IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Study On Optimization Of Inventory Management

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Abstract:

This study investigates key aspects of optimization of inventory management in the logistics and supply chain industry, aiming to enhance customer satisfaction, analyze the contribution of inventory management optimization to risk mitigation in the supply chain and check the impact of improved inventory management optimization on sustainability in the logistics and Supply chain industry. Through comprehensive analysis and research, various strategies and practices are examined like cross-tabulation to optimization of inventory management. The study explores factors such as inventory, risks, customer satisfaction, technology benefits, and much more. Additionally, it investigates the impact of automation, demand forecasting, etc. By identifying best practices and various solutions, this research gives appreciated perception concerning policymakers & professionals seeking to better inventory management, customer satisfaction, risk mitigation, and checking the impact of improved inventory governance in today's market environment.

I. Introduction:

A study on the optimization of inventory management derives into various undertakings, including inventory management, customer satisfaction, and improvement in the logistics and supply chain industry.

Globalization, technological advancements, and changing consumer demands continue to drive the dynamics and importance of the global market for the logistics and supply chain industry. Effective supply chain management and logistics are now essential for sustaining competitiveness and satisfying customer demands as more and more businesses operate globally. In this context, inventory management optimization is crucial because it forms the basis for improving both operational and financial effectiveness. Businesses can minimize stockouts, reduce excess inventory levels, and streamline inventory processes by leveraging automation tools, data analytics, and advanced algorithms. Businesses can improve overall performance, minimize supply chain risks, and react quickly to market fluctuations when they optimize their inventory. Additionally, it promotes sustainable business growth, improves customer satisfaction through on-time deliveries, and facilitates better resource allocation.

II. Literature Review:

The research of Katarína Teplicka from 2020. The author reviews the literature on inventory management. Inventory management is a crucial component of logistics, and since a company's inventories tie up cash and incur significant costs for stocking and upkeep, inventory management requires inventory optimization. The purpose of this contribution is to highlight the opportunities for optimizing the mining company's stocks throughout the granodiorite extraction process. Granodiorite stock optimization can be achieved by using the EOQ inventory optimization model, which determines the ideal amount of raw

material extracted based on economic factors like storage costs, the price of securing the material in the quarry, insurance costs, and other expenses.

As per Jayanti Tripathi Pandey's research (2023), the review study offers an all-encompassing examination of inventory model classification, emphasizing the integration of diverse fuzzy demand functions. One important development in the field is the inclusion of fuzzy sets theory in inventory models. The research highlights the significance of effectively locating relevant literature on this subject, making it an invaluable tool for anybody looking to investigate Systems of inventory that integrate fuzzy need functions. A thorough and methodical analysis of the most current developments in down-covered inventory management was required. Our objective was to present a clear summary of the major advancements in this area and to throw light on likely future research routes. Our assessment of several model elements.

The research of Muhammad Wali from 2021 It is hoped that the participants will be able to:1) Understand the supply plan; 2) Understand and regulate spare parts; and 3) Provide the commodities required in the remodeling process. 4) Manage spare parts efficiently and apply strategies. This service activity aims to provide training, coaching, and support for stock control management software. Establish the minimum inventory and degree of reordering for inventory optimization. 5) Assess the material planning system's operational performance to identify the main issues and potential solutions. The approach should be taken in carrying out the program.

III. Problem Statement:

The logistics and Supply Chain industry cannot properly function without better communication stock or inventory management, transportation, and also customer satisfaction. Inventory optimization management plays a crucial role. This was the main function which should not be missed. The researchers behind this research desire to learn how inventory management is done in the logistics and supply chain industry and how new technologies and customer satisfaction can be a positive knock on the market.

IV. Objectives of study:

- To check the impact of improved inventory management optimization on sustainability in the logistics and Supply chain industry
- To analyze the contribution of inventory management optimization to risk mitigation in the supply chain
- To evaluate the benefits inventory management optimization has on enhancing customer satisfaction.

V. Hypothesis:

H0: The improved inventory management optimization does not have any impact on sustainability in the logistics and Supply chain industry

H1: The improved inventory management optimization impact on sustainability in the logistics and Supply chain industry

H1: Accepted

H0: The inventory management optimization does not contribute to the risk mitigation in the supply chain

H1: The inventory management optimization does contribute to the risk mitigation in the supply chain

H1: Accepted

H0: Effective inventory management optimization does not contribute to enhancing customer satisfaction.

