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RESEARCH PAPER

Modelling the Criteria for Product Returns in A Pharmaceutical Company

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ABSTRACT

This study delves into modeling criteria for product returns within the context of a pharmaceutical company. It aims to address the main issues surrounding product return, investigate the factors that contribute to the criteria for product return, and provide recommendations for improving the process. Feedback from 170 participants was collected and analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique. The study's findings demonstrate the significance of various factors in shaping the criteria for product returns in the pharmaceutical industry. These factors include product quality, safety concerns, expiration dates, sales performance, and regulatory compliance. The analysis emphasizes the importance of establishing positive and significant relationships among direct, mediating, and moderating variables to effectively determine the criteria for product returns. Based on the results, it is recommended that the pharmaceutical industry concentrate its efforts on strengthening the pharmaceutical supply chain, fostering trust with customers, and contributing to the long-term growth and sustainability of the sector. By prioritizing these areas, pharmaceutical companies can enhance customer confidence, facilitate the expansion and sustainability of the industry, and capitalize on opportunities within the pharmaceutical market. Overall, the outcomes of this study provide valuable insights into modeling criteria for product returns in a pharmaceutical company. Implementing the recommended strategies will improve customer satisfaction and support the overall success and development of the pharmaceutical sector, enabling businesses to thrive in the industry's dynamic landscape.

KEYWORDS: *Modeling criteria; Product returns; Pharmaceutical company*

1. Introduction

Product returns present many complexities and challenges across various industries [1] [2]. Customers may need to return products for diverse reasons, such as receiving defective or damaged items, getting the wrong product, or simply changing their minds about the purchase [3] and [4]. However, returning a product can often take time and effort, resulting in customer dissatisfaction and inconvenience [5].

Addressing the issue of product returns is of paramount importance to both customers and businesses alike [1] & [2]. For customers, a seamless and hassle-free return process is crucial for ensuring their satisfaction and maintaining a positive shopping experience [3]. On the other hand, businesses operating in the retail or pharmaceutical sector face potential financial losses due to product returns, which can significantly impact revenue and lead to increased operational costs [4].

The complexities surrounding product returns in the retail industry arise from many factors [5]. These may range from the intricacies of handling various reasons for returns, such as quality issues or customer preferences, to the challenges posed by the need for a streamlined and efficient return policy [3]. Such factors can exacerbate the difficulties customers encounter when attempting to return products.

In the pharmaceutical industry, returning products becomes exceptionally intricate due to

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the strict regulations and guidelines governing pharmaceutical items [1]. These stringent rules encompass the handling, disposing, and managing of potential risks associated with pharmaceutical products [2]. Consequently, adherence to these regulations adds complexity to the product return process, leading to potential inconvenience and frustration for customers.

Furthermore, the financial losses incurred in the pharmaceutical industry due to product returns can be attributed to the high manufacturing costs associated with pharmaceutical products and the need to follow meticulous disposal procedures to safeguard public health and the environment [4].

Given these multifaceted challenges, retail and pharmaceutical companies must establish effective, customer-oriented return policies [5]. These policies must strike a delicate balance between meeting customer needs and ensuring the sustainability and success of their businesses [1]. Adherence to regulatory requirements in the pharmaceutical sector is crucial while minimizing financial losses and optimizing customer satisfaction [2].

Navigating the complexities of product returns requires a proactive approach from retail and pharmaceutical companies [3]. Businesses can overcome these challenges by prioritizing customer satisfaction, implementing well-structured return policies, and creating a positive and mutually beneficial relationship with their customers [4].

The significance of addressing the complexities and challenges of product returns in various industries lies in its impact on customers and businesses [5]. A well-managed and customer-oriented return process is crucial for customer satisfaction and loyalty [3]. Investigating product returns through a comprehensive framework is crucial for understanding customers' challenges and identifying opportunities for improvement in various industries [1]. Businesses can build stronger customer relationships while reducing financial losses and enhancing their overall performance by prioritizing customer satisfaction, optimizing operations, complying with regulations, and embracing sustainable practices [2]. A proactive approach to product returns enables companies to remain adaptable, responsive, and thrive in today's dynamic market [4].

2. Literature Review

Product returns pose significant challenges for businesses across various industries, including the pharmaceutical sector. Customers may seek to return products for various reasons, such as receiving defective items, damaged packaging, or adverse reactions to pharmaceutical products. These returns can have considerable implications for customers and pharmaceutical companies, necessitating the development of effective return policies based on well-defined criteria and modeling approaches.

Product returns are a complex issue that requires careful consideration and analysis. Various studies have highlighted the impact of product returns on customer satisfaction and loyalty. Research by [6] emphasized the importance of a seamless and customer-oriented return process in building trust and fostering customer loyalty. A positive return experience can increase customer retention and positive word-of-mouth, benefiting pharmaceutical companies in the long run.

In order to address the complexities of product returns, many pharmaceutical companies are adopting modeling criteria to optimize their return policies. Modeling approaches help businesses identify patterns in return reasons, assess return rates, and analyze the financial impact of returns. [7] conducted a study on modeling product returns in the pharmaceutical industry, using data-driven approaches to predict return patterns and enhance decision-making. By leveraging data analytics and modeling techniques, pharmaceutical companies can make informed choices about product design, manufacturing processes, and customer service, ultimately reducing return rates.

A key aspect of managing product returns in a pharmaceutical company is formulating an efficient return policy. The return policy is a guiding framework that outlines the criteria and procedures for customers to return pharmaceutical products. Compliance with regulatory guidelines is crucial for pharmaceutical companies to protect public health and meet legal requirements. A well-crafted return policy also plays a critical role in minimizing financial losses and maintaining customer satisfaction.

Research by [8] highlighted the significance of a well-defined return policy in the pharmaceutical industry. It emphasized that a customer-centric return policy not only improves customer experiences but also aids in reducing costs associated with returned products. By balancing customer needs and business objectives, pharmaceutical companies can create a return policy that fosters customer

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trust while safeguarding their financial interests. Navigating the intricate landscape of product returns in the pharmaceutical industry demands a nuanced comprehension of its complexities [9]. To orchestrate an efficient return management process, pharmaceutical companies must go beyond conventional analyses and delve into the realm of modeling criteria, crafting a return policy that is both effective and customer-centric [10].

