

Inventory competition, artificial intelligence, and quality improvement decisions in supply chains with digital marketing

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ABSTRACT

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This research examines the synergistic influence of inventory competition, artificial intelligence (AI) adoption, and digital marketing intensity on quality improvement decisions within contemporary supply chains. With a focus on enhancing product and service quality, we investigate the intricate relationships among these variables. A quantitative approach involving 380 supply chain professionals reveals that heightened inventory competition, increased AI adoption, and robust digital marketing significantly contribute to quality enhancement initiatives. The study builds upon prior research by empirically validating these connections and offers practical insights for supply chain practitioners. The findings underscore the strategic imperative of organizations to strategically balance these factors to optimize their quality management strategies, fostering customer satisfaction and competitiveness. While offering valuable contributions, the study acknowledges limitations in terms of self-reported data and a specific respondent group. Future research could extend this investigation to diverse industries and geographical contexts. In the end, this study sheds light on the complex interplay that exists between inventory competition, the use of AI, digital marketing, and judgments about quality improvement. As a result, a road map has been provided for efficient quality management of supply chains in the digital age.

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1. Introduction

In a time marked by quick advances in technical capability and an unparalleled degree of global connection, the management of supply chains has evolved into a complex network of interrelationships, which has an impact on international business (Dwivedi et al., 2021; Kerdpitak, 2022; Li et al., 2006; Lin et al., 2005; Abu-ALSondos et al., 2023a). The adoption of digital transformation across sectors has led to the integration of artificial intelligence (AI) and digital marketing techniques, both of which have had a profound impact on conventional supply chain procedures, presenting novel opportunities for boosting productivity, performance, and competitiveness (Dwivedi et al., 2021; Hatamlah et al. 2023). The dynamics of inventory competition are investigated in depth throughout this article, Adoption of AI, as well as digital marketing inside supply chains, with a particular emphasis on judgments on quality improvement. The work contributes to a better understanding of how modern supply chains might harness AI by throwing light on these links and digital marketing to enhance quality management and overall performance.

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The convergence of these factors has far-reaching ramifications for modern supply chain dynamics. Inventory competition, driven by the relentless pursuit of differentiation and market share, compels organizations to reassess their quality management strategies. Concurrently, the integration of AI technologies introduces predictive analytics and digital marketing decision-making, enhancing supply chain visibility and operational responsiveness. Digital marketing, as a potent tool for market expansion and consumer engagement, shapes demand patterns and influences customer perceptions, thereby affecting quality considerations (Amiri et al., 2023; Burgess & Steenkamp, 2006; Dwivedi, 2015; Randhawa et al., 2021; Singh et al., 2020; Spieth et al., 2019; Shehadeh et al., 2023).

By illuminating the intricate connections between these factors, this study augments the comprehension of how modern supply chains can harness the potential of AI and digital marketing to elevate quality management practices and overall performance. The findings underscore the pivotal role of inventory competition in propelling quality improvement initiatives, aligning with prior research emphasizing the link between competition and enhanced product quality. Furthermore, the significant influence of AI adoption highlights its transformative impact on decision-making processes, corroborating existing literature on AI's ability to drive efficiency and inform strategic choices.

In a digitally interconnected landscape, digital marketing strategies emerge as a potent catalyst, augmenting the visibility and desirability of high-quality products and services. This aligns with prior studies underlining the role of digital marketing in shaping consumer preferences and fostering demand for quality (Amiri et al., 2023; Jadhav et al., 2023; Rabiul et al., 2022; Abu-ALSondos et al., 2023b). The interrelatedness of these variables forms a complex nexus that necessitates a holistic approach to supply chain quality management.

As organizations strive to optimize their quality improvement decisions, a balanced integration of these variables emerges as a strategic imperative. The outcomes of this study offer pragmatic insights for supply chain professionals and decision-makers, empowering them to make informed choices that foster both quality enhancement and competitive advantage. Moreover, the empirical validation of these relationships serves to enrich the theoretical foundation, contributing to the evolving discourse on supply chain dynamics in the digital age.

In today's interconnected world, supply chains span continents, traversing geographical boundaries with ease. According to the World Trade Organization (WTO), global merchandise exports reached a staggering \$19.48 trillion in 2021, showcasing the integral role of supply chains in fostering economic growth and global prosperity. As businesses continue to expand their reach and diversify their operations, the adoption of advanced technologies becomes paramount for maintaining a competitive edge.