H1: Effective inventory management optimization does contribute to enhancing customer satisfaction.

H1: Accepted

VI. Research Methodology:

Through the use of a questionnaire, the details that are necessary for the study are collected from the various respondents like supply chain manager, logistics manager, warehouse manager, etc. Also used the SPSS tool to analyze data and statistical graphs and charts to know the accurate values.

VI. 1 Research design:

Quantitative and Qualitative research design.

VI. 2 Source of Data:

The data was collected with the help of a structured questionnaire through Google survey forms.

VI. 3 Data Collection method:

This research is grounded on both raw data & second-party data collection by the researcher, the idol research requires both types of data, Primary data as well as Secondary data, So during the study, the researchers used both types of data for data collection.

Secondary data was collected for depth knowledge from sources like websites, Journals as well as Internet.

VI.4 Population:

The Population for the study was managerial professionals associated with the logistics and supply chain industry. Such as CFS employees, Port employees, Freight Forwarders, and some Transport Agencies.

VI. 5 Sampling Method:

The researcher has used their convenient method for sampling or to collect responses from the samples.

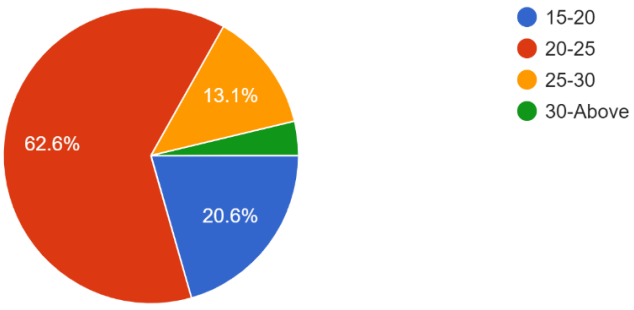
VI. 6 Data collection Instrument:

The study purposed to collect primary data through a questionnaire using the survey method to give precise, accurate, realistic, and relevant data.

VII. Data Analysis and Interpretation:

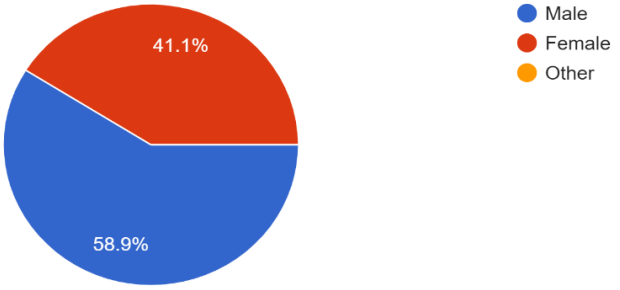
- **Graphic illustration**

Age Group:



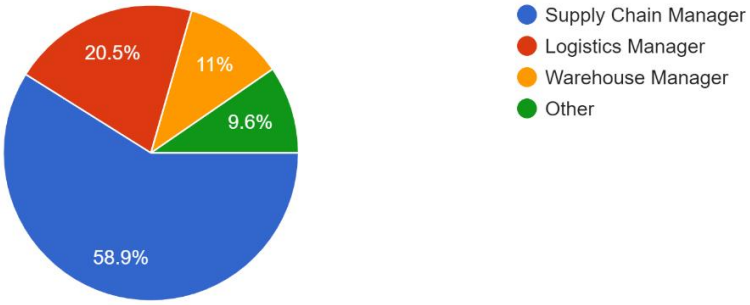
Analysis: From the above chart researchers have found that the age group between 20-25 has a large number of respondents 62.6%, followed by the age group between 15-20 years carrying 20.6%. with 13.1% of the age group between 25-30 carrying the third rank.

