.	Value Orientation	Market Performance	Larsen *et al.* (2018), Ilgin M. A. (2017), Biswas and Abdul-Kader (2018), Prakash *et al.* (2015), Prakash and Barua (2016), Daher *et al.* (2006)
		Higher service level-warranty, responsiveness, returns policy.	
		Collaborating with supply chain members	
		Allocate adequate resources to RL programs	
4.	Strategic Management	Customer retention	Larsen *et al.* (2018), Prakash *et al.* (2015), Daher *et al.* (2006)
		Improved profitability	
		Cost leadership, focus, differentiation	

Table I- Criteria and sub-criteria used for the study

Hypotheses development

The significant criteria's influence on the effectiveness of returns management is what leads to the formulation of the hypotheses. Numerous aspects influence performance in returns management. These elements include strategic advantage, value orientation, general capabilities, and reverse logistics capabilities. The fuzzy analytic hierarchy method calculates the weights and is the statistical tool employed for the analysis. The element with the highest weighting value will be the most prominent one.

H1: General capabilities have the highest impact on returns management performance.

H2: Reverse logistics capabilities have the highest impact on returns management performance

H3: Value orientation has the highest impact on returns management performance

H4: Strategic advantage has the highest impact on returns management performance

Research methodology

The fuzzy analytical hierarchy method has been used as the statistical technique to identify the critical components of the returns management process and assess its effectiveness. The data

was collected from 16 experts who work for Indian online retailers in the apparel and footwear sectors. The research methodology has explained in Figure II.

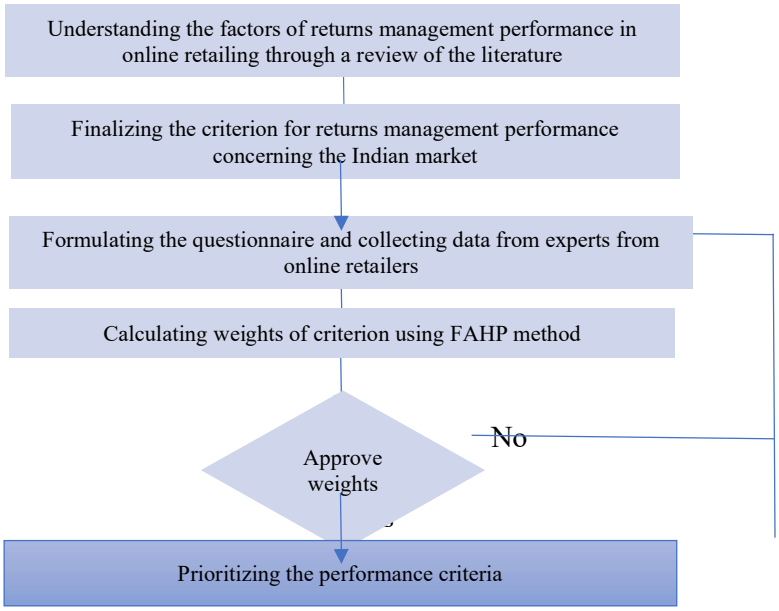

Figure II. Research methodology

Analytical hierarchy process:

Saaty developed AHP in 1980 as a multi-criteria decision-making tool. The analytical hierarchy method transforms the problem into a level of objectives, criteria, and alternatives. To determine a factor's weight, it measures how dominant a component is relative to others. AHP has limitations because of uncertainty and ambiguous topic matter, yet it can measure concrete and intangible attributes.

Fuzzy Theory:

Zadeh introduced the fuzzy analytic hierarchy process in 1965. The vagueness of human thoughts has represented by this theory. Fuzzy logic is the extension of Boolean logic. The Boolean logic has two truth values are; truth (1) and false (0). However, sometimes, partial truth is addressed by fuzzy logic using the intermediate values between 1 and 0. The scale of fuzzy numbers with their linguistic meaning is explained in Table II.

Table II- Scale of fuzzy number

Fuzzy Number	Linguistic	The scale of fuzzy number
1	Equal Priority	(1,1,1)
2	Intermediate	(1,2,3)
3	Moderate Priority	(2,3,4)
4	Intermediate	(3,4,5)
5	Strong Priority	(4,5,6)
6	Intermediate	(5,6,7)
7	Very Strong Priority	(6,7,8)
8	Intermediate	(7,8,9)
9	Extreme Priority	(8,9,10)

Fuzzy sets and fuzzy numbers:

The elements in fuzzy sets have degrees of membership. We can define the fuzzy set as follows,

$\forall_x \in X, f_A(x) \in [0,1]$

Where x is a space of points, A is a fuzzy set defined in x, and $f_A(x)$ is a membership function in the interval $(0,1)$

$$f_A(x) = \begin{cases} 0, & x < a_1 \\ ((x-a_1)/(a_2-a_1)), & a_1 \le x \le a_2 \\ (a_3-x)/(a_3-a_2), & a_2 \le x \le a_3 \\ 0, & x > a_3 \end{cases}$$