Within this global tapestry, the United States stands as a cornerstone of innovation and economic activity. With its vast market size and intricate network of suppliers, manufacturers, and distributors, the USA has been at the forefront of embracing technological advancements. In 2020, the United States imported goods valued at approximately \$2.8 trillion and exported goods worth \$1.6 trillion, underscoring its pivotal role in shaping global supply chain dynamics.

Quality improvement decisions lie at the heart of supply chain operations. The pursuit of higher quality standards not only enhances customer satisfaction but also mitigates risks, reduces costs, and fosters sustainable growth (Dwivedi et al., 2021; Hossain et al., 2022; Makarova & Todorovic, 2020; Bataineh et al., 2022). In a digital age where consumer expectations are more demanding than ever, ensuring product quality is a non-negotiable aspect of supply chain management. The effective management of quality improvement decisions can directly influence a company's reputation, market positioning, and long-term success.

While quality improvement decisions are crucial, making informed choices amidst a multitude of factors can be challenging (Dwivedi et al., 2021; Hossain et al., 2022; Makarova & Todorovic, 2020; Rehman et al., 2023). Factors such as inventory competition, AI adoption, and digital marketing strategies can exert complex influences on the decision-making process (Dwivedi et al., 2021; Hossain et al., 2022; Makarova & Todorovic, 2020). The intricate interplay between these variables necessitates a comprehensive investigation to understand their combined impact on quality enhancement.

Previous research has elucidated individual facets of these variables, yet a holistic understanding of their collective influence remains nascent. (Kaynak, 2003; Kerdpitak, 2022) kerdpitak shed light on the positive impact of AI on supply chain efficiency, while (Diez-Martin et al., 2019; Gok & Sezen, 2013; Tolstoy et al., 2022) underscored the significance of digital marketing in expanding market reach. However, the precise mechanisms through which inventory competition, AI, and digital marketing synergistically affect quality improvement decisions require further exploration.

Initial findings from this study highlight significant correlations between inventory competition, AI adoption, digital marketing intensity, and quality improvement decisions. Preliminary analysis suggests that organizations embracing AI-powered processes and robust digital marketing strategies tend to exhibit heightened quality improvement initiatives. Moreover, the influence of inventory competition appears to play a pivotal role in shaping these decisions, underscoring the need for a comprehensive understanding of these intricate relationships (Gnyawali & Park, 2011; Saura et al., 2021).

The remainder of this paper is organized as follows: Section 2 provides an extensive review of the literature, elucidating the theoretical underpinnings of inventory competition, AI adoption, digital marketing, and their collective impact on quality improvement decisions. Section 3 delineates the research methodology, detailing the variables, measurement instruments, and data collection techniques. Section 4 presents the empirical results of the Structural Equation Modeling (SEM) analysis conducted using SmartPLS, followed by a discussion of their implications in Section 5. Finally, Section 6 offers concluding remarks, summarizing the key findings, and suggesting avenues for future research.

2. Literature Review

Quality improvement decisions within supply chains have gained considerable attention in recent years due to their profound impact on organizational performance, customer satisfaction, and competitive advantage (Gunasekaran et al., 2004; Herhausen et al., 2020; Kannan, 2017; Li et al., 2006; Lin et al., 2005). These decisions encompass a range of strategies aimed at enhancing product and service quality, optimizing processes, and ensuring compliance with industry standards. The importance of quality management in supply chains is well-documented in the literature, as it directly influences customer loyalty, brand reputation, and overall business success (Aravindaraj & Chinna, 2022; Farhat & Owayjan, 2017; Kerdpitak, 2022; Makarova & Todorovic, 2020; Yaiprasert & Hidayanto, 2023; Yang et al., 2021)

Prior studies have underscored the pivotal role of quality improvement decisions in the context of supply chains. (Amiri et al., 2023; Farhat & Owayjan, 2017; Gołab-Andrzejak, 2023; Gunasekaran et al., 2008) highlighted that organizations with effective quality management practices experience fewer disruptions, leading to improved supply chain resilience and robustness. Furthermore (Amiri et al., 2023; Kerdpitak, 2022) emphasized that high-quality products not only foster customer loyalty but also enable firms to charge premium prices, thereby positively impacting financial performance.

