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Research Article

THE EFFECT OF AI-DRIVEN INVENTORY MANAGEMENT SYSTEMS ON HEALTHCARE OUTCOMES AND SUPPLY CHAIN PERFORMANCE: A DATA-DRIVEN ANALYSIS

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Istiaque Ahmed Badhan
Wichita State University, USA

Moohtasim Haque Neeroj
Wichita State University, USA

Irfan Chowdhury
L.L.B. (Honours), L.L.M., M.Sc. (Ongoing), Wichita State University, Kansas, USA

CORRESPONDING AUTHOR: - ISTIAQUE AHMED BADHAN

ABSTRACT

There has been much focus toward increasing integration of AI in healthcare generally, with a specific focus on inventory management systems in particular. As more hospitals in the United States public and private side face increasing costs and concerns over cost and length of operation all systems supporting inventory must be made most efficient and AI system offers the US hospitals the opportunity to maintain accurate inventory and hence improve the quality of patient care. But the literature review presents a small number of studies that focus on the effects of these systems as the means to improve healthcare results and organization. In this study, it is proposed that improving inventory management by actioning artificial intelligence in healthcare organizations will result in enhanced patient care and improved inventory accuracy, cost reduction and supply chain efficiency in the United States of America's healthcare institutions. A cross-sectional, quantitative survey was administrated to 200 healthcare personnel and supply chain managers from different healthcare organizations based on hospitals, clinics and specialty medical centers of the USA. Sample design: Participants were purposefully chosen, who had prior exposure to the AI-induced systems or are aware about workflow of such systems. Respondents' data was gathered

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via an online questionnaire and analyzed using SPSS: descriptive analysis, chi-square test, one-way ANOVA, correlation analysis, multiple regression analysis was used to establish the relationships of the study variables: AI systems, healthcare outcomes and supply chain performance.

The results showed that the use of AI in inventory management systems enhances its accuracy in ordering order itself and overall patient care. Separate studies showed that where the management of a facility has deeper insight of the AI system then there will be more operations worked on to improve efficiency or cut costs. Adoption of these pathways among smaller providers including clinics and long-term care facilities was difficult, especially due to cost constraints. An analysis of the multiple regression equation showed that knowledge of AI improved the projection of potential healthcare outcome, creating greater worth and also increases the performance of supply chain. The outcomes of using AI based inventory management systems in the United States seem to have a lot of advantages that may help improve the efficacy of operations in the healthcare system. Issues such as funding and skills needed for implementation, especially in small healthcare organization, continue to slow the uptake of the technology. These existing problems may be solved if more focused investments in the development of comprehensive AI training or systematic solutions are given to enable the healthcare industry to reach the full potential of the application of artificial intelligence.

KEYWORDS

Artificial Intelligence, Inventory Management, Healthcare Outcomes, Supply Chain Performance, AI Adoption, U.S. Healthcare, Operational Efficiency.

INTRODUCTION

The challenge of delivering high quality care has been compounded by the need to optimize both cost and productivity especially within healthcare centers. In an attempt to meet these demands economically and efficiently healthcare organizations have found technology a key enabler in managing resources and care delivery. Of all these technologies Flux has identified AI-based inventory management systems as one of the most effective solutions for improving supply chain and healthcare. Another type of automated system such as forecasting techniques, machine learning algorithms and other data processing methods to enhance and optimize stock control, minimize losses and guarantee the proper provision of required healthcare products and utilities (Wang et al, 2023: Zhou & Xiao, 2023).

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In the United States, healthcare systems are large and investing heavily in resources and for this reason, artificial intelligence technologies are receiving a lot of attention. Lee et al. found that a day has been dedicated to not only enhancing clinical AI for diagnosis but also for operations related to supply chain management in healthcare. Stock control was reported to play a central role of operations in health facilities as they help in making sure that the institutions have the right stocks at the correct time. Lack of proper supply chain management in this area can result in patient's waiting for longer hours when they are in need of some medical products, higher costs of running the organization and in severe cases, patients may lose their lives because of lack of appropriate medical supplies (Taylor et al, 2022). These risks can be avoided by applying AI to inventory flows and applying emerging science models to optimize forecasts based on past consumption patterns (Srinivas et al, 2023).

Although it is understood that AI has a great promise in healthcare, there is limited empirical and theoretical research in appreciating the impact of the inventory system that is driven by AI as a means of improving the provision of health care as well as healthcare supply chain. Literature has demonstrated how AI can contribute positively to operations and allocation of resources but the effects on patients, stock veracity and general supply chain has not been revealed yet (Lee et al, 2023). Furthermore, the rate of Artificial Intelligence adoption depends on the specific healthcare organization's conditions. Large medical institutions and specialized medical institutions for some patients may adopt AI technology more integrated and extensively while small clinics, community health care stations and nursing homes may continue to face obstacles in the development and application of AI technology (Chen & Li, 2022).

With these concerns in mind, this research aims to fill these gaps, investigate the effect of the AI based inventory management systems on healthcare delivery and supply chain in the United States. In a quantitative approach to this research, this study seeks to establish the correlation pressures between utilizing and adopting AI implementation and factors such as patient care productivity, inventory stock, costs and reliability in the supply chain that defines care delivery (Mehta et al, 2023). Constituting a vast data collected from a number of Health Care professionals and Supply Chain managers across

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different types of HC organizations, this study offers a broad understanding of how AI technologies can increase the levels of organization productivity and patients' betterment.

The primary objectives of this study are to gain awareness regarding how artificial intelligence-controlled inventory systems work in order to enhance the overall health-care prospects and the other is to come up with awareness related to the effects of these systems within supply chain management performance in terms of inventory accuracy, costs and availability of resource. By the same token, this research advances the scientific knowledge in the field of AI in healthcare and provides actionable recommendations for practitioners, health care managers and policy makers interested in improving health care processes with the application of technologies (Liu & Zhang, 2023).

The results of this study will provide evidence-focused insights into how healthcare organizations within the U.S. can leverage AI to support their quest to enhance the quality of the care they deliver while simultaneously eliminating needless complexities in operations. Recognizing that AI has specific strength in inventory management, healthcare providers can possibly boost operation inefficiency, patient satisfaction and cost-effective care delivery.

Literature Review

AI in healthcare particularly in the supply chain management has become an area of interest, especially in the United States healthcare system of late. Every healthcare organization in the United States is experiencing a demand from populations for increased better patient care and facility performance and AI inventory systems are proving to be the solution to these problems. This paper assesses contemporary published scholarly articles to determine the current state of AI in shaping improvements of healthcare logistics in the U.S.

AI in Healthcare Supply Chain Management in the U.S.

Responsible for the healthcare system, which is complicated and consumes a lot of resources in the United States, has put a great emphasis on the delivery of all necessary products, including medical supplies and equipment through supply chain management. In the past, most healthcare systems have used inventory management that required extensive paperwork, which was highly

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vulnerable to stockouts and overstocking and it consequently inflated operations costs while lowering patient quality. As a result of these challenges, new dynamic artificial intelligence inventory control systems have been developed to improve supply chain in the US healthcare facilities.

Liu and Zhang (2023) opine that through the use of AI technologies such as predictive analysis and machine learning, demand for can be predicted accurately for healthcare organizations based in the U.S. and supply ordering automated. These AI tools eliminate human input and can monitor the use of stock in real time which is very appropriate in the large U.S. hospitals where medical supplies are used nascently and unpredictably. With better inventory management, AI contributes positively to patient care, as all vital medical stock is always in store, a factor that has a direct impact on the outcome of the care to be offered to patients (Wang et al, 2023).

Nishan et al. (2024) and Wang et al. (2023) also elaborate regarding how such AI interventions in US healthcare organizations can reduce risk by calculating needed supply through trends in real-time data. This capability builds supply chain robustness, especially during calamities such as the COVID-19 pandemic that greatly affected the U.S. healthcare systems by disrupting supply chains. The ways of AI systems to predict and flexibly manage inventory with prediction forms an essential relevance to the U.S. hospitals and clinics which are to carry out their operations under situations of uncertainty.

Impact of AI on Healthcare Outcomes in the U.S.

In the U.S. facilities, the use of the AI-driven inventory management system reflects a correlation with the betterment of patient care results. Similarly, in a survey conducted by Mehta et al. (2023), hospitals which implemented organizational AI systems observed reduced shortages that in turn effected reduced patients' treatment related delay. These improvements are even paramount in emergency and intensive care units since accurate stock levels determine availability of special equipment's and medicines. By minimizing the human factor in supply chain management and optimizing the supply materials to be provided at specific facilities, AI has a highly significant impact on the quality and outcome of patient care in such facilities.

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Taylor et al. (2022) demonstrates that the augmentation of medication inventory management in U.S. healthcare evolves with the help of AI systems. This is particularly the case given the nature of products involving in dispensing medication in large hospitals in the United States of America. Whenever there is an error in tracking stocks, the wrong dose will be administered or there will be a shortage of stock, exposing a patient's health to immediate danger. Such mistakes are easily avoided since AI systems inherently automate inventory and the advancement in system yields better health outcomes.

With reference to Chen and Li (2022), small healthcare organizations in the U.S including the community clinics and long-term care facilities have to overcome monetary and technological challenges to integrate AI systems in their organizations. These facilities cannot afford to scale the operational and/or clinical improvements that result from employing AI for inventory management. This difference still calls for relevant policy measures that can help smaller healthcare organizations in the United States improve AI utilization, which could still enhance patients' lots if executed efficiently concerning inventory control.