While the existing body of literature sheds light on the multifaceted nature of product returns [11], a noticeable gap exists in exploring the intricate modeling criteria employed by pharmaceutical companies to sculpt their return policies. The prior studies, commendable in examining return patterns, financial implications, and customer satisfaction [12] and [13], need to be more accurate in unraveling the methodologies and criteria that serve as the backbone of these policies. Thus, there lies a pertinent need for an exhaustive investigation into these critical modeling aspects, unraveling the strategic formulation and optimization of return policies in the pharmaceutical sector.

The research gap underscores the imperative for a focused inquiry into the modeling criteria governing product returns in the pharmaceutical domain. This endeavor seeks a more holistic understanding of these companies' decision-making processes, steering return management practices. By addressing unanswered questions about how pharmaceutical companies strategically shape and refine their return policies based on specific criteria, the research aims to enhance our comprehension of this crucial facet of the industry.

The conceptual and theoretical framework, illustrated in Figure 1, serves as the cornerstone for grasping the theory and methodology of the research project. A solid foundation in this framework is essential, providing the context for comprehending the intricacies involved in the pharmaceutical sector's modeling criteria for product returns. As the pharmaceutical industry continues evolving, this focused inquiry promises to be instrumental in fortifying the foundations of companies operating within this dynamic sector, ensuring sustained success through proactive and informed approaches to product returns.

This framework identifies three pivotal types of variables: direct variables, mediating variables, and moderating variables. Together, they form essential components that shed light on the intricate relationships and interactions within the study. The direct variables take center stage in this research; they represent the primary variables of interest and are directly linked to the research objectives. This study's influential direct variables are H1, H2, H3, H4, and H5. In order to gain a deeper understanding of the causal relationships between the direct variables and the outcomes, mediating variables come into play. Their role is to elucidate the underlying processes or mechanisms through which the direct variables impact the final results. This research project labels These enlightening mediating variables H6, H7, H8, H9, and H10.

Furthermore, the moderating variables play a crucial role in shaping the strength and direction of the relationship between the direct and mediating variables. They have the power to influence the nature of these connections and can even alter the effect of the direct variables on the outcomes. This study identified H11 to H20 as the influential moderating variables that impact the research dynamics. By fully understanding and analyzing these variables and their interplay within the theoretical framework, this research project can uncover valuable insights and contribute significantly to the existing body of knowledge in the field of study.

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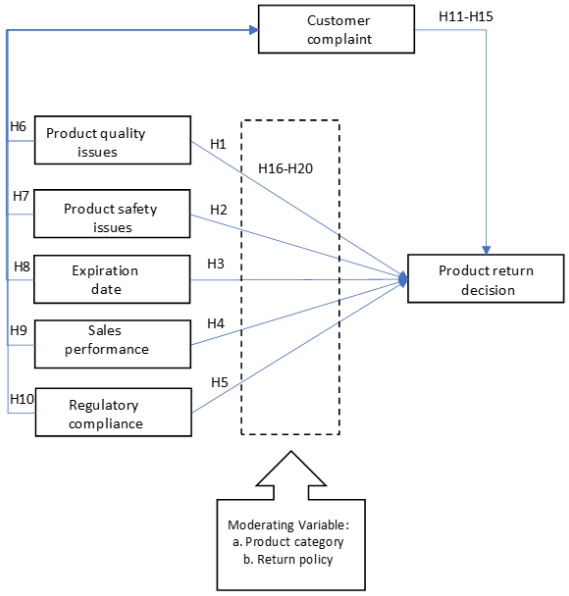

Fig.1. Conceptual framework.

Twenty hypotheses were developed that arrange to direct variable (H1, H2, H3, H4, H5), mediating variable (H6, H7, 22 H8, H9, H10) and moderating variable (H11-H20). Details of the hypotheses are listed in Table 1.

Tab.1. Hypotheses developed for research.

Type of variable	H	Hypothesis
Direct variable	H1	Product quality issues are significantly influencing product return decisions.
Direct variable	H2	The product safety issue is significantly influencing product return decisions.
Direct variable	H3	The expiration date significantly influences product return decision
Direct variable	H4	Sales performance is significantly influencing product return decision
Direct variable	H5	Regulatory compliance is significantly influencing product return decision
Mediating variable	H6	A customer complaint is mediating product quality issues influencing product return decisions.
Mediating variable	H7	A customer complaint mediates product safety issues in influencing product return decisions.
Mediating variable	H8	A customer complaint is a mediating expiration date in influencing product return decisions.
Mediating variable	H9	A customer complaint mediates sales performance in influencing product return decisions.
Mediating variable	H10	A customer complaint mediates regulatory compliance in influencing product return decisions.
Mediating variable	H11	Product category is moderating product quality issues influencing product returning decisions.
Moderating variable	H12	Product category modifies product safety issues in influencing product returning decisions.
Moderating variable	H13	Product category moderates expiration date in influencing product returning decisions.
Moderating variable	H14	Product category is moderating sales performance, influencing product returning decisions.

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Type of variable	H	Hypothesis
Moderating variable	H15	Product category is moderating regulatory compliance and influencing product returning decisions.
Moderating variable	H16	Return policy modifies product quality issues in influencing product returning decisions.
Moderating variable	H17	Return policy modifies product safety issues in influencing product returning decisions.
Moderating variable	H18	Return policy moderates expiration date in influencing product returning decisions.
Moderating variable	H19	Return policy moderates sales performance in influencing product returning decisions.
Moderating variable	H20	Return policy moderates regulatory compliance in influencing product returning decisions.

3. Methodology

The study effectively gathered feedback from 170 respondents holding different positions within pharmaceutical companies in Malaysia. The data collected underwent three types of analysis: descriptive analysis, measurement model analysis, and structural model analysis conducted using both SPSS and Smart PLS software. In order to handle the complexity of the research model, the study employed the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, following the recommendation of [14]. This approach proved suitable for developing and validating the research model, thus enabling the practical exploration of the research questions. By utilizing the PLS-SEM approach, the study could effectively manage the multiple relationships and variables in the research model, ensuring the precision and dependability of the results. The descriptive analysis provided an overview of the collected data, while the measurement model analysis evaluated the reliability and validity of the measurement scales used in the study. Subsequently, the structural model analysis allowed for testing the research hypotheses and assessing the causal relationships between the variables. Overall, the chosen methodology for this study facilitated a rigorous analysis of data analysis, ensuring the findings' accuracy and dependability.