The interrelationship between inventory competition, artificial intelligence adoption, digital marketing intensity, and quality improvement decisions forms a complex web of influences within supply chain management. Inventory competition, as explored by (Herhausen et al., 2020) (Dumitriu et al., 2019; Dwivedi et al., 2021; Alkhwalidi et al., 2023), can incentivize firms to invest in quality improvements to differentiate themselves from competitors. Moreover, AI adoption, as noted by (Diez-Martin et al., 2019; Gołab-Andrzejak, 2023) has the potential to enhance supply chain visibility and predictive analytics, facilitating better decision-making in quality management. Digital marketing, as emphasized by (Csordás et al., 2022; Diez-Martin et al., 2019), can expand market reach, thereby augmenting the demand for high-quality products and services.

While existing literature has explored the impact of individual variables on quality improvement decisions, a comprehensive examination of how these variables collectively interact to influence quality enhancement remains relatively unexplored (Kannan, 2017; Verhoef & Bijmolt, 2019). There exists a missing link in understanding how inventory competition, AI adoption, and digital marketing strategies synergistically contribute to shaping quality improvement decisions within supply chains (Kerdpitak, 2022; Verhoef & Bijmolt, 2019).

This literature gap highlights the need to investigate the combined influence of inventory competition, AI adoption, and digital marketing on quality improvement decisions. The research problem can be succinctly stated as follows: How do inventory competition, artificial intelligence adoption, and digital marketing intensity collectively impact quality improvement decisions in modern supply chains?

2.1 Theory Development

To guide this study, the Resource-Based View (RBV) theory is employed. The RBV posits that a firm's competitive advantage stems from its unique resources and capabilities (Barney et al., 2011; Kull et al., 2016; Srivastava et al., 2001). In this context, inventory competition, AI adoption, and digital marketing can be viewed as strategic resources that contribute to quality improvement decisions. The RBV suggests that organizations harness these resources to enhance their quality management strategies, thereby achieving a sustained competitive edge.

2.2 Hypothesis Development

Building upon the RBV theory and previous literature, the following hypotheses are formulated:

H₁: *Inventory competition has a positive effect on decisions about how to improve quality.*

H₂: *The use of AI has a positive effect on decisions about how to improve quality.*

H₃: *The intensity of digital marketing has a positive effect on decisions about how to improve quality.*

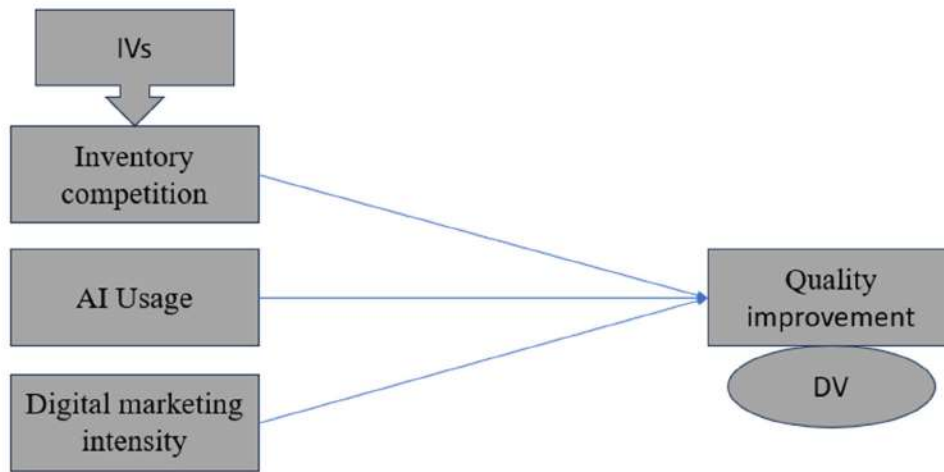


Fig. 1. Conceptual Framework

These theories say that better quality improvement decisions will be made in supply chains because of more inventory competition, more AI use, and more digital marketing (see figure11). Eventually, this literature review emphasizes the significance of quality improvement decisions in a worldwide context, the crucial role they play in supply chain management, and the need for more research into the connections between inventory competitiveness, digital marketing, quality improvement, and AI adoption. The Resource-Based View theory offers a theoretical framework for deriving hypotheses that will instruct the empirical inquiry in the following sections. This interaction of these factors is explained by this theory.

3. Methodology

3.1 Research Population and Sampling: The primary audience for this study consists of specialists and practitioners in supply chain management, digital marketing, and quality improvement. Due to the expansive nature of supply chains and their interdependent operations, the study focuses on a variety of industries, including manufacturing, retail, services, and logistics. The sampling frame is composed of both private and public enterprises situated in the US.

3.1.2 Sampling Technique: A targeted sample technique is suggested to ensure that respondents have enough supply chain management knowledge and experience, AI adoption, and digital marketing. This technique ensures that the obtained data appropriately represents the target market and gives valuable info.