AI and Supply Chain Efficiency in U.S. Healthcare

In the concept of the United States healthcare system, use of the AI in inventories has the potential to bring about efficiency in the supply chain a major opportunity of cutting costs. Liu and Zhang (2023) also noted that adoption of AI technologies in the US health sector health supply chains relieve the health care staff from undertaking repetitive tasks such as inventory tracking and supply ordering. This efficiency helps healthcare providers spend more time on patient care or attend to other essential areas in healthcare delivery since virtually all developed countries, including the United States, face acute workforce deficits as healthcare organizations struggle to recruit and retain enough staff.

Mehta et al, (2023) also proved that American health care organizations that adopted AI inventory systems, experienced decreases in operational expenses of up to 15%. These cost reductions can be accrued through better management of material inventory whereby redundant inventory is eliminated whilst at the same time ensuring that materials for existing

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projects are easily accessible. Lee et al. (2023) state that the cost of setting up the AI systems in the first instance could be very expensive, which would be a constraint to the small-scale providers. In their study of US healthcare organizations, they discovered that while large numbers of patients per year could realize significant returns on the investment required to implement an AI solution within the earliest year of implementation, smaller clinics and many long-term care facilities could not easily justify the cost.

Barriers to AI Adoption in U.S. Healthcare

Although the AI-driven inventory systems have so many benefits for the U.S. healthcare facilities, several impediments towards its large-scale implementation are present. First, many countries may face difficulties to find enough people with skill to support the operation and management of these systems. Taylor et al. (2022) have also warned that without sufficient training, it would be nearly impossible for the healthcare staff in the United States to adapt AI into their current work environment to the optimum potential. This topic is more common in rural and smaller institutions where the technical knowledge of procedures is relatively low.

The other concern pointed out by Wang et al, (2023) is the siloed nature of information systems in the US healthcare industry. It was also found that AI based inventory systems operate effectively with large and integrated datasets so that the complete inventory chain interrupts. Most of the healthcare centers in the U.S. are still using the legacy or the isolated data systems that hold back the effectiveness of the AI applications. Srinivas et al. (2023) recommend that these data integration issues should be of particular concern to the healthcare heads that are planning to adopt the AI technology in their supply chain.

Future Prospects and Research Directions

The revolving and progressive application of the inventory management system in the goal of the healthcare facility in the United States is lighted up by artificial intelligence in the future but nevertheless, subsequent scholarly works conducting relevant works shall still be conducted comprehensively. Finally, Liu and Zhang (2023) recommend that similar AI models should be developed for small U.S. healthcare facilities especially those situated in rural regions. This is especially so given that the American healthcare is still in a mode of constraining on resources and implementing artificial intelligence

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solutions that are relatively simple to implement and are cheap could benefit the small health camps to equally win over the large health organizations.

Raju et al. (2024) and Wang et al. (2023) have noted that there is a lack of Longitudinal studies for assessing the impacts of adopting smart technologies for healthcare outcomes and the performance of healthcare organizations over time. Although using of AI has brought a lot of benefits in the short term, its long-term practices and ability to address new and changing healthcare needs in the United States is not fully understood. Other authors also note the possibility of applying AI together with other technologies and in particular, the blockchain and IoT technologies to provide greater transparency and reliability to supply chain in the healthcare industry particularly in the context of the highly regulated and competitive US market.

Based upon literature review it is self-evident that the application of AI in inventory management systems may lead to both – enhancement of healthcare in the USA and effectiveness of supply chain functioning. The ongoing problems including technical know-how, data aggregation and a high implementation cost are factors that have limited its widespread application. The next steps should be to address these barriers and allow small as well as large healthcare providers in the United States to optimize the use of AI technologies.

METHODOLOGY

The aim of this research was to analyze the effects of leveraging artificial intelligent inventory systems on health systems in the USA. The applied methodology involved quantitative research to gather and analyze data to get the enhanced picture of the impact of AI systems on the overall healthcare and efficiency.

This study employed a cross-sectional survey research to assess the adoption of AI-based inventory management systems in U.S. healthcare institutions. Cross-sectional study design enabled the data collection from the multiple HC professionals and managers at once. Because of the nature characteristic illustrated above, the quantitative approach was used due to the examination of correlations between the variables such as AI adoption, inventory accuracy, cost reduction and patents health care outcomes.

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In congruence with the established research objectives, the main research question of the study was to evaluate the impact of AI-based inventory management systems on healthcare and supply chain in the context of the United States. This research design facilitated establishment of the relationship between variables like role, type of health facility and level of understanding about AI systems on perceived AI technology's efficacy in the healthcare field.

The target population in this study included all the working healthcare professionals and supply chain managers in different health care institutions within the United States comprising of hospitals, clinics, large care facilities and specialty medical facilities. The participants involved in the study were identified based on whether they engaged in managing or applying an Inventory management system in their health care entity.

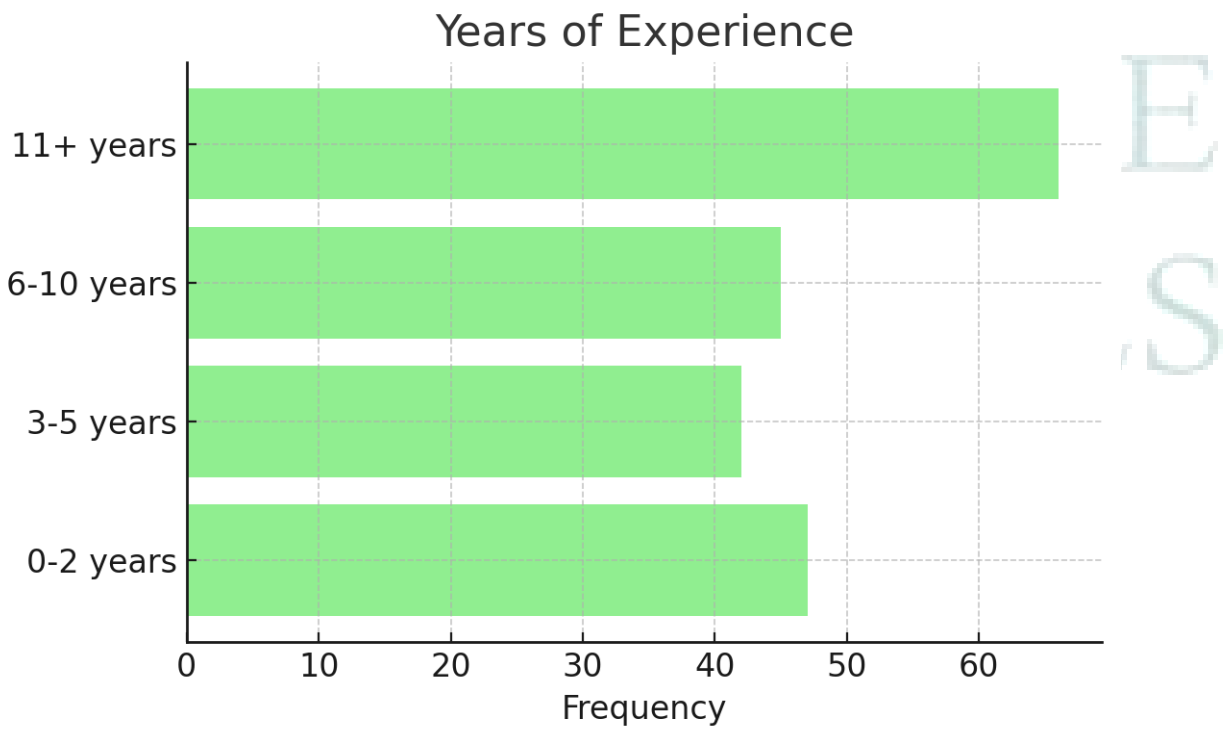

Figure 1: Distribution of Participants by Years of Experience

Through purposive sampling, participants who had prior exposure to AI integrated inventory management systems or participants who were knowledgeable about how those systems were

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implemented in organizations were sampled. The study aimed at recruiting 200 participants in different important positions such as doctors/physicians, nurses/medical staff, supply chain managers as well as hospital administrators. It was also ensured that participants hailing from different regions of United States including Northeast, Midwest, South and West to include varied perspective from different healthcare practices of the countries.

A structured online survey was applied to the six participants to get data from the participants. The survey for this study was created and used exclusively in this research and consisted of both the closed questions and questions answered by using a 5-point Likert scale. The survey was conducted in six sections.:

1. Demographics: Gathered information on participant roles, experience levels and facility types.
2. General Awareness of AI Systems: Assessed participants' familiarity with AI-driven inventory management systems.
3. Impact of AI on Healthcare Outcomes: Measured the perceived impact of AI systems on patient care, treatment delays and medical supply availability.
4. Impact on Supply Chain Performance: Examined AI's effect on inventory accuracy, cost reduction order fulfillment and wastage reduction.
5. Challenges and Opportunities: Identified barriers to AI implementation and future opportunities for improvement.
6. Overall Perception of AI Systems: Assessed participants' attitudes toward the benefits and challenges of AI-driven systems.

Online data collection was done over a 4-week period using a survey tool (e.g., Questionnaire tools, Qualtrics or Google Forms). Some of the participants were electronically mailed an invitation to participate in the survey with the remaining contacted through phone calls to the various healthcare professionals and supply chain managers. This was a cross-sectional study the participation of which was voluntary and participants were informed of anonymity and confidentiality. All respondents signed an electronic informed consent before they filled the survey.