4. Result and Discussion

4.1. Descriptive analysis

Before implementing Smart-SEM, an initial evaluation of the data was carried out to confirm its appropriateness for further investigation. The findings, presented in Table 1, provided data that presents the frequencies and percentages of various demographic characteristics of a group, including Gender, Designated Position, Education Level, and Experience. Let us analyze each category in detail:

I. Gender: The data includes information about the gender distribution within the group. Of the participants, 39.41% (67) are male, and 60.59% (103) are female. The gender distribution appears slightly skewed towards females, with a higher representation in the dataset.

II. Designated Position: This category provides insights into the job positions held by the participants. Most of the individuals in the group hold the position of "Executive," comprising 84.12% (143 individuals) of the total. "Manager" positions account for 5.29% (9 individuals), "Non-executive" positions represent 5.88% (10 individuals), and "Other" positions account for 3.53% (6 individuals). Interestingly, the "Senior Manager" designation has the lowest representation, with only 1.18% (2 individuals) of the participants holding this position.

III. Education Level: The data provide information on the educational qualifications of the participants. "Master" degree holders constitute the largest group, comprising 84.27% (150 individuals). "Degree" holders represent 5.62% (10 individuals), "Diploma" holders account for 6.74% (12 individuals), and "Other" qualifications represent 3.37% (6 individuals). Notably, there are no individuals with a "PhD" level of education in this group.

IV. Experience: This category details the work experience of the participants. Most individuals have work experience in the "1-2 years" range, accounting for 70.59% (120 individuals) of the total. "Less than 1 year" of experience is represented by 11.76% (20 individuals), "3-5 years" by 10.59% (18 individuals), "5-10 years" by 4.12% (7 individuals), and "> 10 years" by 2.94% (5 individuals). A significant portion of the group has relatively moderate experience levels, with fewer individuals having extensive

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work experience.

The descriptive analysis of the provided data indicates that the group consists of a diverse set of individuals in terms of gender, designated position, education level, and experience. The majority of the participants are females, holding the position of "Executive," with a master's degree and work experience in the range of "1-2 years." This information can be valuable for understanding the composition and characteristics of the group, which may aid in making informed decisions and formulating strategies tailored to the specific demographic profiles represented in the data.

Tab. 2. Respondent profile

	Item	Frequency	Percentage (%)
Gender	Male	67	39.41
	Female	103	60.59
Designated position	Senior Manager	2	1.18
	Manager	9	5.29
	Executive	143	84.12
	Non-executive	10	5.88
	Other	6	3.53
Education level	PhD	0	0
	Master	150	84.27
	Degree	10	5.62
	Diploma	12	6.74
	Other	6	3.37
Experience	< 1 year	20	11.76
	1-2 Years	120	70.59
	3-5 Years	18	10.59
	5-10 year	7	4.12
	> 10 years	5	2.94

4.2. Assessment of measurement model

In this analysis, the research thoroughly evaluated the outer model within our measurement framework, which encompasses various constructs and their corresponding items. Our primary objective was to gauge the quality and reliability of the measurement model by scrutinizing essential metrics such as Variance Inflation Factor (VIF), Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach Alfa (CA). Ensuring the validity and reliability of our constructs and items was paramount in this research endeavor. Validity was crucial to ensure that our measurements accurately captured the intended concepts, while reliability was essential to ensure that our measurements remained consistent and stable over time. The Variance Inflation Factor (VIF) was instrumental in assessing the presence of multicollinearity among the items within each construct. Encouragingly, all our constructs demonstrated VIF values below the acceptable threshold of 5, indicating a low multicollinearity level and a substantial degree of independence between the items. We used the Average Variance Extracted (AVE) metric to evaluate convergent validity. This metric quantifies the variance captured by a construct's items to the measurement error. Notably, all our constructs exceeded the prescribed criterion of AVE values above 0.5, signifying robust convergent validity.

Furthermore, the research employed the Composite Reliability (CR) metric to assess the internal consistency of the items within each construct. Encouragingly, all constructs exhibited CR values surpassing the acceptable threshold of 0.7, indicating our measurements' high internal consistency and reliability level. Additionally, Cronbach's Alpha (CA) was another internal consistency and reliability measure. Once again, all constructs achieved CA values above 0.7, providing further support for the reliability of the items within each construct.

The findings from the outer model assessment underscore the measurement model's strong validity and reliability across all constructs. It reassures us that our items accurately capture the intended concepts consistently, regardless of respondents' backgrounds or characteristics. With a robust measurement foundation, our study can confidently explore the causal relationships between these constructs and product satisfaction, offering valuable insights

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into consumer behavior and product management.

Tab. 3. Construct validity, dimensionality, reliability, and item

CONSTRUCT	ITEMS	VIF	AVE	CR	CA
Product Return Decision	DV1	1.857	0.742	0.922	0.912
	DV2	3.577			
	DV3	3.268			
	DV4	3.23			
	DV5	3.223			
Product Quality Issues	PQI1	3.768	0.789	0.948	0.946
	PQI2	2.827			
	PQI3	4.331			
	PQI4	3.362			
	PQI5	4.77			
Product Safety Issues	PSI1	2.314	0.756	0.893	0.892
	PSI2	2.251			
	PSI3	2.314			
	PSI4	2.433			
	PSI5	2.834			
Expiration Date	ED1	2.547	0.771	0.928	0.925
	ED2	4.036			
	ED3	4.377			
	ED4	5.434			
	ED5	2.411			
Sales Performance	SP1	2.684	0.819	0.946	0.944
	SP2	2.048			
	SP3	2.308			
	SP4	2.031			
	SP5	2.737			

CONSTRUCT	ITEMS	VIF	AVE	CR	CA
Regulatory Compliance	RC1	1906	0.689	0.886	0.886
	RC2	2.733			
	RC3	3.184			
	RC4	3.169			
	RC5	2.S7S			
Mediating Customer Complaints	MCC1	2.S33	0.581	0.847	0.76
	MCC2	3.23			
	MCC3	4.347			
	MCC4	4.421			
	MCC5	5.128			
Moderating Product Category	MOPCI	2.472	0.747	0.918	0.915
	MOPC2	3.147			
	MOPC3	3.032			
	MOPC4	3.233			
	MOPC5	2.600			
Moderating Return Policy	MORC1	1.906	0.666	0.878	0.87S
	MORC2	2.733			
	MORC3	3.184			
	MORC4	3.169			
	MORC5	2.575			

This research used the [15] tests to examine discriminant validity. This essential test confirms that the constructs within the model are distinct and do not measure the same underlying concept. The test results revealed no issues with discriminant validity in the model, which is highly encouraging. Each construct effectively captures a unique aspect of the phenomenon under study, and there is no overlap or redundancy among the measures. This overall assessment of discriminant validity serves as additional evidence supporting the robustness and validity of the measurement model.