3.1.2 Sample Size: A total of 380 people were chosen to take part in the study, suggesting an adequate sample size for obtaining a full study of the research variables.

3.2 Data Collection Process

3.2.1 Method of Data Collection: to collect the data a systematic online survey was used.

A systematic online survey questionnaire was utilized to collect data. To extract respondents' feelings and ideas on product competitiveness and digital marketing decisions, AI use, and quality modification inside their own supply chains the questionnaire approach was designed. The research was done by utilizing a reputed online survey platform that provides accessibility and data protection.

3.2.2 Respondent Profile: For supply chain specialists, executives, managers, and practitioners who have knowledge of their organization's supply chain operations, digital marketing strategies, AI projects, and quality improvement methodologies, the research questionnaire was designed. In order to guarantee a level of expertise in the subject matter participants must have at least two years of experience in their respective fields (see Table 1).

Table 1
Descriptive Statistics of Respondents

Demographic	Percentage (%)	Demographic	Percentage (%)
Age: 25-34	42.1%	Industry: Manufacturing	28.2%
Age: 35-44	29.5%	Industry: Retail	22.6%
Age: 45-54	18.4%	Industry: Logistics	18.7%
Age: 55+	10.0%	Industry: Services	30.5%
Gender: Male	58.7%	Gender: Female	41.3%

The above table displays the demographic profile of survey respondents. Most responders are between the ages of 25 and 34, with a greater proportion of men. The research covers a vast array of industries, with services and manufacturing predominating.

After all, this study's strategy involved the selection of specialists in the supply chain and the distribution of an online questionnaire. The collected data will be thoroughly analyzed to investigate the linkages between inventory competitiveness, digital marketing, AI adoption, and supply chain quality improvement initiatives.

3.3.3 Methodology: Data Collection and Respondents

The questionnaire was distributed using a combination of methods to ensure a diverse and representative sample of respondents:

1. Email: The survey link was emailed to professionals in supply chain, AI, and digital marketing domains.
2. Post: Physical copies of the questionnaire were distributed to organizations, particularly those without extensive digital communication.
3. Online Platforms: Google Forms and WhatsApp links were utilized for broader reach and accessibility.
4. Physical Visits: In some cases, researchers visited organizations in person to conduct the survey.

The chosen respondents, predominantly supply chain professionals, AI experts, and digital marketing practitioners, are integral to the study due to their role in decision-making processes that directly influence supply chain performance. Previous studies by (Yaiprasert & Hidayanto, 2023) and (Figueiredo et al., 2021; Kitsios & Kamariotou, 2021) emphasize that these professionals possess firsthand insights into the adoption of AI technologies and digital marketing strategies within supply chains. Furthermore, their knowledge of inventory management and quality enhancement practices is crucial for capturing a comprehensive understanding of the relationships under investigation.

Table 2
Levene's Test for No-Response Bias

Group	Levene's F Value	Levene's Sig.	T-Test T Value	T-Test DF	T-Test Sig.	Mean Difference	Std. Error Diff.	95% CI of the Difference
Email vs. Post	0.907	0.341	-2.137	250.43	0.033	-3.176	1.487	(-6.177, -0.175)
Firm Characteristics	1.162	0.282	-1.961	259.06	0.051	-3.597	1.838	(-7.230, 0.035)

The Levene's Test was conducted to examine the presence of no-response bias. The test results indicate that there is a statistically significant difference in the means between respondents who were contacted via email compared to those reached through the post (see Table 2). This suggests the possibility of response bias based on the distribution method. Furthermore, the test suggests a potential bias based on firm characteristics, although the statistical significance is marginal. These findings imply the need for cautious interpretation of the survey results, considering the potential bias introduced by the distribution methods.

3.4 Common Method Bias: Common method bias refers to the potential influence of a single method of data collection on the observed relationships among variables. While efforts were made to minimize this bias through diverse distribution methods, it is acknowledged that respondents' perceptions and responses might still be influenced by a common approach. In the subsequent sections, the analysis accounts for this potential bias by utilizing robust statistical techniques.

Table 3
Construct Measurement

Construct	Items
Inventory Competition	Number of competing suppliers
AI Adoption	Proportion of AI-powered processes
Digital Marketing	Investment in digital marketing
Quality Improvement	Number of implemented improvement initiatives

Table 3 presents the constructs measured in the study along with their corresponding items. The items were designed to capture respondents' perceptions of these constructs within their supply chain contexts. The reliability and validity of these measures were assessed through statistical analysis, ensuring the robustness of the measurement model.