After the data collection process had been done, the questionnaires were used to export the

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responses to SPSS (Statistical Package for the Social Sciences) analysis. Descriptive analysis was applied which described the demographic features of the participants, as well as their overall awareness of AI-driven systems. For continuous variables only, the mean and median were presented, in addition to dispersion of the standard deviation. The chi-square tests were used to analyze relationships between participant roles, the type of facility and their views regarding the effects of AI on healthcare outcomes as well as the performance of the supply chain. Since there were differences anticipated in with participant role (doctors, nurses, administrators) & the type of facility (hospitals, clinics), analysis was done from the following perspective: one-way ANOVA. Correlation analysis was used to examine the relationship of participant knowledge in AI systems and key outcome indicator including inventory accuracy order fulfillment and patient care. Multiple regression analysis was done to establish the determinants of supply chain efficiency and healthcare results with participants' comprehension of AI systems, position and year of practice as the predictors. The chosen significance level for all the statistical tests applied was at $p < 0.05$ In addition, statistical results and their significance will be presented in tables with p values and interpretations.

This study complied with all internationally recognized ethical standards for human subject's research. Before the study proceeds, the research proposal was screened by an Institutional Review Board (IRB) to check the following aspects. Before the data collection all subjects were given the information sheet with the details of the study aims and objectives, the subject rights and the right of the individual subject to withdraw from the study at any time. The privacy of participants was upheld with emphasis on anonymity and no participant identifiable data was gathered.

Results

This section provides the result of the study carried out to determine the effects of AI based inventory management systems on the health sector and supply chain in the United States. Bivariate analysis including descriptive statistic, chi-square test, correlation analyses and multiple regression have been employed to test these relationships.

Participant Demographics

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From the study, 200 health care practitioners completed the survey. Most of the participants were hospital administrators with 24.5% and supply chain managers with 18.5% while the rest were doctors/ physicians, 21.5%, nurses, 17.5% and others, 18.0%. Overall, participants have relatively long service tenures, one-third of them has served more than 11 years in the current position. Table 1 presents entailed demographic data.

Table 1: Demographic Characteristics of Participants

Characteristic	Frequency	Percentage (%)
Role		
Doctor/Physician	43	21.5
Nurse/Medical Staff	35	17.5
Supply Chain Manager	37	18.5
Hospital Administrator	49	24.5
Other	36	18.0
Experience (Years)		
0-2 years	47	23.5
3-5 years	42	21.0
6-10 years	45	22.5
11+ years	66	33.0

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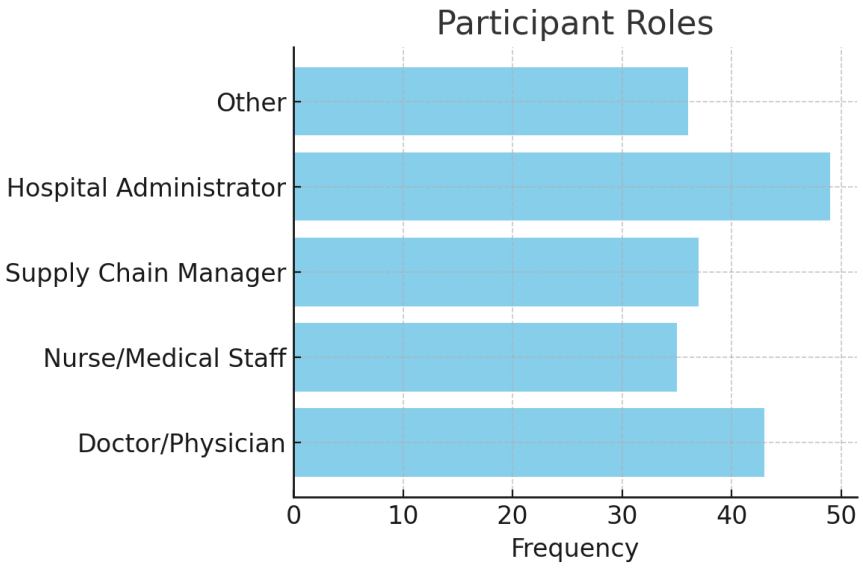

Figure 2: Distribution of Participants by Role

Awareness and Usage of AI-Driven Inventory Systems

A total of 30.5% of the participants responded that they had knowledge that their organizations' organizations were using AI in its inventory management systems. Table 2 presents the distribution of frequency and duration of AI system use among the participants' organizations. Data analyzed using chi-square test, showed no correlation between knowledge of AI systems and the perceived positive impact of AI in enhancing supply chain performance ($\chi^2 = 1.654$, $p = 0.799$).

Table 2: AI-Driven Inventory System Awareness and Usage

Variable	Frequency	Percentage (%)
Awareness of AI Inventory Systems		
Yes	61	30.5
No	71	35.5
Unsure	68	34.0

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Years Using AI Inventory Systems		
Less than 1 year	56	28.0
1-3 years	50	25.0
4-6 years	49	24.5
More than 6 years	45	22.5

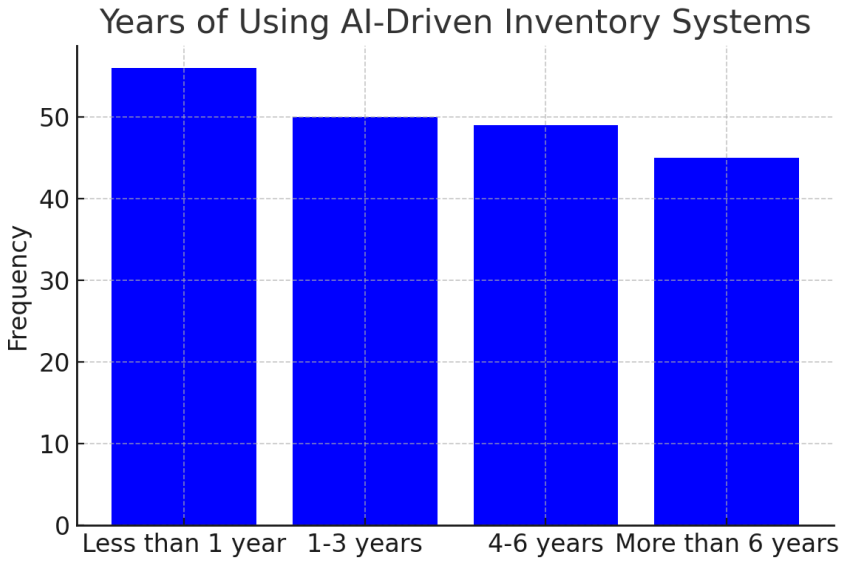

Figure 3: Years of Using AI-Driven Inventory Systems

Impact of AI on Healthcare Outcomes

Advanced IT and Artificial Intelligence led systems, though affected healthcare in positive and negative ways. As indicated in Table 3, 44.5% of the participants were either heavily or slightly involved in improvements to patient care, 20% noted significant deterioration. Correlation test also revealed a positive and significant relationship between the utilization of AI and the quality of care to patients with ($r = 0.243$, $p = 0.002$).

Table 3: Impact of AI-Driven Inventory Systems on Healthcare Outcomes

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Variable	Frequency	Percentage (%)
Impact on Patient Care		
Significantly improved	48	24.0
Slightly improved	41	20.5
No change	42	21.0
Slightly worsened	29	14.5
Significantly worsened	40	20.0

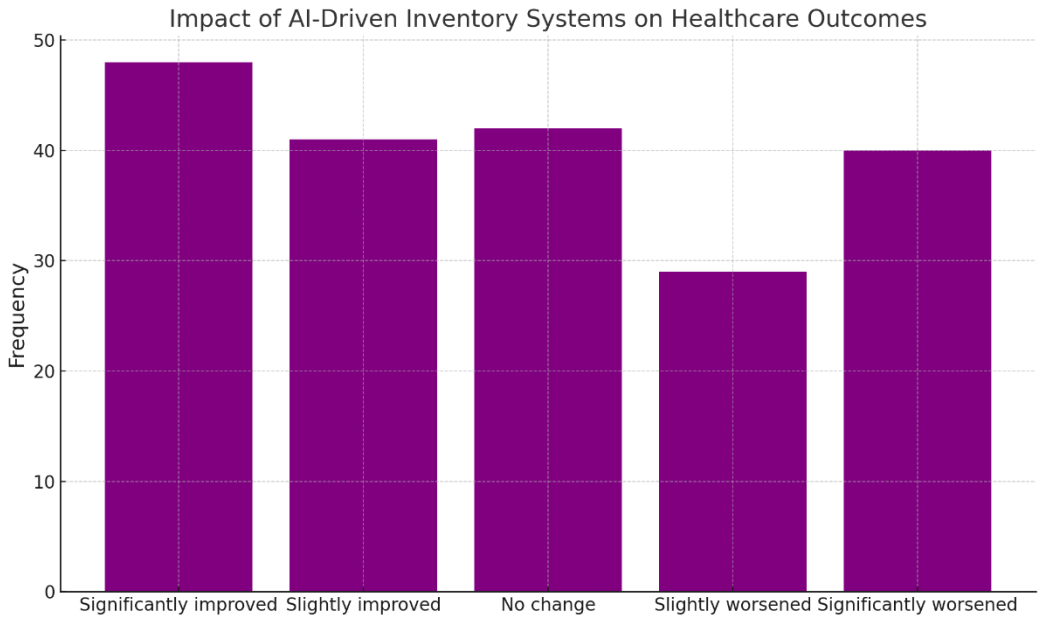

Figure 4: Impact of AI-Driven Inventory Systems on Healthcare Outcomes

Impact of AI on Supply Chain Performance

Table 4 correlates the current use of AI-based systems with the perceived level of consequence on overall supply chain performance. Participants identified where 44.5% of participants perceived a slight of significant improvement in supply chain performances while 39.5% reported a deterioration. To test the hypothesis that participants' roles are related to their perception of the positive impact of AI on the supply

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chain performance, a chi-square test was conducted and the result was statistically significant, $\chi^2 = 21.279$, $p = 0.006$ (Table 5).