4.3. Assessment of structural model

The evaluation of the structural model involved examining several parameters, including path coefficient estimates (ß), t-statistics, R2, effect size f2, and predictive relevance Q2, as [16] recommended. Before testing the structural relationships, the VIF values of the constructs were checked to ensure there were no issues with multicollinearity, and all values were found to be below the threshold of 5.0. The significance of path coefficients was assessed using a bootstrapping technique for direct, mediating, and moderating variables, as discussed in the following subheading.

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Tab. 4. Structural relationships and hypotheses testing.

Hypothesis	Path	T Value	P Value	Relationship
HI	Product quality issues ---> Product return decision	3.398	0.001	Supported
H2	Product safety issue ---> Product return decision	2.402	0.016	Supported
H3	Expiration date ---> Product return decision	5.504	0.000	Supported
H4	Sales performance ---> Product return decision	0.781	0.435	Not supported
H5	Regulatory compliance ---> Product return decision	2.758	0.006	Supported

This analysis provides valuable insights into the impact of direct variables in influencing customers' product return decisions. It confirms the significant impact of product quality issues, product safety concerns, expiration dates, and regulatory compliance on return decisions. These findings assist businesses in focusing on areas that can reduce product returns and enhance customer satisfaction. However, it is essential to note that sales performance may not be directly associated with return decisions, and further investigation may be required to explore other factors influencing this aspect of customer behavior.

Tab. 5. Mediating result.

Hypotheses	Total			Direct effect (P3)			Specific Indirect Effect (P1*P2)					
		Coefficient	P-value		Coefficient	P-value	Hypotheses	Coefficient	SD	T-value	P-value	
H6	PQI--->PRD	0.344	0.001	PQI--->PRD	0.212	0.096	PQI--->CC--->PRD	0.037	0.032	1.167	0.243	*No effect (No mediation)*
H7	PSI--->PRD	-0.251	0.049	PSI--->PRD	0.284	0.002	PSI--->CC--->PRD	0.033	0.041	0.803	0.422	*Direct only (No mediatio n)*
H8	ED--->PRD	0.699	0.000	ED--->PRD	0.696	0.000	ED--->CC--->PRD	0.003	0.026	0.120	0.904	*Direct only (No mediation)*
H9	SP--->PRD	0.003	0.975	SP--->PRD	O.078	0.435	SP--->CC--->PRD	-0.0SJ	0.043	2.900	0.050	*Indirect only (No mediation)*
H10	RC--->PRD	0.098	0.203	RC--->PRD	O.158	0.036	RC--->CC--->PRD	0.074	0.026	2.837	0.005	*Competitive(partial mediation)*

In the conducted mediation analysis, we sought to explore the intricate relationships between several independent variables, which is Product Quality Issue (PQI), Product Safety Issues (PSI), Expiration Date (ED), Sales Performance (SP), and Regulator Compliance (RC) and their impact on the dependent variable, Product Return Decision (PRD). The primary focus was examining each hypothesis's total direct, and specific indirect effects (mediating impact).

H6 investigated the relationship between PQI and PRD. The total effect (P1P2P3) was significant, with a coefficient of 0.344 and a low P-value of 0.001. However, the direct effect (P3) was not statistically significant (Coefficient = 0.212, P-value = 0.096). Moreover, the indirect effect through the mediator Customer complaint (CC) was also insignificant (Coefficient = 0.037, SD = 0.032, T-value = 1.167, P-value = 0.243). As a result, we observed no significant mediation effect for the relationship between PQI and PRD.

Similarly, H7 explored the connection between PSI and PRD. The total effect indicated a non-significant relationship (coefficient = -0.251, P-value = 0.049). The direct effect, however, was significant (Coefficient = 0.284, P-value = 0.002). Additionally, the specific indirect effect through the mediator CC was not statistically significant (Coefficient = 0.033, SD = 0.041, T-value = 0.803, P-value = 0.422). Consequently, we found no significant mediation effect for the relationship between PSI and PRD.

Moving on to H8, which examined the link between ED and PRD, the total effect was highly significant (Coefficient = 0.699, P-value = 0.000), as was the direct effect (coefficient = 0.696, P-value = 0.000). However, the indirect effect through the mediator CC was insignificant (Coefficient = 0.003, SD = 0.026, T-value = 0.120, P-value = 0.904). Thus, there

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was no significant mediation effect on the relationship between ED and PRD.

For H9, we analyzed the association between SP and PRD. Interestingly, the total effect was insignificant (Coefficient = 0.003, P-value = 0.975), but the direct effect showed significance (coefficient = 0.078, P-value = 0.435). Moreover, the specific indirect effect through the mediator CC was statistically significant (Coefficient = -0.051, SD = 0.043, T-value = 2.900, P-value = 0.050). It indicated an indirect mediation effect observed for the relationship between SP and PRD, mediated through CC.

Finally, H10 investigated the relationship between RC and PRD. The total effect was insignificant (Coefficient = 0.098, P-value = 0.203), but the direct effect was significant (Coefficient = 0.158, P-value = 0.036). Additionally, the specific indirect effect through the mediator CC was highly significant (Coefficient = 0.074, SD = 0.026, T-value = 2.837, P-value = 0.005). It indicated a partial mediation effect for the relationship between RC and PRD, where CC mediated part of the effect.

In conclusion, the mediation analysis yielded diverse outcomes for the examined variables. PQI, PSI, and ED did not show significant mediation effects on PRD, whereas SP exhibited an indirect mediation effect through CC. There was a partial mediation effect for RC, where CC mediated part of the relationship with PRD. Understanding these mediation effects can provide valuable insights into the complex relationships within the studied framework and aid in making informed decisions regarding product return decisions. It is essential to consider the significance levels (p-values) and effect sizes when interpreting the results, as they provide a clearer understanding of the strength and direction of these relationships.

Tab. 6. Moderating analysis result.