Gender:



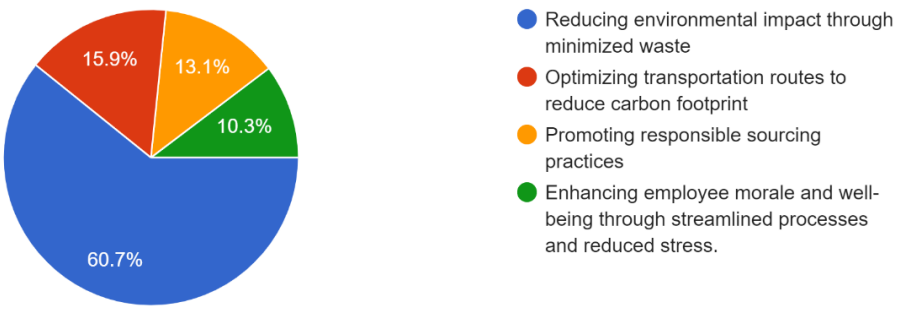
Analysis: From the above chart researchers have found that the male responds were 58.9% out of total number of responds and remaining were female respondents which were 41.1%.

What is your role within your organization?



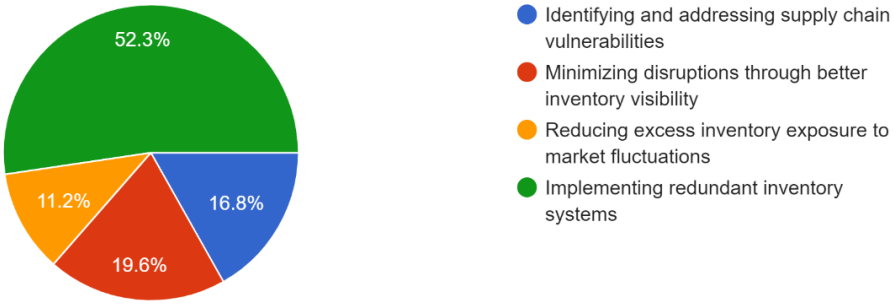
Analysis: From the above chart researchers have found that the role of supply chain managers has a large number of respondents carrying 58.9% out of the total number of respondents, while the role of logistics managers carries 20.5% of respondents with second rank, following with 11% and 9.6% from warehouse managers and others respectively.

What impact does improved inventory management optimization have on sustainability in the logistics and supply chain industry?



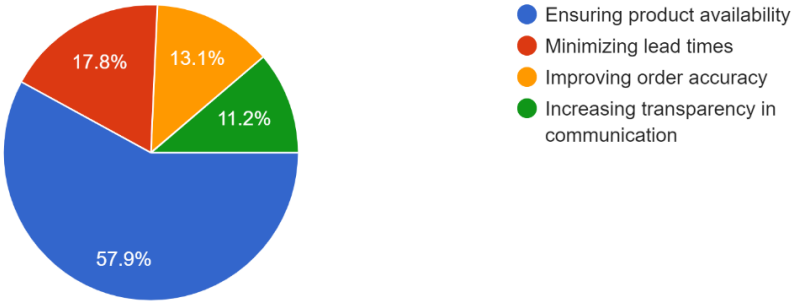
Analysis: From the above chart researchers have found the respondents majorly selected reducing environmental impact through minimized waste, then secondly 15.9% selected optimizing transportation routes to reduce carbon footprint, and further 13.1% and 10.3% selected promoting responsible sourcing practices and enhancing employee morale and well-being through streamlined processes and reduced stress respectively.

How does inventory management optimization contribute to risk mitigation in the supply chain?



Analysis: From the above chart researchers have found the respondents majorly selected Implementing redundant inventory systems 52.3%, then 19.6% selected minimizing disruptions through better inventory visibility and further 16.8% and 11.2% selected identifying and addressing supply chain vulnerabilities and reducing excess inventory exposure to market fluctuations respectively.

How does effective inventory management optimization contribute to enhancing customer satisfaction?



Analysis: From the above chart researchers have found that respondents mostly selected ensuring product availability as it had 57.9% secondly 17.8% selected minimizing lead times and further 13.1% and 11.2% improving order accuracy and increasing transparency in communication respectively.