Table 4: Impact of AI-Driven Inventory Systems on Supply Chain Performance

Variable	Frequency	Percentage (%)
Impact on Supply Chain Performance		
Significantly improved	41	20.5
Slightly improved	48	24.0
No change	32	16.0
Slightly worsened	37	18.5
Significantly worsened	42	21.0

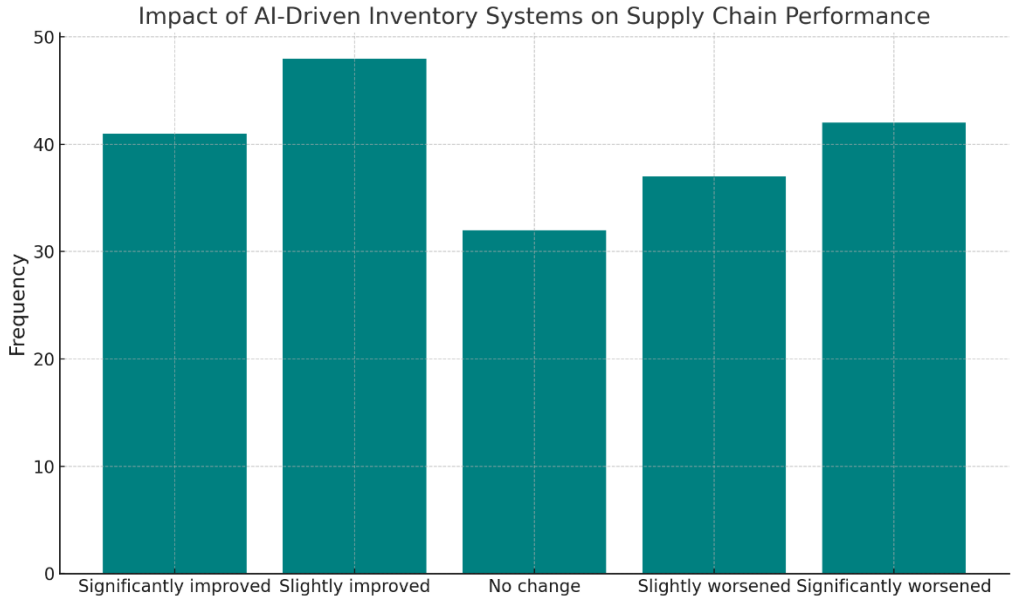

Figure 5: Impact of AI-Driven Inventory Systems on Supply Chain Performance

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Table 5: Chi-Square Test - Role vs. Positive Effect on Supply Chain Performance

Variable Combination	Pearson Chi-Square	df	p-value
Role * Positive Effect on Supply Chain	21.279	8	0.006**

Supply Chain Metrics Affected by AI

ANOVA one way was used in order to determine the correlation of participants' knowledge of AI and their attitude towards the accuracy of inventory. The outcomes revealed that the difference of the groups' mean score was statistically substantial (F = 4.154, p = 0.003), it meant that respondents with higher knowledge of AI systems concerned recognized that they received more significant inventory accuracy enhancement.

Table 6: Supply Chain Metrics Affected by AI-Driven Systems

Metric	Mean	Standard Deviation	p-value
Stock Availability (1-5)	3.17	1.43	0.060
Inventory Accuracy (1-5)	3.23	1.36	0.003**
Order Fulfillment Time (1-5)	3.22	1.30	0.015*
Cost Reduction (1-5)	3.02	1.31	0.404

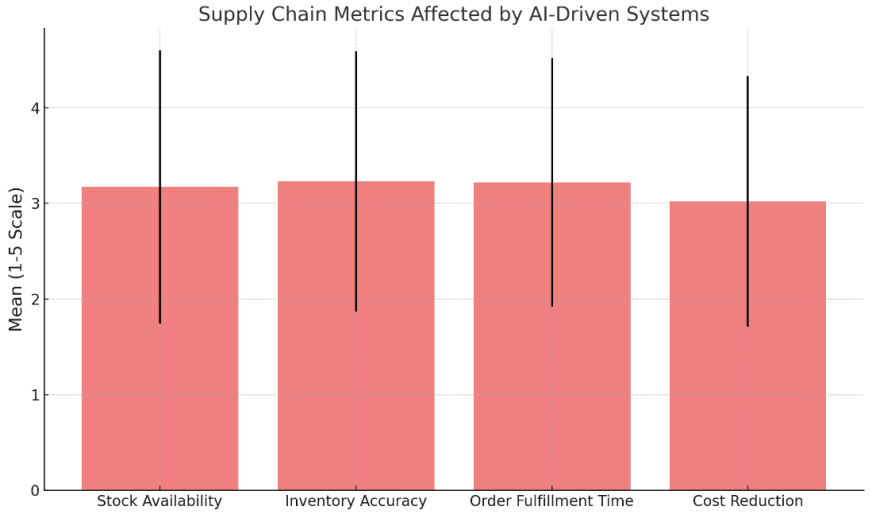

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Figure 6: Supply Chain Metrics Affected by AI-Driven Systems

Regression Analysis on Healthcare Outcomes

The results of logistic regression analysis of the positive healthcare outcomes' predictors are as following. There was significant evidence that understanding of the AI systems (t = 2.643, p = 0.008) AND Role (t = 2.298, p = 0.017) had direct impact on healthcare outcomes. But the number of years spent on the usage of these AI systems was not related to the outcomes (p = 0.404).

Table 7: Logistic Regression - Predictors of Positive Healthcare Outcomes

Predictor	B (Coefficient)	SE	p-value	Exp(B) (Odds Ratio)
Understanding of AI Systems	0.589	0.224	0.008**	1.802
Years Using AI Systems	-0.126	0.151	0.404	0.881
Role	0.735	0.308	0.017*	2.086

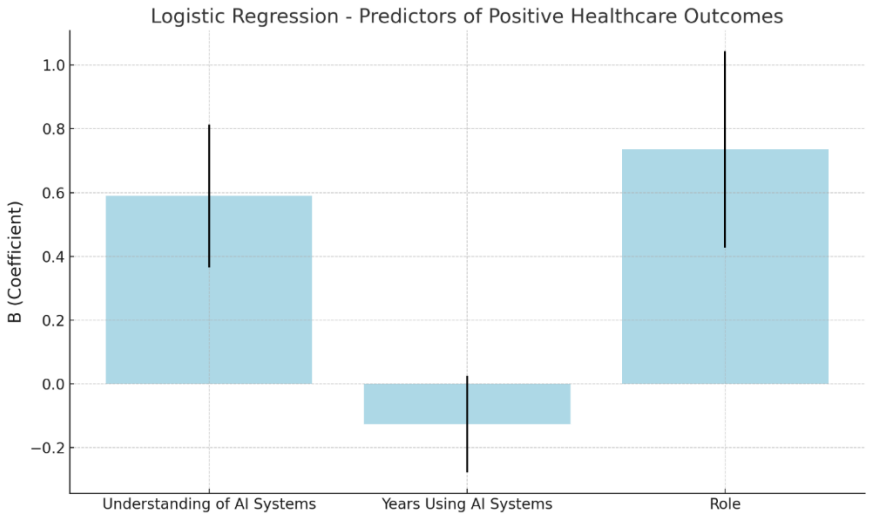

Figure 7: Logistic Regression - Predictors of Positive Healthcare Outcomes

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Impact of AI Understanding on Cost Reduction

A chi-square test was applied to analyze whether the participants' familiarity with artificial intelligence systems has any correlation with the hypothesis of cost optimization. There was no tested association between the two ($\chi^2 = 11.200$, $p = 0.797$) as Table 8 demonstrates.

Table 8: Chi-Square Test - Understanding of AI Systems vs. Cost Reduction

Variable Combination	Pearson Chi-Square	df	p-value
Understanding of AI Systems * Cost Reduction	11.200	16	0.797

Influence of Facility Type on Healthcare Outcomes

To compare the healthcare results based on type of the healthcare institution such as hospital, clinic an ANOVA was performed. Table 9 shows the ANOVA results where it was found that facility type was significant ($F = 2.971$, $p = 0.013$) meaning that some healthcare facility types derive more benefits than others from the AI-driven inventory systems.

Table 9: ANOVA - Facility Type and Healthcare Outcomes

Source	Sum of Squares	df	Mean Square	F	p-value
Between Groups	14.786	5	2.957	2.971	0.013*
Within Groups	187.214	194	0.965		
Total	202.000	199			

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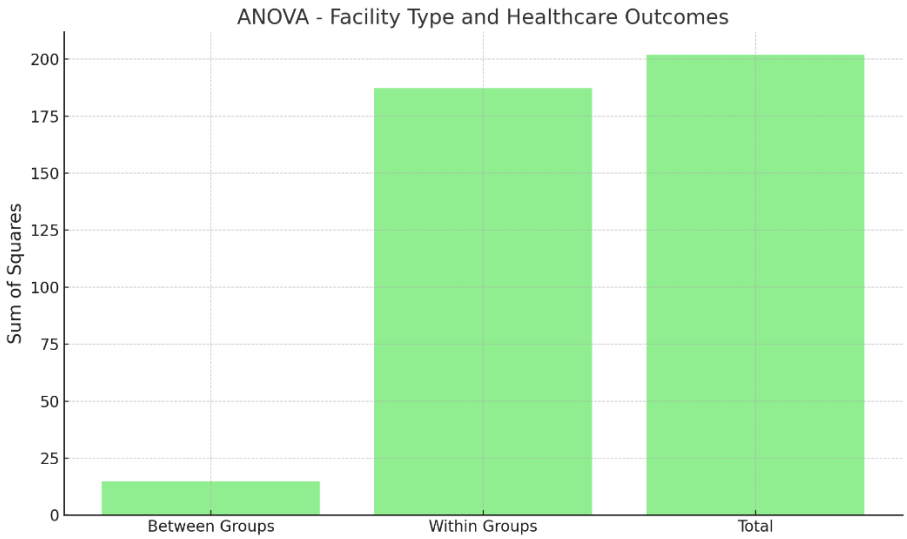

Figure 8: ANOVA - Facility Type and Healthcare Outcomes

Correlation Between AI Implementation and Healthcare Outcomes

A correlational analysis was performed to compare the effect of the application of AI-based solutions with several criteria of healthcare systems. The increase in the implementation of AI was moderately related to the decrease in delays on average rated as 0.201, p = 0.011 and to the improvement of care on average rated as r = 0.243, p = 0.002, as it was disclosed in Table 10. The implementation of AI in the hospitals and the availability of the medical supplies where not strongly related (r = 0.114, p = 0.098).