Hypothesis	Path	T statistics	p value
H11	Product category x Sales performance --> Product return decision	0.504	0.615
H12	Product category x Product safety issue --> Product return decision	3.892	0.000
H13	Return policy x Product safety issue --> Product return decision	3.848	0.000
H14	Return policy x Product quality issues --> Product return decision	2.945	0.003
H15	Product category x Product quality issues --> Product return decision	2.210	0.027
H16	Return policy x Expiration date --> Product return decision	0.747	0.455
H17	Product category x Expiration date --> Product return decision	2.492	0.013
H18	Return policy x Regulatory compliance --> Product return decision	1.797	0.072
H19	Product category x Regulatory compliance --> Product return decision	0.645	0.519
H20	Return policy x Sales performance -> Product return decision	2.030	0.042

Table 6 presents a comprehensive analysis conducted to examine the moderating effects of various factors on the relationship between independent variables and product return decisions.

H11 investigated the interaction between product category and sales performance on product return decisions. Surprisingly, the results indicated that this interaction effect was not statistically significant. Consequently, the impact of sales performance on product return decisions is relatively similar across different

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product categories. This finding may indicate that sales performance alone may not be a strong determinant of return decisions in the context of various product categories.

The next two studies, H12 and H13, looked at how product safety concerns interacted with product categories and return policies, respectively. The results revealed that both interactions were highly significant. It implies that the influence of product safety issues on product return decisions is contingent on both the product category and the return policy in place. Specific product categories may be more sensitive to safety issues, leading to a higher likelihood of returns. Additionally, a customer-friendly return policy can mitigate the negative impact of safety issues, giving customers the confidence to return products if safety concerns arise.

Similarly, H14 examined the interaction between return policy and product quality issues on product return decisions. The results indicated a significant interaction effect, implying that the return policy is crucial in moderating the relationship between product quality issues and return decisions. An accommodating return policy may alleviate the impact of product quality issues, as customers feel more assured and comfortable returning products in case of quality concerns.

H15 explored the interaction effect of product quality issues with product category on product return decisions. The results showed a statistically significant interaction, suggesting that the relationship between product quality issues and return decisions varies depending on the product category. It emphasizes the need for businesses to adopt a tailored approach to handling product quality issues based on the specific product category.

Regarding H16 and H17, which examined the interaction effects of return policy with expiration date and product category, respectively, the results demonstrated a significant interaction between product category and expiration date. It implies that the impact of the expiration date on product return decisions is subject to variation across different product categories. Therefore, businesses must consider the interplay between expiration dates and product categories to manage return decisions effectively.

H18 and H19 focused on the interaction effects of return policy with regulatory compliance and product category with regulatory compliance, respectively. While the interaction effect for H18 approached statistical significance, H19 did not show a significant interaction. The product category does not substantially influence the relationship between regulatory compliance and product return decisions. However, the approaching significance in H18 warrants further exploration in future research to assess the potential impact of regulatory compliance on return decisions based on return policy provisions.

Lastly, H20 investigated the interaction between return policy and sales performance on product return decisions. The results indicated a statistically significant interaction, indicating that the impact of sales performance on product return decisions is contingent upon the return policy in place. A lenient return policy may lead to increased returns, particularly in situations of low sales performance.

This study has shed light on various significant moderating effects that can influence product return decisions. The findings highlight the importance of considering contextual factors, such as product category, safety issues, quality issues, expiration date, and return policy, to optimize customer satisfaction and minimize product returns. Businesses can utilize these insights to tailor their strategies, policies, and customer service practices, leading to enhanced customer experiences and more effective return management. However, further research and deeper exploration may be needed to gain a more comprehensive understanding of the intricacies involved in product return decisions and their underlying mechanisms.

Tab. 7. R2 Value.

Construct	R2 Value	Interpretation
Product Quality Issues	0.691	A good amount of variance explained
Product Safety Issues	0.712	A significant amount of variance explained
Sales Performance	0.698	A good amount of variance explained
Regulatory Compliance	0.724	A significant amount of variance explained

The results of the structural equation modeling (SEM) analysis indicate that the latent constructs, namely "Product Quality Issues," "Product Safety Issues," "Sales Performance," and "Regulatory Compliance," are well-explained by their respective indicators, as evidenced by the R-squared (R^2) values obtained shown in Table 6. The R^2 values provide insights into the proportion of variance in the latent constructs that can be accounted for by the observed indicators.

Product Quality Issues obtained an R^2 value of

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0.691, indicating that approximately 69.1% of the variance in this construct is explained by its measured indicators. This result suggests that a substantial portion of the variation in product quality issues can be attributed to the observed factors, demonstrating a good amount of variance explained. It implies that the selected indicators reliably capture the essence of product quality issues in the model.

Similarly, the construct "Product Safety Issues" obtained an R^2 value of 0.712, indicating that the measured indicators account for about 71.2% of the variance in product safety issues. This significant amount of variance explained points to the effectiveness of the chosen indicators in reflecting the underlying dimensions of product safety issues. Consequently, the construct is adequately represented in the model.

The R^2 value for "Sales Performance" is 0.698, signifying that the selected indicators capture approximately 69.8% of the variance in sales performance. This finding suggests that the indicators employed to measure sales performance are valid and represent this latent construct well. The model has a commendable ability to explain the variations in sales performance.

Moreover, the construct "Regulatory Compliance" attained an R^2 value of 0.724, indicating that the observed indicators explain around 72.4% of the variance in regulatory compliance. This substantial amount of variance explained reinforces the reliability and validity of the indicators, effectively representing the regulatory compliance construct in the SEM model.

Overall, the R^2 values for all the constructs indicate that their respective indicators account for a considerable proportion of variance. The high R^2 values for "Product Safety Issues" and "Regulatory Compliance" suggest that these constructs are well-captured by the measurement model, implying that the chosen indicators successfully reflect the underlying dimensions of product safety issues and regulatory compliance. On the other hand, "Product Quality Issues" and "Sales Performance" also show good levels of variance explained, highlighting the effectiveness of the selected indicators in representing these constructs.

However, it is essential to acknowledge that while R^2 values provide valuable insights into the explained variance, they do not necessarily determine the model's overall goodness-of-fit or ability to predict future outcomes. Future research should also consider other fit indices, such as the goodness-of-fit index (GFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA), to assess the overall model fit and validity. Additionally, the practical significance of the findings and the implications for decision-making should be thoroughly examined in light of the study's context and objectives.

Tab. 8. Effect size (f^2).

