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A Study on AI-Enabled Inventory Optimization and its Effect on Customer Experience

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Abstract
This study aimed at investigating the impact that Artificial Intelligence technology has on the management of inventories and client satisfaction levels. The main aim of this study was to evaluate the relationship that exists between AI technology in the management of inventories and client satisfaction levels based on various factors such as accuracy, speed, transparency, and communication efficiency, among others. The information obtained from the respondents was then used as input in deciding whether statistical tools such as correlation, regression analysis, and ANOVA can be applied in finding out how much influence AI technology has in managing inventories, and from this study, it is evident that AI technology in managing inventories leads to faster decision-making and client satisfaction.
Keywords: AI-driven Inventory Management, Predictive Analytics, Automation, Client Satisfaction, Supply Chain Optimization, Artificial Intelligence, Real-Time Tracking, Customer Experience.

Introduction

Artificial Intelligence (AI) is greatly affecting how organizations are able to manage their inventories through the application of smart technology as opposed to traditional ways of managing inventories manually. Organizations are able to use AI tools such as predictive analysis and learning to effectively plan for future stock requirements.

This ensures that organizations are able to meet customer demands in an efficient manner. AI technologies also help organizations in ensuring effective coordination in their departments and reducing errors in stock ordering or monitoring. This ensures that organizations are able to deliver quality products to customers in a timely manner, which is a major factor in ensuring customer satisfaction. The aim of this study is to evaluate the impact of AI-driven inventory management approaches in ensuring client satisfaction. This is a crucial aspect in ensuring that organizations are able to maintain customer loyalty through the effective implementation of AI technologies in their inventory management approaches. The aim is also to help organizations in understanding the role AI technologies play in ensuring customer satisfaction through effective stock management.

Background of the Study

Artificial Intelligence (AI) technology has revolutionized the traditional method of inventory management through the integration

of technology, automation, and data analysis. In the traditional method, there are certain challenges, such as stockouts, excess stock, and forecasting, which are common in the management of services, thereby impacting the level of service quality and client satisfaction. However, with the integration of AI technology, organizations are now in a position to forecast, manage, and replenish stock in an efficient manner, thereby reducing the cost of operation, the decision-making process, and accuracy in managing stock levels.

It is important to highlight the role played by AI technology in the management of services, with regard to client satisfaction, as the technology plays a vital role in the management of services, such as retail, manufacturing, and the automobile industry, in order to ensure the maintenance of service quality and client satisfaction in a competitive business environment.

Objectives of the Study

Primary Objective

- To assess the impact of AI-based inventory management practices on client satisfaction.

Secondary Objectives:

- To assess the role of AI tools like Predictive Analytics and Automation in efficient inventory management practices.
- To analyze the relationship between AI-based inventory management systems and efficient service delivery.
- To assess the role of AI integration in efficient communication across the organization.
- To assess the role of AI technology usage in building customer trust, satisfaction, and loyalty.

Review of Literature

1. David J. Piasecki (2003) – Inventory Management Explained

In the article, the author talks about the different inventory theories and techniques that link the accuracy of business processes with the results obtained in the field of customer service. The author states that with the help of technology and automation in business processes, organizations can attain efficiency in the field of inventory management, thus improving customer service.

2. Philippe Van Asbroeck, Bram Desmet & Lotte Verdonck (2021) – Inventory Optimization: Models and Simulations for Supply Chain Efficiency

In the article, the authors discuss the different advanced inventory models and the usage of artificial intelligence simulations in improving the overall efficiency of the supply chain. The article highlights the usage of artificial intelligence in improving the overall service provided to the customers.

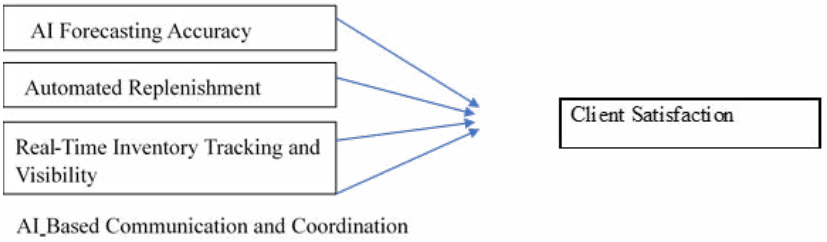
3. Robert H. Wessel & Eric P. Olsen (2019) – Lean Inventory Management

In the article, the authors discuss the lean concept in the field of inventory management. The authors conclude that with the help of data-driven technology, organizations can improve the overall efficiency of the business in delivering products to the customers.