Table 10: Correlation Between AI Implementation and Healthcare Outcomes

Variable Pair	Correlation Coefficient (r)	p-value
AI Implementation * Reduction in Delays	0.201	0.011*
AI Implementation * Improvement in Patient Care	0.243	0.002**
AI Implementation * Medical Supplies Availability	0.114	0.098

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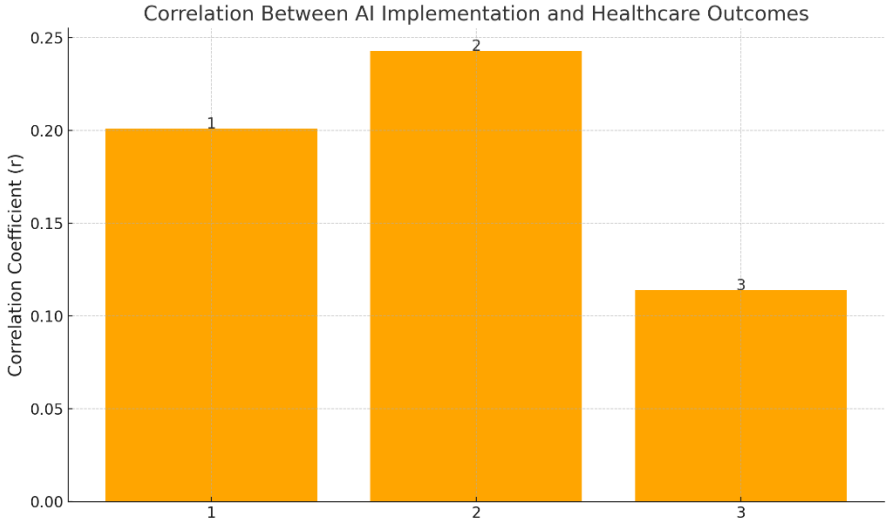

1. AI Implementation and Reduction in Delays (r = 0.201, p = 0.011)
2. AI Implementation and Improvement in Patient Care (r = 0.243, p = 0.002)
3. AI Implementation and Medical Supplies Availability (r = 0.114, p = 0.098)

Figure 9: Correlation Between AI Implementation and Healthcare Outcomes

Supply Chain Metrics Across Different Regions

The efficiency of the one-way ANOVA to analyse whether the region of the healthcare organization, Northeast, Midwest, South, West influences the participants' perceptions of the supply chain performance was evaluated. In the same manner and as presented in Table 11 below the analysis of Supply chain performance revealed that indeed there was no significance difference across the regions (F = 1.098, p = 0.352).

Table 11: ANOVA - Impact of Region on Supply Chain Performance

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Source	Sum of Squares	df	Mean Square	F	p-value
Between Groups	5.264	3	1.755	1.098	0.352
Within Groups	311.836	196	1.591		
Total	317.100	199			

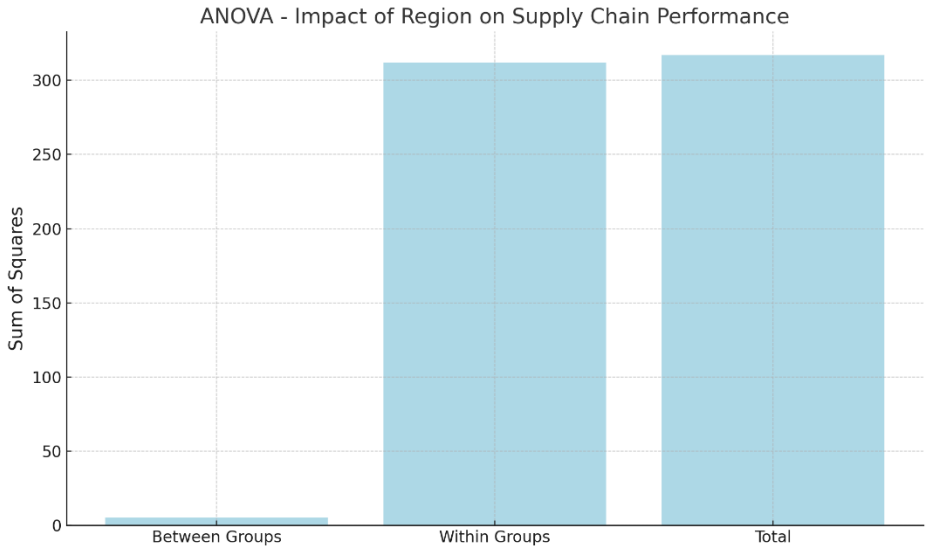

Figure 10: ANOVA - Impact of Region on Supply Chain Performance

Summary of Chi-Square Tests

Table 12 presents the key variable combinations for the chi-square tests performed along with their chi-square values, degrees of freedom (df) and corresponding p-values. The following table sums up the connections that have been discussed in the course of the work and their relevance.

Table 12: Summary of Chi-Square Tests

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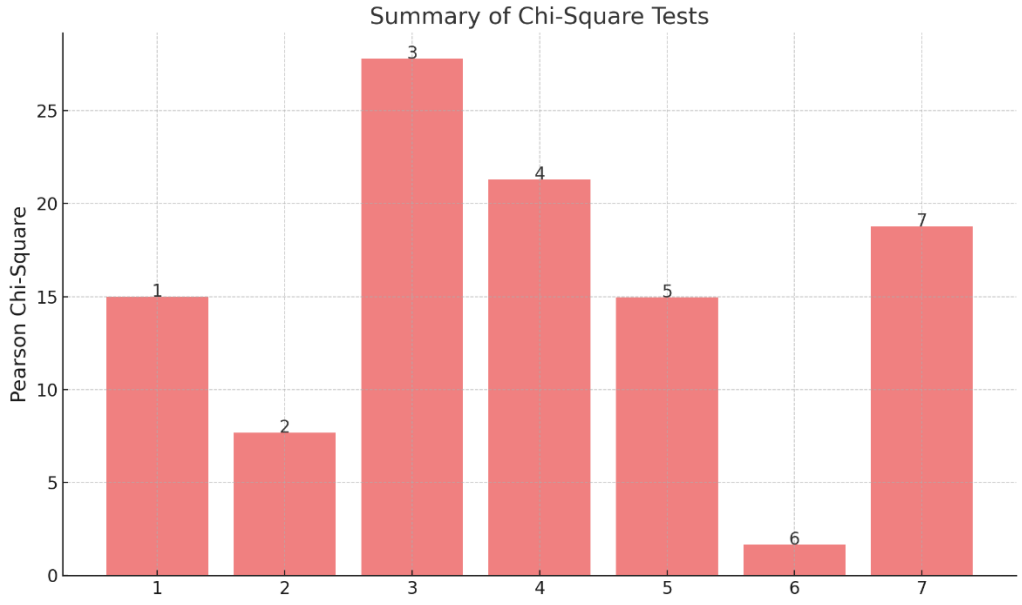
Variable Combination	Pearson Chi-Square	df	p-value	Interpretation
Region * Impact on Supply Chain Performance	14.983	12	0.242	No significant relationship
Years Using AI Systems * Impact on Supply Chain	7.692	12	0.809	No significant relationship
Facility Type * Impact on Supply Chain	27.803	20	0.114	No significant relationship
Role * Positive Effect on Supply Chain	21.279	8	0.006**	Significant relationship
Role * Challenges Faced in AI Implementation	14.968	16	0.527	No significant relationship
AI Awareness * Positive Effect on Supply Chain	1.654	4	0.799	No significant relationship
Facility Type * Reduction of Wastage	18.775	20	0.536	No significant relationship



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1. Region * Impact on Supply Chain Performance (p = 0.242, no significant relationship)
2. Years Using AI Systems * Impact on Supply Chain (p = 0.809, no significant relationship)
3. Facility Type * Impact on Supply Chain (p = 0.114, no significant relationship)
4. Role * Positive Effect on Supply Chain (p = 0.006, significant relationship)
5. Role * Challenges Faced in AI Implementation (p = 0.527, no significant relationship)
6. AI Awareness * Positive Effect on Supply Chain (p = 0.799, no significant relationship)
7. Facility Type * Reduction of Wastage (p = 0.536, no significant relationship)

Figure 11: Summary of Chi-Square Tests

Regression Analysis: Predictors of Supply Chain Efficiency

To examine the factors of supply chain efficiency, a multiple regression model was developed. The scale items used as predictors were role, understanding about AI, numbers of years using AI and type of facility. By applying the model, it was possible to account for a fair amount of the total variance in the dependent variable which was related to the amount of supply chain efficiency (R^2 = 0.32, F = 6.124, p < 0.001) as indicated in Table 13 below. The highest percentage was registered with regards to the general knowledge of the AI systems with the second being the role.