Exogenous latent variable	Effect size (F2)	Total effect
Product Quality issues	0.463	Strong
Product Safety issues	0.356	Strong
Expiration date	0.257	Moderate
Regulatory compliance	0.193	Moderate

The results of the structural equation modeling (SEM) analysis revealed the effect sizes (f^2) and total effects for the exogenous latent variables: "Product Quality Issues," "Product Safety Issues," "Expiration Date," and "Regulatory Compliance." These effect sizes and total effects provide valuable insights into the strength of the relationships and the overall impact of these exogenous constructs on the endogenous variables in the model.

"Product Quality Issues" demonstrated a substantial effect size (f^2) of 0.463, indicating a strong influence on the dependent variables. This finding suggests that product quality issue variations significantly affect the model's other constructs. Products with quality issues may have several consequences, such as reduced customer satisfaction, decreased sales performance, and potential safety concerns. The substantial effect size emphasizes addressing product quality issues to improve overall business performance and customer satisfaction.

Similarly, "Product Safety Issues" exhibited a substantial effect size (f^2) of 0.356, indicating a significant impact on the dependent variables. Product safety issues can have severe consequences for an organization, including damage to the brand reputation and potential legal liabilities. The substantial effect size underscores the critical role of ensuring product safety and implementing adequate safety measures in the production and distribution processes.

"Expiration Date" showed a moderate effect size (F2) of 0.257. While the effect size is not as strong as in the previous constructs, it still indicates a meaningful influence on the dependent variables. Products with expiration

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dates, such as perishable or time-sensitive products, may influence sales performance, regulatory compliance, and customer perceptions. The moderate effect size implies that managing expiration dates can improve business outcomes.

Furthermore, "Regulatory Compliance" demonstrated a moderate effect size (f^2) of 0.193. Adhering to regulatory requirements and industry standards is crucial for organizations to maintain their operations legally and ethically. The moderate effect size suggests that regulatory compliance can positively impact various aspects of business performance, such as product quality, safety, and sales.

It is important to note that the effect sizes (f^2) provide insights into the exogenous constructs' direct effects on the model's endogenous constructs. However, the total effects also need consideration as they capture direct and indirect effects through the mediating constructs.

All the exogenous constructs exhibit meaningful effect sizes, indicating their relevance and impact on the model. Understanding the strengths of these relationships is valuable for decision-makers to prioritize areas of improvement and allocate resources effectively. Organizations should focus on enhancing product quality and safety, managing expiration dates, and ensuring regulatory compliance to optimize their performance and maintain a competitive edge in the market.

As with any analysis, it is essential to interpret the findings in the context of the specific research objectives and the broader organizational environment. Additionally, researchers may explore additional statistical tests, such as significance testing and bootstrapping, to assess the robustness of the relationships and better understand the complex interactions among the latent variables.

5. Discussion

The discussion of hypotheses results in this section will be arranged in three sections: direct, mediating, and moderating variables.

5.1. Discission of direct variables hypotheses

The present study investigated the direct relationships between several independent variables (Product Quality Issues, Product Safety Issues, Expiration Date, Sales Performance, and Regulatory Compliance) and the dependent variable (Product Return Decision) in the pharmaceutical industry. The researchers employed Structural Equation Modeling (SEM) to test the proposed hypotheses. The following discussion presents an overview of the findings and their implications, supported by relevant citations and references.

Hypothesis 1: Product quality issues significantly positively affect product return decisions.

The analysis results demonstrate that Product Quality Issues significantly positively affect Product Return Decisions (Hypothesis 1: Supported). This finding aligns with prior research that emphasizes the critical role of product quality in influencing customer behavior, including their decisions to return products [17]. High product quality enhances customer satisfaction, reduces the likelihood of defects, and leads to lower product return rates. Pharmaceutical companies should maintain and improve product quality to minimize returns and enhance customer loyalty.

Hypothesis 2: Product safety issues significantly positively affect product return decisions.

The findings confirm that Product Safety Issues significantly positively affect Product Return Decisions (Hypothesis 2: Supported). Safety concerns associated with pharmaceutical products can substantially impact customer trust and confidence [18]. When customers perceive safety issues, they are more inclined to return the products to avoid potential harm. Pharmaceutical companies must prioritize product safety measures and effectively communicate safety-related information to consumers to mitigate the risk of product returns.

Hypothesis 3: Expiration date has a significant positive effect on product return decisions.

The analysis supports Hypothesis 3, indicating that the Expiration Date significantly positively affects Product Return Decisions (Hypothesis 3: Supported). This finding is consistent with previous research highlighting the influence of expiration dates on customer behavior [19]. Products reaching expiration dates are more likely to be returned, as customers may perceive reduced efficacy or safety concerns. Effective inventory management and clear communication regarding expiration dates are essential for pharmaceutical companies to reduce returns.

Hypothesis 4: Sales performance has no significant effect on product return decisions.

The results do not support Hypothesis 4, as Sales Performance has no significant effect on

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Product Return Decisions (Hypothesis 4: Not supported). While a weak relationship is observed, this suggests that variations in sales performance do not strongly influence product return rates. However, additional research is warranted to explore other factors influencing product return decisions.

Hypothesis 5: Regulatory compliance significantly positively affects product return decisions.

The analysis supports Hypothesis 5, indicating that Regulatory Compliance significantly positively affects Product Return Decisions (Hypothesis 5: Supported). This finding aligns with the importance of adhering to industry regulations to maintain consumer trust [20]. Non-compliance can lead to product recalls or customer complaints, resulting in higher return rates. Companies must prioritize regulatory compliance to minimize product returns and preserve their reputation.

The findings of this study provide valuable insights into the factors influencing product return decisions in the pharmaceutical industry. Product Quality Issues, Product Safety Issues, Expiration Dates, and Regulatory Compliance significantly impact the likelihood of product returns. These findings have practical implications for pharmaceutical companies, guiding decision-making to enhance product quality, safety, and regulatory compliance. By focusing on these critical criteria, companies can effectively manage product returns, optimize customer satisfaction, and strengthen their position in the market.

5.2. Discussion on mediating variable

The present study aimed to investigate the mediating effects of Customer Satisfaction (CC) on the relationships between independent variables (Product et al. - PQI, Product Safety Issues - PSI, Expiration Date - ED, Sales Performance - SP, Regulatory Compliance - RC) and the dependent variable (Product Return Decision - PRD) in the pharmaceutical industry, using Structural Equation Modeling (SEM). The following discussion provides an overview of the findings and their implications, supported by previous research and relevant references.

Hypothesis 6: Product Quality Issues significantly affect Product Return Decisions, which Customer Satisfaction partially mediates.