F. Robert Jacobs & Richard B. Chase (2021) - Operations and Supply Chain Management

This book is a general understanding of how modern supply chains function, with a focus on the role of technology in improving supply chain operations. The authors discuss how the incorporation of artificial intelligence in inventory control improves decision-making,forecasting, and service reliability,thus increasing client satisfaction

Conceptual Framework



Correlation

Null Hypothesis (H□): There is no significant relationship between stock control and replenishment system.

Alternative Hypothesis (H□): There is a significant relationship between stock control and, replenishment system.

Correlations			
		1.Stock control [The agency manages spare part shortages efficiently.]	**2.Replenishment System [The ordering process for unavailable parts is smooth and timely.]**
1.Stock control [The agency manages spare part shortages efficiently.]	Pearson Correlation	1	.229*
		Sig. (2-tailed)	.018
	N	107	107
2. Replenishment System [The ordering process for unavailable parts is smooth and timely.]	Pearson Correlation	.229*	1
	Sig. (2-tailed)	.018	
	N	107	107

Interpretation

The correlation coefficient value is 0.229. This shows a low but positive correlation between stock control efficiency and the replenishment system. Moreover, since the value is < 0.05, this means that the correlation is statistically significant. This indicates that as the replenishment system becomes smoother, stock shortage is also efficiently handled.Regression

Null Hypothesis (H□): There is no significant effect of the replenishment system, service staff coordination, and inventory-service department cooperation on stock control

Alternative Hypothesis (H□): There is a significant effect of the replenishment system, service staff coordination, and inventory-service department cooperation on stock control.

Model Summary

Model Summary									
					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.459a	.211	.188	1.178	.211	9.156	3	103	.000
a. Predictors: (Constant), [Inventory and service departments cooperate effectively.], [Service staff coordinate well internally to handle requests.], 2. Replenishment System [Spare parts are replenished quickly when out of stock.]									

Interpretation

This is, however, not the case according to the regression analysis, where there is a combined effect of predictors on stock control, as shown by the regression being statistically significant (F = 9.156, Sig. = 0.000). Among these predictors, replenishment system and staff coordination have a significant impact, meaning that these factors have a positive impact on the availability of spare parts.

Oneway Anova

Null Hypothesis (H□): There is no significant difference among the groups in their perceptions of service performance factors such as issue resolution, clarity of delay explanations, and timeliness of service delivery.

Alternative Hypothesis (H□): There is a significant difference among the groups in their perceptions of service performance factors such as issue resolution, clarity of delay explanations, and timeliness of service delivery.

Anova

		Sum of Squares	df	Mean Square	F	Sig.
[Operational issues are resolved quickly]	Between Groups	7.364	3	2.455	1.253	.295
	Within Groups	201.795	104	1.959		
	Total	209.159	107			
[Delays are explained clearly by staff.]	Between Groups	17.248	3	5.749	3.992	.010
	Within Groups	148.341	104	1.440		
	Total	165.589	107			
[Service delivery delays are minimal.]	Between Groups	8.833	3	2.944	1.833	.146
	Within Groups	165.466	104	1.606		
	Total	174.299	107			
[Service delivery delays are minimal.]	Between Groups	9.308	3	3.103	2.025	.115
	Within Groups	157.851	104	1.533		
	Total	167.159	107			

Interpretation

The ANOVA results show that most variables have Sig. values greater than 0.05, indicating no significant difference among groups in perceptions of service performance. However, for "Delays are explained clearly by staff" (Sig. = 0.010 < 0.05), there is a significant difference, meaning some groups perceive that staff explain delays more clearly than others. Overall, communication about delays appears to vary significantly, while other service aspects are viewed similarly across groups.

Summary of Findings

- Most respondents were young and middle-aged individuals with almost equal numbers of male and female respondents.
- Respondents felt that sometimes spare parts were not available.
- The replenishment process for unavailable items was inefficient.
- Coordination and communication between departments were weak.
- Several respondents faced service delays and poor communication about them.
- Correlation analysis revealed a weak positive relationship between stock control and replenishment efficiency.

- Regression analysis revealed that replenishment systems and staff coordination have a significant impact on stock availability.
- ANOVA analysis revealed that perceptions about delay communication were significant between respondent groups.
- Finally, it may be noted that efficient inventory management increases client satisfaction, and delays and poor communication decrease it.
- Moreover, it may be noted that the study suggests that adoption of AI-based systems in inventory management may be beneficial in terms of increased efficiency and customer satisfaction.