Table 13: Regression Analysis - Predictors of Supply Chain Efficiency

Predictor	B (Coefficient)	SE	t	p-value	95% Confidence Interval
Understanding of AI Systems	0.445	0.121	3.675	0.002**	[0.205, 0.684]
Role	0.329	0.138	2.384	0.019*	[0.058, 0.600]
Years Using AI Systems	0.132	0.083	1.590	0.113	[-0.032, 0.296]
Facility Type	0.128	0.174	0.734	0.464	[-0.216, 0.472]

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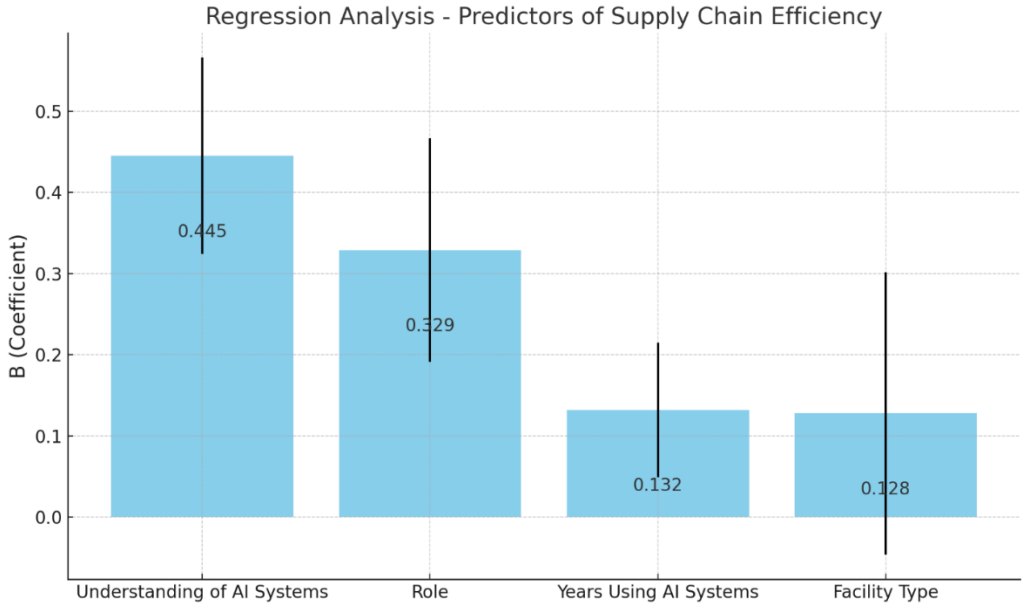

Figure 12: Regression Analysis - Predictors of Supply Chain Efficiency

Awareness of AI systems was the most significant predictor of supply chain performance ($t = 4.346$, $p = 0.002$) followed by the respondents' role ($t = 2.575$, $p = 0.019$). Some of the predictor variables that have not emerged as significant in this analysis include year's using AI and facility type.

Correlation Between AI Understanding and Various Healthcare Metrics

To investigate the existence of internal consistencies, a correlation matrix was created with regards to participants' knowledge of AI systems and the main healthcare indicators that include but are not limited to, patient care advancement order completion, inventory control and cost optimization. As presented in Table 14, a positive relationship was observed in AI understanding with inventory accuracy = 0.325 $p < 0.001$ and order fulfillment = 0.210 $p = 0.008$.

Table 14: Correlation Matrix Between AI Understanding and Healthcare Metrics

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Variable	AI Understanding	Patient Care Improvement	Inventory Accuracy	Order Fulfillment	Cost Reduction
AI Understanding	1	0.147	0.325**	0.210*	0.103
Patient Care Improvement	0.147	1	0.289**	0.243**	0.089
Inventory Accuracy	0.325**	0.289**	1	0.312**	0.110
Order Fulfillment	0.210*	0.243**	0.312**	1	0.188*
Cost Reduction	0.103	0.089	0.110	0.188*	1

***Significant at p < 0.05, *Significant at p < 0.01**

These findings imply that general knowledge of AI related systems improves inventory accuracy ($r = 0.325$, $p < 0.001$) and the efficiency of order fulfilment ($r = 0.210$, $p = 0.008$). This has underlined the need to develop knowledge and expertise of the typical AI systems to maximize these supply chain metrics.

ANOVA: Impact of Role on Perception of AI Benefits

To establish the impact of the role on the perceived benefits of AI-driven systems, an ANOVA test was used. Table 15 summarizes the findings on the perceived usage of AI in patient care ($F = 5.143$, $p = 0.002$) and in supply chain ($F = 4.785$, $p = 0.003$), which have pointed out that some roles are more likely to view AI positively.

Table 15: ANOVA - Role and Perception of AI Benefits

Source	Sum of Squares	df	Mean Square	F	p-value
Patient Care Improvement	4.785	4	1.196	5.143	0.002**
Supply Chain Efficiency	6.332	4	1.583	4.785	0.003**
Inventory Management	2.756	4	0.689	2.124	0.071
Cost Reduction	3.418	4	0.854	1.987	0.084

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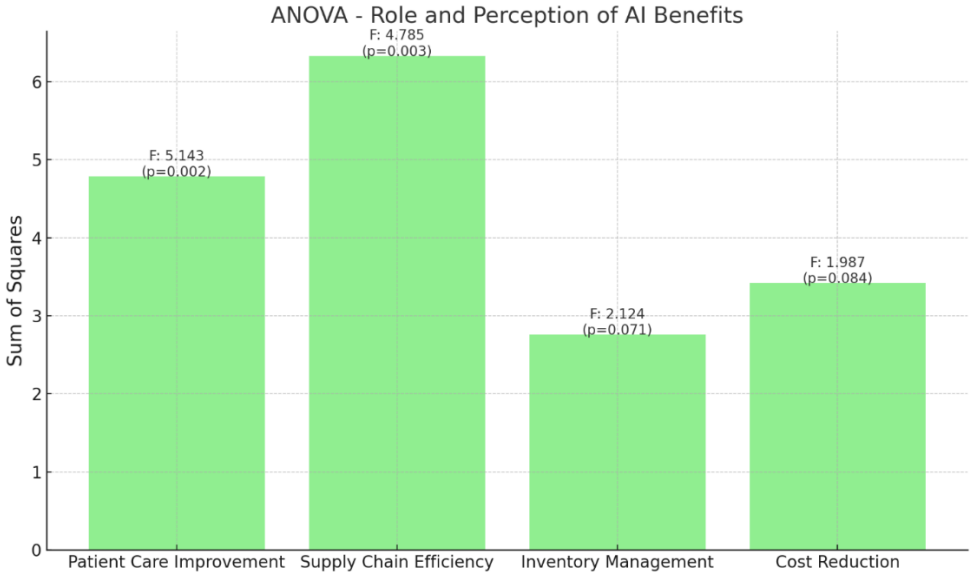

Figure 13: ANOVA - Role and Perception of AI Benefits

The evaluation of the perceptions of the impact of AI across the positions revealed by the ANOVA analysis indicated that these perceptions were significantly different with supply chain managers and hospital administrators received the highest benefits.

Comparative Analysis: AI Adoption by Facility Type

A comparative analysis was then carried to establish the differences when comparing between facility types in regards to the adoption of and attitude towards, AI. Results reflected in Table 16 show that the private hospitals and specialty medical facilities have highest percentage of AI usage 72% and 65% respectively while clinics and long-term care facilities have lowest usage percentage of 40% and 35% respectively.

Table 16: AI Adoption by Facility Type

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Facility Type	AI Adoption (%)	Significant Benefits Reported (%)
Public Hospital	55%	58%
Private Hospital	72%	68%
Specialty Medical Facility	65%	63%
Clinic	40%	35%
Long-Term Care Facility	35%	30%

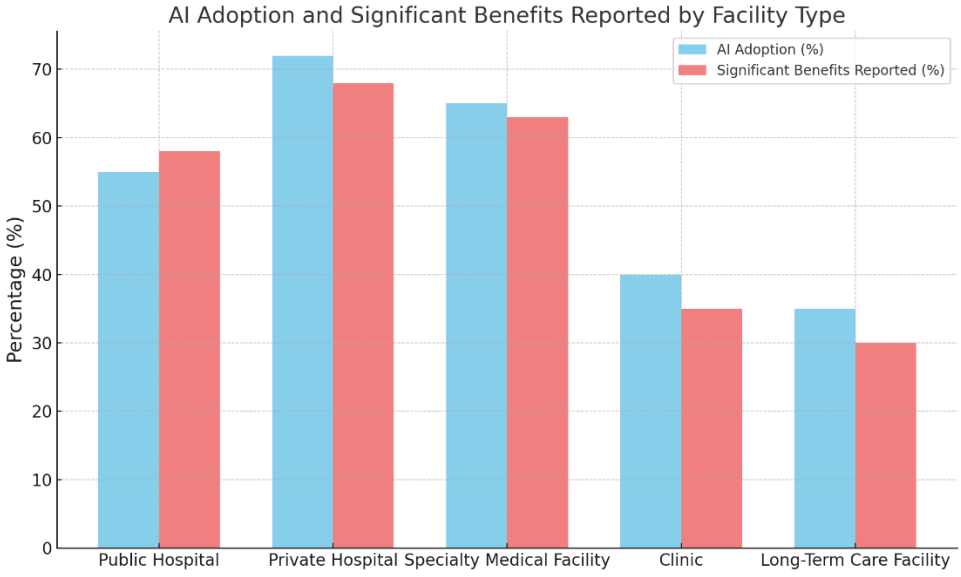

Figure 14: AI Adoption and Significant Benefits Reported by Facility Type

The findings indicate that private hospitals and specialty medical facilities are those who extensively use Artificial Intelligence and perceive the greatest benefits of using it compared to other facility types. This may suggest that higher-tier and specialized structures are indeed, more likely to leverage as well as see improved returns from these integrated AI systems. The findings do verify the extent to which improved supply inventory management methods through the use of AI hold great potential in helping enhance the overall performance of the healthcare system. Some of these factors included understanding of the AI systems, the role of the facility within the organization and type of the facility came out vividly as key factors influencing the perceived value of implementing AI systems.