VIII. Reliability Statistics

Case Processing Details			
		N	%
Cases	Valid	105	10.5
	eliminated[a]	894	89.5
	Sum	999	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability metrics	
Coefficient Alpha	No. of Items
.757	16

Explanation: Cronbach's alpha is an estimate of inner steadiness reliability, which judges how closely related a set of objects is as a set. It stages from zero to one, with better values indicating greater reliability. here's an interpretation primarily based on the Cronbach's alpha price you supplied:

Cronbach's alpha fee: zero.757

mild to appropriate internal consistency: The Cronbach's alpha value of zero.757 suggests slight to desirable inner consistency in a number of the gadgets for your dataset. which means the gadgets covered in your analysis are fairly reliably measuring the same underlying construct or idea.

IX. Normality Test

Tests of Normality							
	How does inventory management optimization contribute to risk mitigation in the supply chain?	K-S[a]			Shapiro-Wilk (normality)		
		Figures	df	(Sig.)	Statistic	df	(Sig.)
Age Group	Identifying and addressing supply chain vulnerabilities	.389	18	.000	.703	18	.000
	Minimizing disruptions through better inventory visibility	.357	21	.000	.756	21	.000
	Reducing excess inventory exposure to market fluctuations	.300	12	.004	.809	12	.012
	Implementing redundant inventory systems	.315	54	.000	.801	54	.000
Gender	Identifying and addressing supply chain vulnerabilities	.501	18	.000	.457	18	.000
	Minimizing disruptions through better inventory visibility	.372	21	.000	.633	21	.000

	Reducing excess inventory exposure to market fluctuations	.374	12	.000	.640	12	.000
	Implementing redundant inventory systems	.349	54	.000	.636	54	.000
What is your role within your organization?	Identifying and addressing supply chain vulnerabilities	.189	18	.090	.863	18	.014
	Minimizing disruptions through better inventory visibility	.251	21	.001	.764	21	.000
	Reducing excess inventory exposure to market fluctuations	.277	12	.012	.764	12	.004
	Implementing redundant inventory systems	.354	54	.000	.708	54	.000
How many years of experience do you have in supply chain management?	Identifying and addressing supply chain vulnerabilities	.305	18	.000	.840	18	.006
	Minimizing disruptions through better inventory visibility	.310	21	.000	.811	21	.001
	Reducing excess inventory exposure to market fluctuations	.300	12	.004	.809	12	.012
	Implementing redundant inventory systems	.318	54	.000	.775	54	.000
a. Lilliefors Significance Correction							

Explanation: The Shapiro-Wilk and K-Smirnov tests have been performed for each of these variables.

For these tests, the data's normal distribution is the null hypothesis.

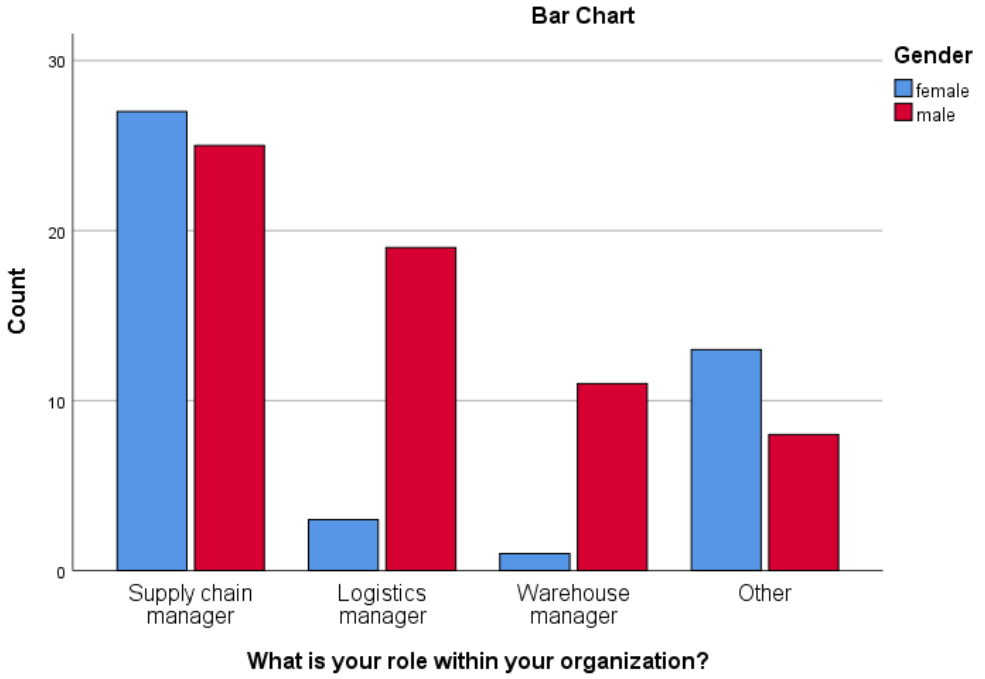
The statistics reported for each variable include the test statistic, degrees of freedom (df), and significance level (Sig.). These are the statistics that are presented for each variable.