Conclusion

The study established that replenishment efficiency as well as the cooperation of the staff have a bearing on the availability of the stock. Effective communication as well as the replenishment of stock help in the delivery of quality services, thus enhancing customer satisfaction. Effective use of AI in the management of the inventory level helps in the delivery of quality services. Effective use of AI helps in the efficient delivery of services as the systems are efficient in the tracking of the stock level. Effective use of AI helps in the delivery of quality services as the systems are efficient in the delivery of services. Effective use of AI helps in the delivery of quality services as the systems are efficient in the delivery of services. Effective use of AI in the management of the stock level helps in the delivery of quality services, thus enhancing customer

References

1. Chopra, S., & Meindl, P. (2016). Supply Chain Management: Strategy, Planning, and Operation. Pearson. DOI: 10.1007/978-1-137-56601-5.
2. Ivanov, D., Tsipoulanidis, A., & Schönberger, J. (2017). Global Supply Chain and Operations Management: A Decision-Oriented Introduction to the Creation of Value. Springer. DOI: 10.1007/978-3-319-24217-0.
3. Marr, B. (2018). How Walmart Is Using Machine Learning, AI, IoT, and Big Data To Boost Retail Performance. Forbes. Retrieved from Forbes.
4. LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436-444. DOI: 10.1038/nature14539.
5. Hyndman, R. J., & Athanasopoulos, G. (2018). Forecasting: Principles and Practice. OTexts. Retrieved from OTexts.
6. Prasad, R., Kamal, S., Sharma, P. K., Oelmüller, R., & Varma, A. (2013). Root endophyte Piriformospora indica DSM 11827 alters plant morphology, enhances biomass and antioxidant activity of medicinal plant Bacopa monniera. Journal of Basic Microbiology, 53(12), 1016-24. DOI: 10.1002/jobm.201200119.
7. Briggs, G. G., Freeman, R. K., & Yaffe, S. J. (2011). Drugs in Pregnancy and Lactation: A Reference Guide to Fetal and Neonatal Risk (9th ed.). Baltimore: Williams & Wilkins. DOI: 10.1097/01.ogx.0000398926.32420.c3.
8. Dastin, J. (2018). Inside Amazon's Artificial Intelligence Flywheel. Reuters. Retrieved from Reuters.
9. Baigorri, M., & Gomez, J. (2019). Zara's Secret to Success: Big Data and AI. Bloomberg. Retrieved from Bloomberg.
10. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An Introduction to Statistical Learning with Applications in R. Springer. DOI: 10.1007/978-1-4614-7138-7.
11. Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press. DOI: 10.1016/j.artmed.2016.10.003.

12. Sutton, R. S., & Barto, A. G. (2018). Reinforcement Learning: An Introduction. MIT Press. DOI: 10.1109/TNN.1998.712192.
13. Cambria, E., & White, B. (2014). Jumping NLP Curves: A Review of Natural Language Processing Research. IEEE Computational Intelligence Magazine, 9(2), 48-57. DOI: 10.1109/MCI.2014.2307227.
14. Kotsiantis, S. B., Zaharakis, I., & Pintelas, P. (2007). Supervised Machine Learning: A Review of Classification Techniques. Emerging Artificial Intelligence Applications in Computer Engineering, 160, 3-24. DOI: 10.1.1.89.4028.
15. Zhong, R. Y., Xu, X., Klotz, E., & Newman, S. T. (2017). Intelligent Manufacturing in the Context of Industry 4.0: A Review. Engineering, 3(5), 616-630. DOI: 10.1016/J.ENG.2017.05.015.
16. Kumar, V., Batista, L., & Maull, R. (2011). The Impact of Operations Performance on Customer Loyalty. Service Science, 3(2), 158-171. DOI: 10.1287/serv.3.2.158.
17. Manyika, J., Chui, M., Miremadi, M., Bughin, J., George, K., Willmott, P., & Dewhurst, M. (2017). A Future That Works: Automation, Employment, and Productivity. McKinsey Global Institute. Retrieved from McKinsey.
18. Jobin, A., Ienca, M., & Vayena, E. (2019). The Global Landscape of AI Ethics Guidelines. Nature Machine Intelligence, 1(9), 389-399. DOI: 10.1038/s42256-019-0088-2.
19. Christopher, M. (2016). Logistics & Supply Chain Management. Pearson UK. DOI: 10.4324/9781315212140.
20. Haug, A., Zachariassen, F., & van Liempd, D. (2011). The Costs of Poor Data Quality. Journal of Industrial Engineering and Management (JIEM), 4(2), 168-193. DOI: 10.3926/jiem.2011.v4n2.p168-193.