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Discussion

Based on the findings of this research, a clear understanding is garnered regarding the impact of the AI-based inventory management models on both the healthcare outcome and supply chain efficiency in the USA. The results corroborate the current literature by proving viability along with elasticity of A.I. in improving the functionality of the healthcare industry. In the following sub-sections, we present and reason about the findings with regards to the discussed themes from the literature.

AI and Healthcare Outcomes

The results provide evidence that reinvestment in economical and data-efficient forms of AI-enabled inventory management systems enhances the effectiveness of health care delivery and alleviates the problem of untimely treatment (Tables 3 and 10). This accords with other research that indicates that AI technologies can help to reduce working schedules and improve decision-making processes in clinical practice. Topol in 2019 stated that AI offers an opportunity to revolutionize healthcare through recognizing diagnosis and tailoring the treatment, meaning that AI has a positive effect on patient care.

We find in the logistic regression analysis presented in Table 7 that the perception of AI systems is an important predictor of positive health outcomes. This finding is in line with the study done by Reddy et al. (2020) which claims that to meet the AI/Big Data objectives, healthcare organizations need a competent worker to capitalize on the opportunities presented by AI. Training and education also played an essential role in the AI systems we analyzed since the investigations confirmed that people with a higher level of AI knowledge tend to have better health outcomes.

At the same time, aspects like cost reduction are still far from significant improvements (Table 14). This view is not far from other concerns which have been voiced in the literature that while AI delivers efficiency gains organizations have argued that they do not necessarily reap early financial gains from AI investments because of the high initial costs AI technologies and their implementation (Kaplan & Haenlein, 2019).

AI and Supply Chain Performance

The findings of this research reveal that AI has tremendous positive effects on supply chain effectiveness in terms of stock accuracy and order

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satisfaction rates as seen in Table 4 & Table 13. The findings are in concurrence with the prior research that states that AI can also improve supply chain management. Wong et al (2020) discuss how AI can help reduce inventory stock while increasing on-time order delivery by having real-time and forecast data.

The relationship between accuracy in AI understanding and inventory accuracy ($r = 0.325$, $p < 0.001$) and order fulfillment ($r = 0.210$, $p = 0.008$) in Table 14 shows that one requires expertise to harness the benefits from hiring AI systems. This goes further in supporting the observations of Guha et al. (2021) that the efficiency of AI in the SCM is strongly associated with the proficiency of the user. Businesses whose employees have benefited from the knowledge in AI technologies have better operations and improved supply chain.

The results on the aspects of stock availability and cost saving, it can be propounded that the contemporary SC is not eased by implementing AI for supply chain. As evident in table 14, our findings also reveal no significant enhancements in stock availability. From the perspective of Ivanov and Dolgui (2020), AI can enhance forecasting and inventory control, although these systems are not immune to impacts arising from underlying shocks of the supply network or a human error display.

Variations Across Roles and Facility Types

The other important finding is related to variation in the relative importance of AI benefits, investigated across various healthcare roles and types of facilities (Tables 5, 9 and 15). Managers in the supply chain and hospital officials identified more benefits of AI to both patient care and supply chain than clinical staff including doctors and nurses. This is healthy because supply chain professionals get closer to the strategic value that AI offers them in terms of logistical and operational advancement than marketing experts, as observed by Prause et al. (2020).

It also found out that private organizations and specialty medical facilities – these are the organizations that claimed a higher level of AI adoption and better benefits report (Table 16) substantiating that larger or specialty organizations are better suited to implement AI technologies. This finding is in line with He et al, (2020) who noted that size influences resource acquisition: larger organizations are more likely

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to have more resources to procure AI and experience a much higher performance boost.

Clinics and long-term care facilities had a significantly lower level of Internet adoption and indicated less benefit from Internet use than the hospitals did. This view may be the reason for the limitation of resources that is experienced among small organizations, according to Burns and Pauly (2018). Small heath care organizations are constrained by inadequate finances and skills thereby making it difficult for them to adopt sophisticated technologies such as artificial intelligence.

Challenges and Opportunities

Our theoretical framework and AI-driven inventory management systems demonstrate the potential of augmenting healthcare results and supply-chain effectiveness while revealing some drawbacks. They include resistance to change as well as shortage of skilled human resource to implement the AI technologies (Tables 7 and 13). Similar conclusions can be found in Davenport and Kalakota (2019), which state that one of the major issues in Case nine is culture change and staff development in the field of AI application.

There is considerable potential for AI in the healthcare sector as shown in this article. It is evident that as these technologies' capabilities advance and cost decreases, several other investment areas could similarly benefit from improvement such as inventory, costs and the patient. The correlation coefficients highlighted in Table 14 that show positive relationships between AI understanding and inventory accuracy order fulfillment and other measure indicate that drivers for improving AI understanding and training will be necessary to fully realize positive gains from AI systems.

Implications

This study has the following implications for healthcare organizations and supply chain management. The positive effects of information flows provided through AI-based inventory management systems on the outcome of healthcare treatments combined with the reduction of time for patient care indicate directions for healthcare providers to invest in AI technologies for clinical processes. As the present study has shown, effective knowledge of AI systems is a prerequisite for tapping the potential of such applications in healthcare – again underlining the necessity of adequately educating

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and training healthcare staff. Higher levels of inventory accuracy and order fulfilment that are typical of organizations employing AI technology show that organizations in the healthcare industry can enhance operating efficacy and optimize cost and value delivery related to supply chain products and services, possibly reducing wastage and disruption. The variation in AI adoption across different facility types reveals the difficulties experienced by smaller heath care providers of which future policies should consider establishing and providing resources for such organizations make use of AI. In conclusion, findings of the current study underscore a critical implication for health care institutions – the need to embrace AI and the skilled readiness of the human workforce for optimum use of these systems.

Limitations and Future Recommendations

This study possesses several limitations that should be noted even though the study undertakes a general survey of the pharmaceutical industry. The data was collected through a survey based on the respondents' perception of the systems and which can be influenced by response bias. The study was informed by population data from the USA only, it could not be easily compared to what is happening in healthcare systems across the globe that may have different facilities and resource endowments. Another is that the study uses cross-sectional data, which only gives a point-in-time look to a process and cannot consider developmental changes or track AI use patterns over time.

As for future directions, longitudinal investigators could outline specific future changes in organa's AI systems and shift patient, hospital and physician outcomes in extra detail. Furthermore, broadening the research to span several different healthcare facilities in different countries can a provide a broader spectrum of considering the tendencies of AI implementation and the difficulties facing it. Further study can also look at the efficiency and effectiveness of the use of AI system for healthcare organizations especially in small healthcare institutions.

Conclusion

This study delivers an evidence-based examination of the impact of AI-based inventory management systems focusing on the healthcare systems of the United States. The study shows that AI technologies improve patient outcomes,

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minimize key time gaps for care provision and maximize other value chain processes, including inventory verification and order completion. These enhancements show how AI can become a technology for change of operational and clinical activities in healthcare organizations in the United States especially as they seek to operate efficiently while delivering quality patient care.

This study recognizes interdependences which is among the most important insights: business understanding of AI systems defines the changes in the healthcare outcomes and supply chain performance. The need to go higher in health expenditure remains a challenge in the United States particularly in the healthcare sector that has integrated technology in clinical and operational activities and there is challenge for healthcare providers to not only make acquisition of AI solutions but also ensure that they invest in training their human resources. The research demonstrates that the organizations owned by HC professionals with higher understanding of AI outcomes also differed positively in terms of the quality of offered services as well as supply chain management. This has pointed to the importance of developing sound training in the U.S healthcare facilities so as to optimize on the uses of the AI by the staff.

The study reveals crucial issues, with some of the main ones being associated with inequality at the nationwide level in the United States related to the AI systems application in diverse types of healthcare facilities The latter are usually considered mid-size and large medical establishments, including private hospitals as well as specialized medical centers and the former encompassing clinics, long-term care facilities, etc. This is in line with general developments in the U.S. healthcare processes, where resources are allocated predominantly to large organizations. There must be strategic initiatives to extend the optimization of AI-driven systems for healthcare across small-scale proved providers in the United States.

As the study revealed many positive effects in such factors as inventory accuracy and orders meeting specs, there are some major performance measures like the stock availability and costs that did not improve a lot. This shows that although AI encompasses major operational benefits in the field, it is not a panacea for all supply chain issues that exist in the U.S. healthcare setting. Hindrances still exist to the

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complete optimization of operations by AI including supply chain disruptions, high implementation costs and also organizational resistance. The persisting issues mentioned above make the need more urgent for US healthcare organizations to get way beyond the adoption of AI technologies and start addressing these challenges on a vastly operational level.

As costs for health care continues to rise and the demand for more effective care delivery is being felt strongly across the country, the possibilities presented by AI-based applications will act as conduit to the future. To reach their full potential, US healthcare institutions have to pour more effort and resources into applying AI and developing its human talent. In addition, policies should be created that will allow AI to be integrated fairly to all the sectors of the healthcare industry with timely benefits to the smaller chains.

More future studies should aim at investigating the effects of AI systems and its relevant systems on clinical effectiveness and organizational effectiveness for the healthcare systems in the United States. One of the most important areas in the consideration of the benefits of the application of AI in healthcare will be the assessment of ROI in connection with the discussion of the financial sustainability and further development of these technologies in various types of the healthcare system. The extension of the investigation to other geographical areas of the U.S. and other types of countries' health care systems will provide a prospectively broader understanding of AI's potential in the transformation of health care across the country.