Several defuzzification methods convert the triangular fuzzy number into a real crisp number. Defuzzification (Q)can be calculated using the center of area method. The formula is as below (Ilgin and Gupta, 2012)

$$Q = \frac{(a_3 - a_2) + (a_2 - a_1)}{3} + a_1$$

Basic operations on triangular fuzzy numbers (Chan *et al.*, 2003) are as follows ($A = (a1, a2, a3)$ and $B = (b1, b2, b3)$),

Addition operation: $A + B = (a_1 + b_1, a_2 + b_2, a_3 + b_3)$

Subtraction operation: $A - B = (a_1 - b_3, a_2 - b_2, a_3 - b_1)$

Multiplication operation: $A \otimes B = (a_1 b_1, a_2 b_2, a_3 b_3)$

Division operation: $\frac{A}{B} = \left(\frac{a_1}{b_3}, \frac{a_2}{b_2}, \frac{a_3}{b_1}\right)$

Inversion operation: $A^{-1} = \left(\frac{1}{a_3}, \frac{1}{a_2}, \frac{1}{a_1}\right)$

Fuzzy AHP:

AHP cannot be applicable in a few cases due to uncertainty and an unstable judgment scale. Fuzzy logic is applied to eliminate those restrictions of AHP FAHP is an extended methodology of AHP that helps in uncertain and subjective decision-making. The steps to calculate weight using FAHP are as follows (Sun, 2010),

Step 1: Construct the pairwise comparison matrices for all the criteria for the hierarchy system and then assign the linguistic terms to the pairwise comparisons asking which factor is prominent between the two.

$$\tilde{A} = \left(\begin{pmatrix} 1 & \tilde{a}_{12} & \cdots & \tilde{a}_{1n} \\ \tilde{a}_{21} & 1 & \ldots & \tilde{a}_{2n} \\ \ldots & \ldots & \ddots & \vdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \cdots & 1 \end{pmatrix} \right) = \begin{pmatrix} 1 & \tilde{a}_{12} & \cdots & \tilde{a}_{1n} \\ 1/\tilde{a}_{12} & 1 & \ldots & \tilde{a}_{2n} \\ \ldots & \ldots & \ddots & \vdots \\ 1 / \tilde{a}_{1n} & 1 / \tilde{a}_{2n} & \cdots & 1 \end{pmatrix}$$

Where $\{\tilde{9}^{-1}, \tilde{8}^{-1}, \tilde{7}^{-1}, \tilde{6}^{-1}, \tilde{5}^{-1}, \tilde{4}^{-1}, \tilde{3}^{-1}, \tilde{2}^{-1}, \tilde{1}^{-1}, \tilde{1}, \tilde{2}, \tilde{3}, \tilde{4}, \tilde{5}, \tilde{6}, \tilde{7}, \tilde{8}, \tilde{9}, i \neq j\}$

Step 2: The geometric mean has been calculated using the fuzzy logic, and the weight is calculated as below (Hsieh *et al.*, 2004),

$\tilde{r}_i = \{\tilde{a}_{i1} \otimes \ldots \otimes \tilde{a}_{ij} \otimes \ldots \otimes \tilde{a}\}^{1/n}$

$\widetilde{W}_i = \tilde{r}_i \otimes^{-1}$

Where $\tilde{r}_i$ is a geometric mean of the fuzzy comparison value of criterion *i* to each criterion, $\tilde{a}_{i1}$ is the fuzzy comparison value of dimension *i* to criterion *j*, $\widetilde{W}_i$ is the fuzzy weight of the *i* criterion whose triangular fuzzy numbers are *(lw_i mw_i, uw_i)*.

Data analysis and interpretation

Data from 16 experts working with e-retailers of apparel and footwear has been collected. Data analysis has carried out using MS Excel.

Calculations of the value of fuzzy synthetic extent:

Four primary performance evaluation criteria have been taken into consideration in this research. These elements include strategic advantage, value orientation, general capabilities, and reverse logistics capabilities. The judgment is reliable if the consistency index and ratio are less than 0.1. The Table III shows how the analysis's findings were expressed. The following lists the weights of the primary criterion, sub-criteria, and their overall rankings.