A low probability value (usually under 0.05) suggests that the figures may not be regularly distributed and allows for rejecting the null hypothesis.

The figures in this instance are not normally distributed, as shown by the low p-values ($p < 0.05$) for each variable in the Shapiro-Wilk and Kolmogorov-Smirnov tests.

Cross Tabulations (1)

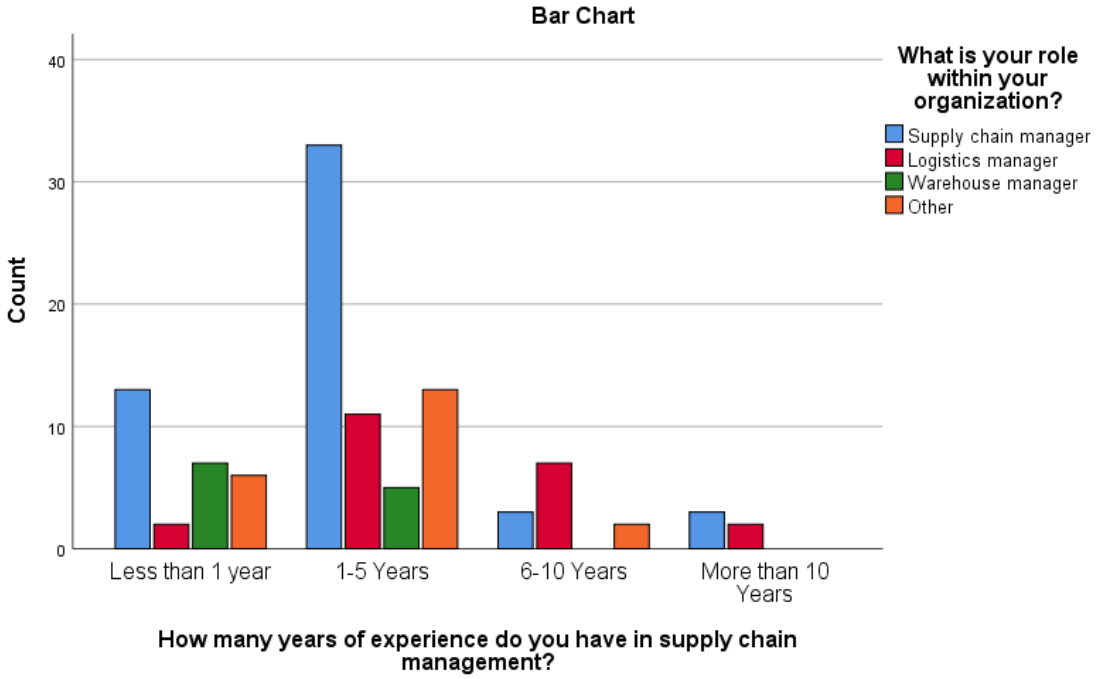
What is your role within your organization? * Gender Crosstabulation				
Count				
		Gender		Total
		female	male	
What is your role within your organization?	Supply chain manager	27	25	52
	Logistics manager	3	19	22
	Warehouse manager	1	11	12
	Other	13	8	21
Total		44	63	107



Interpretation: The crosstabulation shows the gender difference in different roles of respondents within the organization. The following table and graph show that supply chain manager females and males are 27 and 25 respectively. Whereas logistics manager females are 3 and 19 males respectively and warehouse managers and others are 12 and 21 respectively.