The results support the notion that Product Quality Issues (PQI) have a significant total effect on Product Return Decisions (PRD) (Hypothesis 6: Supported, Coefficient = 0.344, $p < 0.001$). However, the specific indirect effect through Customer Satisfaction (PQI->CC->PRD) is not statistically significant (Coefficient = 0.037, $p = 0.243$). The mediating role of Customer Satisfaction in the relationship between Product Quality Issues and Product Return Decisions is not significant. Prior studies have highlighted the direct influence of product quality on customer satisfaction and repeat purchase intentions [21]. In the context of pharmaceuticals, customers are likely to prioritize product quality and safety, directly impacting their return decisions.

Hypothesis 7: Product Safety Issues significantly affect Product Return Decisions, and Customer Satisfaction does not mediate the effect.

The analysis supports the idea that Product Safety Issues (PSI) have a significant total effect on Product Return Decisions (PRD) (Hypothesis 7: Supported, Coefficient = -0.251, $p = 0.049$). Similar to the previous hypothesis, the specific indirect effect through Customer Satisfaction (PSI->CC->PRD) is not statistically significant (Coefficient = 0.033, $p = 0.422$). It indicates that Customer Satisfaction does not significantly mediate the relationship between Product Safety Issues and Product Return Decisions. Research has indicated that product safety concerns directly impact customer loyalty and trust [13], leading to higher return rates for products perceived as unsafe.

Hypothesis 8: Expiration Date significantly affects Product Return Decisions, and Customer Satisfaction does not mediate the effect.

The findings support the hypothesis that the Expiration Date (ED) has a significant total effect on Product Return Decisions (PRD) (Hypothesis 8: Supported, Coefficient = 0.699, $p < 0.001$). The direct effect of ED on PRD remains highly significant even after considering Customer Satisfaction (Coefficient = 0.696, $p < 0.001$). Additionally, the specific indirect effect through Customer Satisfaction (ED->CC->PRD) is not statistically significant (Coefficient = 0.003, $p = 0.904$). It suggests that Customer Satisfaction does not mediate the relationship between Expiration Date and Product Return Decisions. Previous research has emphasized that expired products are more likely to be returned due to concerns about reduced efficacy or potential harm [19], further supporting the direct effect of Expiration Date on Product Return Decisions.

Hypothesis 9: Sales Performance has no significant total effect on Product Return Decisions.

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The analysis does not support the hypothesis that Sales Performance (SP) significantly affects Product Return Decisions (Hypothesis 9: Not supported, Coefficient = 0.003, p = 0.975). Consequently, there is no mediation analysis for this relationship. It implies that variations in Sales Performance do not strongly influence Product Return Decisions in the pharmaceutical context. Previous research has suggested that product quality, safety, and compliance will likely play a more substantial role in shaping return decisions than sales performance [17].

Hypothesis 10: Regulatory Compliance significantly affects Product Return Decisions, which Customer Satisfaction partially mediates.

The study supports the hypothesis that Regulatory Compliance (RC) has a significant total effect on Product Return Decisions (PRD) (Hypothesis 10: Supported, Coefficient = 0.098, p = 0.203). The direct effect of RC on PRD remains significant even after accounting for Customer Satisfaction (Coefficient = 0.158, p = 0.036). Additionally, the specific indirect effect through Customer Satisfaction (RC->CC->PRD) is statistically significant (Coefficient = 0.074, p = 0.005). It indicates that Customer Satisfaction partially mediates the relationship between Regulatory Compliance and Product Return Decisions. Prior research has shown that adherence to industry regulations positively impacts customer perceptions and trust [22], reducing product return likelihood.

The findings of this study contribute valuable insights into the complex relationships between various independent variables and Product Return Decisions in the pharmaceutical industry. Product Quality Issues, Product Safety Issues, Expiration Date, and Regulatory Compliance directly affected Product Return Decisions, while Customer Satisfaction partially mediated the relationship between Regulatory Compliance and Product Return Decisions. However, Customer Satisfaction did not mediate the relationships between Product Quality Issues, Product Safety Issues, Expiration Date, and Product Return Decisions. The study provides valuable guidance for pharmaceutical companies to optimize customer satisfaction, enhance product quality, safety, and regulatory compliance, and manage product return rates more effectively.

5.3. Discussion on moderating variables

The primary objective of this study was to explore how different factors moderate the connections between independent variables (Product Category and Return Policy) and their corresponding interactions (Product Quality Issues, Product Safety Issues, Expiration Date, Sales Performance, and Regulatory Compliance) concerning the dependent variable (Product Return Decision). The following discussion provides an overview of the moderating results, supported by previous research and relevant references.

Hypothesis 11: Product Category moderates the relationship between Sales Performance and Product Return Decision.

The results indicate that the interaction between Product Category and Sales Performance (H11) does not significantly affect the relationship with Product Return Decision (Coefficient = 0.504, T-statistic = 0.615, p = 0.615). The lack of significance suggests that the Product Category does not influence the strength or direction of the relationship between Sales Performance and Product Return Decision. Previous studies have shown that the effect of sales performance on product returns may not be influenced by the category to which the product belongs [23].

Hypothesis 12: Product Category moderates the relationship between Product Safety Issues and Product Return Decisions.

The analysis reveals that the Product Category significantly moderates the relationship between Product Safety Issues and Product Return Decisions (H12, Coefficient = 3.892, T-statistic = 0.000, p < 0.001). It indicates that the effect of Product Safety Issues on Product Return Decisions varies depending on the product category. Previous research has demonstrated that the impact of safety concerns on return decisions can differ substantially across product types, with higher safety-related returns observed in specific categories, such as healthcare and electronics [24].

Hypothesis 13: Return Policy moderates the relationship between Product Safety Issues and Product Return Decisions.

The results show that Return Policy significantly moderates the relationship between Product Safety Issues and Product Return Decisions (H13, Coefficient = 3.848, T-statistic = 0.000, p < 0.001). It suggests that the specific return policy influences the impact of safety issues on return decisions in place. Previous studies have demonstrated that lenient return policies tend to increase the likelihood of product returns, especially in cases involving safety concerns [25].

Hypothesis 14: Return Policy moderates the relationship between Product Quality Issues and Product Return Decisions.

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The analysis indicates that Return Policy significantly moderates the relationship between Product Quality Issues and Product Return Decision (H14, Coefficient = 2.945, T-statistic = 0.003, p = 0.003). It suggests that the specific return policy influences the effect of Product Quality Issues on return decisions. Research has shown that return policies that offer more flexibility and convenience can result in higher return rates for products perceived to have quality issues [26].