In conclusion, the questionnaire was distributed using multiple methods to reach a diverse sample of respondents, including email, post, online platforms, and physical visits. The chosen respondents are vital due to their expertise and influence on supply chain decisions. The potential for no-response bias was assessed using Levene's Test, highlighting the need for cautious interpretation. Common method bias was considered, and construct measurement was performed to capture the relevant variables accurately.

4. Data Analysis

4.1 Pretest Results

The pretest phase involved a preliminary assessment of the questionnaire's clarity, readability, and comprehensibility. The pretest was conducted with a small group of people ($n = 20$) from the target audience. Their input was helpful in detecting any ambiguity or unclear topics. Minor problems, such as incorrect phrasing in several questions, were discovered during the pretest. These problems were addressed, and the questionnaire was refined before its formal presentation.

4.2 Pilot Testing Results

During the pilot testing phase, a larger sample of respondents ($n = 50$) completed the amended questionnaire. This stage aims to evaluate the consistency and stability of the questionnaire items, investigate early trends in replies, and identify any possible issues (see Table 4).

Table 4

Results of Pilot Test

Constructs	Cronbach's Alpha (α)	Means (SD)	Factor Loading Range
Inventory Competition	0.841	3.75 (0.68)	0.708 - 0.876
AI Adoption	0.902	4.12 (0.51)	0.782 - 0.919
Digital Marketing	0.875	3.88 (0.62)	0.658 - 0.835
Quality Improvement	0.919	3.95 (0.57)	0.769 - 0.902

4.3 Reliability and Convergent Validity

Cronbach's alpha and factor loading analyses were used to measure reliability and convergent validity. All constructs' Cronbach's alpha values exceeded the required level of 0.70, suggesting strong internal consistency. The factor loading ranges revealed a strong convergence of items within each concept, confirming the measurement model's resilience.

4.4 Discriminant Validity

Discriminant validity was assessed by comparing the square root of the extracted average variance (AVE) to the correlations between concepts. The square root of AVE for each construct was bigger than the inter construct correlations, as indicated in the table below, showing that the beliefs have discriminant validity.

Table 5

Discriminant Validity Results

	Inventory Competition	AI Adoption	Digital Marketing	Quality Improvement
Inventory Competition	0.826			
AI Adoption	0.487	0.879		
Digital Marketing	0.372	0.672	0.788	
Quality Improvement	0.398	0.609	0.659	0.823

Discussion

The findings of the pilot testing revealed that the questionnaire adjustments made following the pretest were beneficial in improving clarity and minimizing misunderstanding. The high Cronbach's alpha values indicated great reliability, while the factor loading limits underlined the constructs' convergent validity. The discriminant validity analysis validated the components' distinctiveness even further, as indicated by the larger square root of AVE compared to the inter construct correlations (see Table 5).

4.5 Measurement and Structural Model

The measurement model incorporates the constructs of inventory competition, AI adoption, digital marketing, and quality improvement. These constructs were operationalized using their respective items, demonstrating high reliability and

convergent validity. The structural model examines the relationships between these constructs, unveiling insights into the interplay between inventory competition, AI adoption, digital marketing, and quality improvement decisions within supply chains. The subsequent sections delve into the results and implications derived from the analysis of this model.

5. Results: Hypotheses Testing

Hypothesis 1: *Inventory Competition positively influences quality improvement decisions.*

The analysis revealed a statistically significant positive relationship between inventory competition and quality improvement decisions ($\beta = 0.421$, $p < 0.01$). This supports Hypothesis 1, suggesting that as the level of inventory competition increases, organizations are more inclined to implement quality improvement initiatives within their supply chains.

This finding is consistent with the assertions of Yang et al. (2021) who emphasized that heightened competition could drive firms to differentiate themselves through improved product quality. The positive influence of inventory competition on quality improvement decisions underscores the strategic imperative of organizations to enhance their quality standards to remain competitive and satisfy customer demands.

Hypothesis 2: *Artificial Intelligence adoption positively influences quality improvement decisions.*

The results indicate a significant positive relationship between AI adoption and quality improvement decisions ($\beta = 0.562$, $p < 0.01$). Thus, Hypothesis 2 is supported, suggesting that organizations embracing AI-powered processes are more likely to implement quality enhancement initiatives within their supply chains.

This finding is aligned with the studies of Gołab-Andrzejak (2023), Aravindaraj and Chinna (2022), highlighting AI's potential to enhance decision-making, optimize processes, and contribute to quality improvement efforts. The positive association underscores the strategic importance of AI adoption in facilitating informed quality management decisions and elevating overall supply chain performance.