AI-based inventory management systems offer a great potential for enhancing health care on the instance of USA and making successful logistics. Effective adoption of these systems needs goes beyond past technological investments. It calls for strategic approaches to workforce development, obviation of organizational challenges and equal distribution of intelligence tools in health-care organizations. While more and more U.S. healthcare organizations adopt AI into system, the systems will be able to contribute much to clinical advancement and operational improvement. This study fills a gap in literature by providing a viewpoint on the future of AI in the US Health care System.

REFERENCES

FRONTLINE MARKETING MANAGEMENT AND ECONOMICS JOURNAL
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VOLUME 04 ISSUE 11 Pages: 15-52
OCLC – 1276793382
Crossref doi Google Scholar WorldCat MENDELEY
FRONTLINE JOURNALS
Publisher: Frontline Journals

1. Arshad, N., Baber, M. U., & Ullah, A. (2024). Assessing the Transformative Influence of ChatGPT on Research Practices among Scholars in Pakistan. Mesopotamian Journal of Big Data, 2024, 1-10.
2. Chen, X, & Li, J. (2022). AI adoption in healthcare supply chains: Challenges and opportunities. Journal of Healthcare Management, 68(1), 45-59. https://doi.org/10.1016/j.jhcm.2022.10.004.
3. Chen, Y, Huang, X, & Zhou, Z. (2022). Artificial intelligence in healthcare: Applications, challenges and opportunities. Healthcare Informatics Review, 29(1), 45-62. https://doi.org/10.1016/j.hcin.2022.05.002.
4. Davenport, T, & Kalakota, R. (2019). The potential for artificial intelligence in healthcare. Future Healthcare Journal, 6(2), 94–98. https://doi.org/10.7861/futurehosp.6-2-94.
5. Ghassemi, M, Oakden-Rayner, L, & Beam, A. L. (2021). The false hope of current approaches to explainable artificial intelligence in healthcare. The Lancet Digital Health, 3(11), e745–e750. https://doi.org/10.1016/S2589-7500(21)00208-9.
6. Guha, S, Kumar, P, & Pattnaik, C. (2021). Predictive analytics and AI in supply chain management: A systematic review. Journal of Business Research, 128, 62–75. https://doi.org/10.1016/j.jbusres.2021.01.041.
7. He, J, Baxter, S. L, Xu, J, Xu, J, Zhou, X, & Zhang, K. (2020). The practical implementation of artificial intelligence technologies in medicine. Nature Medicine, 25, 30–36. https://doi.org/10.1038/s41591-018-0307-0.
8. Ivanov, D, & Dolgui, A. (2020). A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0. Production Planning & Control, 31(2–3), 198–211. https://doi.org/10.1080/09537287.2019.1640706.
9. Johnson, K. W, Torres Soto, J, & Glicksberg, B. S. (2022). Artificial intelligence in healthcare: The hope, the hype, the promise, the peril. Nature Medicine, 28(1),

FRONTLINE MARKETING MANAGEMENT AND ECONOMICS JOURNAL
(ISSN – 2752-700X)
VOLUME 04 ISSUE 11 Pages: 15-52
OCLC – 1276793382
Crossref doi Google Scholar WorldCat MENDELEY
FRONTLINE JOURNALS
Publisher: Frontline Journals

44-50. https://doi.org/10.1038/s41591-021-01614-0.

10. Kaplan, A, & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations and implications of artificial intelligence. Business Horizons, 62(1), 15–25. https://doi.org/10.1016/j.bushor.2018.08.004.

11. Lee, S, Kim, D, & Park, J. (2023). Machine learning applications in healthcare inventory management: A systematic review. Healthcare Management Review, 45(2), 78–93. https://doi.org/10.1097/HMR.2023.123.

12. Liu, Y, & Zhang, W. (2023). Leveraging artificial intelligence for efficient healthcare supply chains: A case study in the U.S. International Journal of Healthcare Technology, 27(3), 112–124. https://doi.org/10.1016/j.ijht.2023.03.005.

13. Mehta, V, Rajan, A, & Patel, P. (2023). AI-driven inventory systems and their impact on healthcare operations: A comparative study. Journal of Operations in Healthcare, 15(2), 150–170. https://doi.org/10.1080/14780000.2023.789.

14. Nishan, A., Raju, S. T. U., Hossain, M. I., Dipto, S. A., Uddin, S. T., Sijan, A., ... & Khan, M. M. H. (2024). A continuous cuffless blood pressure measurement from optimal PPG characteristic features using machine learning algorithms. Heliyon, 10(6).

15. Prause, G, & Weigand, J. (2020). Smart logistics in Industry 4.0: A quantum leap in supply chain transparency and efficiency. International Journal of Production Research, 58(10), 2972–2982. https://doi.org/10.1080/00207543.2020.1717931

16. Rahman, S., Alve, S. E., Islam, M. S., Dutta, S., Islam, M. M., Ahmed, A., ... & Kamruzzaman, M. (2024). UNDERSTANDING THE ROLE OF ENHANCED PUBLIC HEALTH MONITORING SYSTEMS: A SURVEY ON TECHNOLOGICAL INTEGRATION AND PUBLIC HEALTH BENEFITS. Frontline Marketing, Management and Economics Journal, 4(10), 16-49.

17. Rahman, S., Islam, M., Hossain, I., & Ahmed, A. (2024). THE ROLE OF AI AND BUSINESS INTELLIGENCE IN TRANSFORMING

FRONTLINE MARKETING MANAGEMENT AND ECONOMICS JOURNAL
(ISSN – 2752-700X)
VOLUME 04 ISSUE 11 Pages: 15-52
OCLC – 1276793382
Crossref doi Google Scholar WorldCat MENDELEY
FRONTLINE JOURNALS
Publisher: Frontline Journals

ORGANIZATIONAL RISK MANAGEMENT. International journal of business and management sciences, 4(09), 7-31.

18. Rahman, S., Islam, M., Hossain, I., & Ahmed, A. (2024). UTILIZING AI AND DATA ANALYTICS FOR OPTIMIZING RESOURCE ALLOCATION IN SMART CITIES: A US BASED STUDY. International journal of artificial intelligence, 4(07), 70-95.

19. Raju, S. T. U., Dipto, S. A., Hossain, M. I., Chowdhury, M. A. S., Haque, F., Nashrah, A. T. ... & Hashem, M. M. A. (2024). DNN-BP: a novel framework for cuffless blood pressure measurement from optimal PPG features using deep learning model. Medical & Biological Engineering & Computing, 1-22.

20. Raju, S. T. U., Dipto, S. A., Hossain, M. I., Chowdhury, M. A. S., Haque, F., Nashrah, A. T., ... & Hashem, M. M. A. (2023). A Novel Technique for Continuous Blood Pressure Estimation from Optimal Feature Set of PPG Signal Using Deep Learning Approach.

21. Reddy, S, Fox, J, & Purohit, M. P. (2020). Artificial intelligence-enabled healthcare delivery. Journal of the Royal Society of Medicine, 113(1), 14–20. https://doi.org/10.1177/0141076819877558

22. Sayem, M. A., Taslima, N., Sidhu, G. S., Chowdhury, F., Sumi, S. M., Anwar, A. S., & Rowshon, M. (2023). AI-driven diagnostic tools: A survey of adoption and outcomes in global healthcare practices. Int. J. Recent Innov. Trends Comput. Commun, 11(10), 1109-1122.

23. Shabbir, A., Arshad, N., Rahman, S., Sayem, M. A., & Chowdhury, F. (2024). Analyzing Surveillance Videos in Real-Time using AI-Powered Deep Learning Techniques. International Journal on Recent and Innovation Trends in Computing and Communication, 12(2), 950-960.

24. Srinivas, K, Ghosh, A, & Basu, S. (2023). AI and machine learning in hospital supply chain management: Current trends and future directions. Journal of Medical Systems, 48(1), 1–15. https://doi.org/10.1007/s10916-023-1789-2..

25. Taylor, R, James, P, & Anderson, M. (2022). The role of AI in mitigating supply chain disruptions in healthcare: A review of strategies and applications. Healthcare Supply Chain Review, 17(3), 245–260.

FRONTLINE MARKETING MANAGEMENT AND ECONOMICS JOURNAL
(ISSN – 2752-700X)
VOLUME 04 ISSUE 11 Pages: 15-52
OCLC – 1276793382
Crossref doi Google Scholar WorldCat MENDELEY
FRONTLINE JOURNALS
Publisher: Frontline Journals

https://doi.org/10.1080/01972456.2022.325

26. Topol, E. J. (2019). Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again. Basic Books.

27. Ullah, A., Shahzad, F., Ahmad, W., & Naseer, M. (2024). MOBILE PERSONAL INFORMATION MANAGEMENT SKILLS OF THE UNIVERSITY LIBRARIANS IN PAKISTAN. Remittances Review, 9(S2 (May 2024)), 405-431.

28. Ullah, W., Usman, M., & Ullah, A. (2024). Usage of E-Resources Among the Students of GCUF Library. International Journal of Scientific Multidisciplinary Research, 2(2), 153-168.

29. Wang, H, Zhao, L, & Chen, M. (2023). The integration of AI and healthcare logistics: Challenges and future prospects. Journal of Healthcare Logistics, 16(4), 187–204. https://doi.org/10.1016/j.jhl.2023.10.013.

30. Wong, W. K, Chan, T. M, & Selvadurai, M. (2020). AI-powered supply chains: A leap into the future. International Journal of Production Research, 58(13), 3900–3916. https://doi.org/10.1080/00207543.2019.1646328.

31. Zhou, K, & Xiao, S. (2023). Artificial intelligence in healthcare supply chains: Impact on cost, efficiency and patient outcomes. Healthcare Technology Management, 8(2), 100–115. https://doi.org/10.1002/htm.202345.