Cross Tabulations (2)

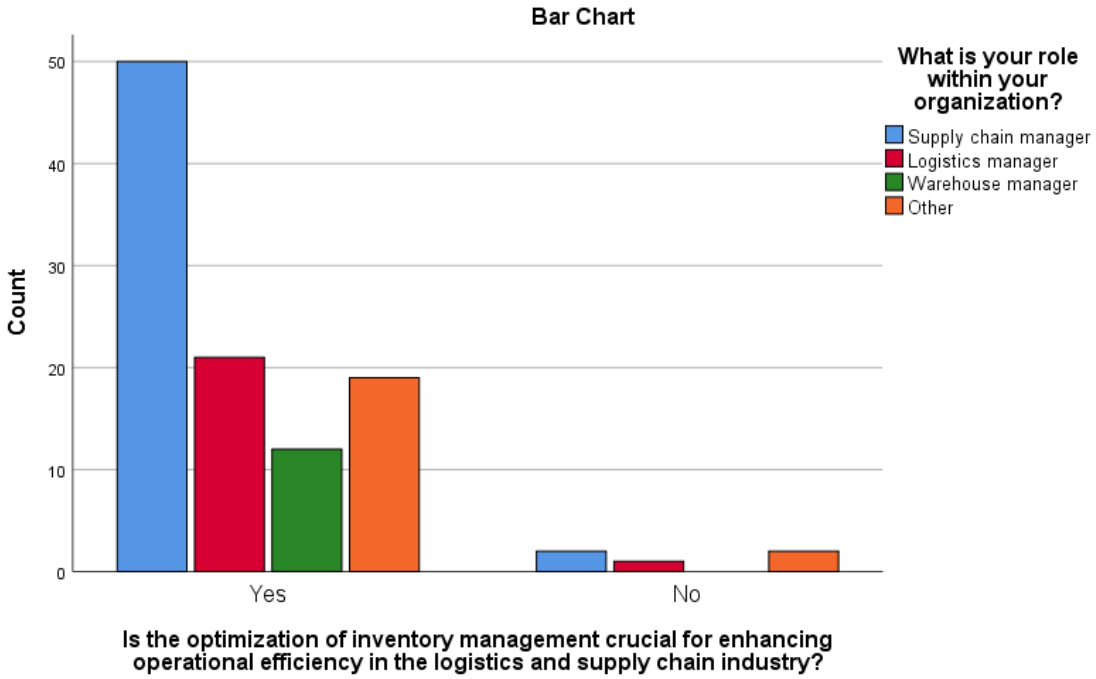
How many years of experience do you have in supply chain management? * What is your role within your organization? Crosstabulation						
Count						
		What is your role within your organization?				Total
		Supply chain manager	Logistics manager	Warehouse manager	Other	
How many years of experience do you have in supply chain management?	Less than 1 year	13	2	7	6	28
	1-5 Years	33	11	5	13	62
	6-10 Years	3	7	0	2	12
	More than 10 Years	3	2	0	0	5
Total		52	22	12	21	107



Interpretation The crosstabulation shows the role differences at different levels of experience in the following table and graph. Here supply chain managers with less than one year of experience are 13, then logistics managers are 2, and count of warehouse and others are 7 and 6 respectively. Then 1-5years experience SCM managers are 33 and logistics managers are 11, and warehouse and other are 5 & 13 respectively. Then 6-10years experience SCM managers are 3, logistics managers are 7, and warehouse and others are 0 & 2 respectively. Lastly, more than 10 years of experience is a total of 5. which shows that respondents with the role of the supply chain are more than other all roles.

Cross Tabulations (3)

Is the optimization of inventory management crucial for enhancing operational efficiency in the logistics and supply chain industry? * What is your role within your organization? Crosstabulation						
Count						
		What is your role within your organization?				Total
		Supply chain manager	Logistics manager	Warehouse manager	Other	
Is the optimization of inventory management crucial for enhancing operational efficiency in the logistics and supply chain industry?	Yes	50	21	12	19	102
	No	2	1	0	2	5
Total		52	22	12	21	107



Interpretation: The crosstabulation shows the different roles of respondents in the organization with their suggestions on the optimization of inventory management crucial for enhancing operational efficiency in this industry.

The result shows that more respondents believe that optimization of inventory management is crucial for enhancing operational efficiency in the logistics and supply chain industry.