Table III- Weight of criteria and its ranking

Main-criterion	Weight	Percentage	Sub-criterion	Weight	Overall weight	Percentage	Rank
General capabilities	0.3736	37.36%	Low working capital requirement	0.592	0.2212	22.12%	1
			Reduced inventory investment	0.312	0.1166	11.66%	3
			Higher product quality and innovation	0.109	0.0407	4.07%	8
Reverse logistics capabilities	0.2956	29.59%	Customer orientation	0.678	0.2004	20.04%	2
			Resource Commitments	0.227	0.0671	6.71%	6
			Contractual Arrangements	0.113	0.0334	3.34%	10
Value Orientation	0.2045	20.45%	Market Performance	0.359	0.0734	7.34%	4
			Higher service level-warranty, responsiveness, returns policy	0.327	0.0668	6.68%	7
			Collaborating with supply	0.210	0.0429	4.29%	9

			chain members				
			Allocate adequate resources to RL programs	0.104	0.0212	2.12%	13
Strategic advantage	0.1266	12.66%	Customer retention	0.566	0.0717	7.17%	5
			Improved profitability	0.256	0.0324	3.24%	11
			Cost leadership, focus, differentiation	0.200	0.0253	2.53%	12

Results and discussion:

The main and sub-criterion weights are presented in Table 3. The most important component influencing returns management performance is general capabilities. Performance in reverse logistics is significantly impacted by reverse logistics capabilities as well. The effectiveness of returns management is also influenced by value orientation and strategic advantage. The weights of the factors have determined their priority order. The weight has been determined for all the sub-criterion. The final weight of the sub-criteria has been calculated by multiplying the weight of the sub-criteria to the weight of the corresponding main criteria. Low working capital and customer orientation are the most prominent sub-factors in the performance evaluation of returns management. Reduced inventory investment and market performance have an impact on returns management performance. The performance of returns management has been impacted by customer retention, resource commitments, and return policies. Other factors like collaboration with channel members, improved profitability, cost leadership, focus, and differentiation impact the returns management performance evaluation less.

Hypotheses results:

General capabilities have the highest weight means it is the most prominent factor in returns management performance. Reverse logistics capabilities and value orientation have affected the performance evaluation of returns management. According to the weights, strategic management has the least weight means a lesser impact on returns management performance. The hypothesis results with description have shown in the below Table IV.

Table IV- Hypotheses results

Main-criterion	Hypothesis	Weight of the criteria	Hypothesis acceptance	Note
General capabilities	H1	0.3736	Accepted	General capabilities have the highest weight.

				Therefore, it is the most prominent factor.
Reverse logistics capabilities	H2	0.2956	Rejected	Reverse logistics capabilities also have an impact on returns management performance.
Value orientation	H3	0.2045	Rejected	Value orientation also has some impact on returns management performance
Strategic advantage	H4	0.1266	rejected	Strategic advantage has less importance in returns management performance.

Final framework:

The scores of all the criteria according to their weights has represented in the final framework through FAHP. The scores are obtained by rounding up or down the final weight and used in returns management performance evaluation. The complete framework has explained in the following Table V. The general capabilities of the firm dominate the returns management system. Sub-criteria like low-working capital requirements and customer orientation have scored the highest. Reduced inventory investment, market performance, and customer retention have average scores in returns management. All other factors have less impact on the returns management performance.

Table V- The framework for evaluation of returns management performance

Main-criterion	Score	Sub-criterion	Score
General capabilities	37	Low working capital requirement	22
		Reduced inventory investment	11
		Higher product quality and innovation	4
Reverse logistics capabilities	30	Customer orientation	20
		Resource Commitments	7
		Contractual Arrangements	3
Value Orientation	20	Market Performance	7
		Higher service level- warranty, responsiveness, returns policy	7

		Collaborating with supply chain members	4
		Allocate adequate resources to RL programs	2
Strategic advantage	13	Customer retention	7
		Improved profitability	3
		Cost leadership, focus, differentiation	3
Total	100		100

Conclusion:

Returns management of online retailers is becoming a part of their strategic management. An efficient returns management process can give a strategic advantage to online retailers. The customer's product cognition comes from seeing the product virtually. Sometimes, the actual product may differ from the online description can cause dissatisfaction among customers. The situation has to be managed with product returns management. This paper gives a framework of returns management performance with all factors related to the returns management system of online retailers. Performance evaluation helps in improving the efficiency of returns management. Focusing on the dominant area of returns management may reduce the uncertainty in returns management decision-making. The prominent factors need to be tackled first according to their scores.

General and reverse logistics capabilities have the highest impact on returns management. Prioritizing these factors may help reduce the issues in the returns management of online retailers. Strategic advantage and value orientation enhance the effectiveness of returns management. The evaluation of the returns management performance of online retailers will help the online retailers to overcome the challenges, and to achieve business value.

The results may differ as the data had been collected during the covid-19 pandemic. The study is carried out in selected areas of India. Therefore, it may need to be more generalizable to other regions. Other researchers have only studied the returns management process and its challenges. This study considered the evaluation of the returns management performance of online retailers. There is scope for future research into the strategic alignment of returns management and the competitive strategy of online retailers.

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