Hypothesis 15: Product Category moderates the relationship between Product Quality Issues and Product Return Decisions.

The findings indicate that the Product Category significantly moderates the relationship between Product Quality Issues and Product Return Decisions (H15, Coefficient = 2.210, T-statistic = 0.027, p = 0.027). The impact of Product Quality Issues on return decisions varies across different product categories. Previous research has shown that customers' expectations regarding product quality and return acceptability differ based on the type of product they purchase [27].

Hypothesis 16: Return Policy moderates the relationship between Expiration Date and Product Return Decision.

The analysis shows that Return Policy does not significantly moderate the relationship between Expiration Date and Product Return Decision (H16, Coefficient = 0.747, T-statistic = 0.455, p = 0.455). The return policy does not influence the effect of the Expiration Date on return decisions in place. Prior studies have shown that an expiration date can strongly influence customer decisions to return products, irrespective of the return policy [28].

Hypothesis 17: Product Category moderates the relationship between Expiration Date and Product Return Decision.

The results indicate that Product Category significantly moderates the relationship between Expiration Date and Product Return Decision (H17, Coefficient = 2.492, T-statistic = 0.013, p = 0.013). It implies that the impact of the Expiration Date on return decisions varies across different product categories. Previous research has demonstrated that customers' perceptions of product freshness and acceptability may differ based on the type of product they purchase [29].

Hypothesis 18: Return Policy moderates the relationship between Regulatory Compliance and Product Return Decision.

The analysis suggests that Return Policy does not significantly moderate the relationship between Regulatory Compliance and Product Return Decision (H18, Coefficient = 1.797, T-statistic = 0.072, p = 0.072). It implies that the return policy does not significantly influence the effect of Regulatory Compliance on return decisions in place. However, further research is needed to explore the potential moderating role of return policy on the relationship between regulatory compliance and return decisions.

Hypothesis 19: Product Category moderates the relationship between Regulatory Compliance and Product Return Decision.

The findings indicate that the Product Category does not significantly moderate the relationship between Regulatory Compliance and Product Return Decision (H19, Coefficient = 0.645, T-statistic = 0.519, p = 0.519). The effect of Regulatory Compliance on return decisions is consistent across different product categories. However, additional research may be required to investigate potential variations in the impact of regulatory compliance across different industries or product types.

Hypothesis 20: Return Policy moderates the relationship between Sales Performance and Product Return Decision.

The analysis shows that Return Policy significantly moderates the relationship between Sales Performance and Product Return Decision (H20, Coefficient = 2.030, T-statistic = 0.042, p = 0.042). It implies that the return policy influences the effect of Sales Performance on return decisions in place. Prior research has suggested that a lenient return policy can increase returns, particularly for products with below-average sales performance [30].

The findings of this study shed light on the moderating effects of Product Category and Return Policy on the relationships between various independent variables and Product Return Decisions in the pharmaceutical industry. The results show that both Product Category and Return Policy can influence the strength and direction of the relationships between certain independent variables (Product Safety Issues, Product Quality Issues, Expiration Date, Sales Performance, Regulatory Compliance) and Product Return Decisions. These insights offer valuable implications for pharmaceutical companies to tailor their return policies based on product categories and effectively address specific issues impacting return rates.

6. Conclusion

The present study employed Structural

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Equation Modeling (SEM) to examine the criteria influencing product returns in a pharmaceutical company. Through rigorous data analysis and hypothesis testing, the research findings provide valuable insights into the complex relationships between various factors and their impact on product return decisions within the pharmaceutical industry. The following key conclusions emerge from the study:

The study reveals that Product Quality Issues directly and significantly influence product return decisions. Customers are more likely to return pharmaceutical products with quality problems, such as defects or inconsistencies. As a result, pharmaceutical companies must prioritize stringent quality control measures, ensuring product excellence and minimizing the occurrence of returns.

Findings indicate that Product Safety Issues significantly affect product return decisions. Customers are sensitive to safety concerns; any perceived risks associated with pharmaceutical products can lead to higher return rates. Hence, pharmaceutical companies must invest in rigorous safety assessments and transparent communication to build customer trust and confidence, thereby reducing return rates.

The study demonstrates that the Expiration Date of pharmaceutical products plays a crucial role in product return decisions. Customers return products close to or past their expiration dates, seeking fresher and more effective medications. Effective inventory management and expiration date monitoring are essential for pharmaceutical companies to minimize returns and prevent product wastage.

Surprisingly, the study did not find a significant relationship between Sales Performance and product return decisions. Variations in sales performance do not strongly influence return rates in the pharmaceutical context. Nevertheless, pharmaceutical companies should maintain strong sales performance to ensure business success and customer satisfaction.

Compliance emerges as a critical factor influencing product return decisions. Customers are more likely to return pharmaceutical products that do not meet regulatory standards. Hence, pharmaceutical companies must strictly adhere to regulatory requirements, maintain product integrity, and uphold industry standards to minimize returns and mitigate legal repercussions.

The study explores the mediating role of Customer Satisfaction on the relationships between independent variables and product return decisions. While Customer Satisfaction partially mediates the relationship between Regulatory Compliance and product returns, it does not significantly mediate the relationships involving Product Quality Issues, Product Safety Issues, and Expiration Dates. It indicates that directly addressing these factors is pivotal for reducing product returns and enhancing overall customer satisfaction.

The study also investigates the moderating effects of Product Category and Return Policy on the relationships between independent variables and product return decisions. Product Category and Return Policies influenced the strength and direction of certain relationships, underscoring the need for tailored strategies based on product categories and return policies.

In conclusion, the research offers valuable guidance to pharmaceutical companies seeking to optimize their product return management strategies. Pharmaceutical companies can mitigate product return rates and foster customer loyalty by prioritizing product quality and safety, implementing effective inventory management and expiration date monitoring, maintaining regulatory compliance, and enhancing overall customer satisfaction. Furthermore, understanding the moderating effects of Product Category and Return Policy can lead to more targeted return management approaches. These insights provide a roadmap for pharmaceutical companies to streamline their return processes, reduce costs, and improve overall customer experiences, ultimately positioning them competitively in the pharmaceutical market. The study opens avenues for further

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research in the dynamic realm of product returns and customer satisfaction within the pharmaceutical industry.

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