Hypothesis Test (1):

H0: In the logistics and supply chain sector, enhanced inventory management optimization does not affect sustainability.

H1: The influence of better inventory management optimization on sustainability in the supply chain and logistics sector.
H1: Accepted

What impact does improved inventory management optimization have on sustainability in the logistics and supply chain industry? * What is your role within your organization? Crosstabulation						
Count						
		What is your role within your organization?				Total
		Supply chain manager	Logistics manager	Warehouse manager	Other	
What impact does improved inventory management optimization have on sustainability in the logistics and supply chain industry?	Reducing environmental impact through minimized waste	36	14	8	7	65
	Optimizing transportation routes to reduce carbon footprint	5	5	3	4	17
	Promoting responsible sourcing practices	4	2	1	7	14
	Enhancing employee morale and well-being through streamlined processes and reduced stress.	7	1	0	3	11
Total		52	22	12	21	107

Pearson Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.997[a]	9	.049
Likelihood Ratio (LR)	17.127	9	.047
Linear correlation Association	3.448	1	.063
No. of Valid Cases	107		
a. 9cells (56.3%) had an anticipated count of fewer than 5. The minimum predicted count is 1.23.			

Analysis: The probability value for the Pearson chi-square test in the provided analysis is 0.049, which is lower than the commonly used threshold level of 0.05.

We conclude to reject the null hypothesis when the probability value is less than 0.05. This suggests that, at the 5% significance level, there is a noteworthy correlation between the category variables under investigation.

Hypothesis Test (2):

H0: Improving customer satisfaction is not a result of optimizing inventory management effectively.

H1: Increasing customer satisfaction is a result of optimizing inventory management effectively.
H1: Accepted

How does effective inventory management optimization contribute to enhancing customer satisfaction? * What is your role within your organization? Crosstabulation						
Count						
		What is your role within your organization?				Total
		Supply chain manager	Logistics manager	Warehouse manager	Other	
How does effective inventory management optimization contribute to enhancing customer satisfaction?	Ensuring product availability	39	10	8	5	62
	Minimizing lead times	4	5	3	7	19
	Improving order accuracy	6	5	0	3	14
	Increasing transparency in communication	3	2	1	6	12
Total		52	22	12	21	107

Pearson Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.525[a]	9	.004
Likelihood Ratio (LR)	25.604	9	.002
Linear-by-Linear Association	10.376	1	.001
No. of Valid Cases	107		
a. 9 cells (56.3%) had an anticipated count of fewer than 5. The minimum predicted count is 1.35.			

Analysis: The probability value for the Pearson chi-square test in this analysis is 0.004, which is lower than the usually recognized significance threshold is 0.05.

As the probability value is fewer than 0.05, the H0 hypothesis is disproved. This suggests that, at a 5% significance level, there is a meaningful relationship between the category variables under investigation.

In essence, based on the observed data, the test results offer evidence to establish that it had a substantial link between the factors.

X. Findings:

This research investigation's primary goal was to ascertain the effects of enhanced inventory management optimization on sustainability in the supply chain and logistics sector.

• To assess the impact of optimizing inventory management on raising customer satisfaction.

After going through some major steps of analysis such as the Graphical, Cross tabulation, and Hypothesis testing analysis the researchers have found the following findings as follows:

• A more sustainable logistics and supply chain sector is impacted by enhanced inventory management optimization;

• Higher customer satisfaction is a result of efficient inventory management optimization.

Findings	Accepted or rejected
1. The improved inventory management optimization impact on sustainability in the logistics and Supply chain industry.	Accepted
2. The effective inventory management optimization does contribute to enhancing customer satisfaction	Accepted

XI. Conclusions:

The study explained the Optimization of stock management in the logistics and supply chain industry, to conclude the results with the help of various analyses done by researchers it was found that inventory management optimization very much contributes to an increase in overall business efficiency as it has major impact on sustainability in the logistics and Supply chain industry as well as it also contributes to risk mitigation in the supply chain and finally the effective inventory management optimization also contribute to enhancing customer satisfaction. So, in conclusion, we can say that effective inventory management optimization is very crucial in the logistics and supply chain industry.

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