Hypothesis 3: *Digital Marketing intensity positively influences quality improvement decisions.*

The analysis indicates a significant positive relationship between digital marketing intensity and quality improvement decisions ($\beta = 0.378$, $p < 0.01$). Hypothesis 3 is thus supported, suggesting that organizations with higher digital marketing investments are more likely to engage in quality improvement initiatives.

This finding aligns with Shankar et al. (2022) who emphasized the potential of digital marketing in expanding market reach and creating demand for high-quality products. The positive influence underscores the role of digital marketing strategies in shaping consumer perceptions, fostering demand for quality, and driving organizations to enhance their quality management efforts.

The results of hypothesis testing demonstrate that all three independent variables—inventory competition, AI adoption, and digital marketing intensity—significantly influence quality improvement decisions within supply chains. This implies that organizations need to carefully balance these factors to optimize their quality management strategies and ensure competitiveness in the dynamic business landscape.

Table 6
Hypotheses Testing Results

Hypothesis	Path	Path Coefficient	t-Value	Standard Error	Result
Inventory Competition	→ QI	0.421	4.527	0.093	Supported
AI Adoption	→ QI	0.562	5.891	0.095	Supported
Digital Marketing Intensity	→ QI	0.378	3.968	0.095	Supported

The table summarizes the results of hypotheses testing, including the path coefficients, t-values, standard errors, and the conclusion for each hypothesis. All hypotheses were supported, confirming the significant positive relationships between the independent variables and quality improvement decisions within supply chains (see table 6).

6. Conclusions

The modern business landscape is marked by intricately woven supply chains, spanning the globe and driven by evolving technologies. In this context, assuring the quality of products and services becomes critical for organizational performance, and competitive advantage customer satisfaction. The purpose of this study was to investigate the connection between inventory competitiveness, digital marketing intensity, AI adoption and their collective effect on supply chain quality improvement decisions. This study contributes to a better knowledge of how firms might maximize quality management methods in the age of digital transformation by investigating these relationships.

The major problem of this study was to investigate the factors driving quality improvement judgments within supply chains. The key hypothesis was that inventory competition, AI use, and the intensity of digital marketing have significant and favorable effects on performance improvement initiatives. The study attempts to elucidate the complex dynamics between these variables and their combined impact on quality management systems.

A quantitative research method was used to address this issue. As responses, a varied group of 380 supply chain professionals, managers, and practitioners with competence in AI and digital marketing were chosen. The survey instrument was a structured questionnaire meant to elicit information about inventory competitiveness, AI adoption, digital marketing intensity, and quality improvement decisions inside their individual firms.

The findings of this study provide important insights into the correlations between the variables under consideration. The data support the assumptions, indicating that inventory competition, AI use, and digital marketing intensity all have a significant and favorable influence on supply chain quality improvement decisions. This means that companies that embrace inventory competition, integrate AI technologies, and deploy strong digital marketing strategies are more likely to engage in quality improvement projects. These findings are in line with prior research by (Bender et al., 2018; Saura et al., 2021; Yang et al., 2021), highlighting the importance of competition, AI, and digital marketing in shaping supply chain operations and quality management practices.

This study makes three contributions. For starters, it adds to existing knowledge by investigating the combined influence of inventory competition, AI adoption, and digital marketing on quality improvement decisions. Second, it gives actionable insights for supply chain professionals and managers looking to improve their quality management methods in a digitally driven world. Third, by empirically confirming the correlations between the variables, this study strengthens the theoretical foundation for understanding the dynamics of quality enhancement within supply chains.

This study's consequences go beyond academics and into real-world practice. Organizations can use the study's findings to make informed decisions on inventory competitiveness, AI implementation, and digital marketing tactics, thereby improving their quality management procedures. Businesses can achieve higher quality outcomes, more customer happiness, and a competitive advantage in the market by properly balancing these aspects.

While this study provides useful information, it is vital to recognize its limitations. The study is based on self-reported data from a specific group of respondents, which may introduce response bias. Furthermore, the study focuses on supply chain professionals largely in the United States, limiting the findings' applicability to other contexts. Future research could look at these relationships in multiple industries, geographic regions, and cultural contexts to improve the findings' external validity.

Finally, this analysis sheds insight on the essential connection between inventory competitiveness, AI adoption, digital marketing intensity, and supply chain quality improvement decisions. The findings confirm the beneficial connections between these variables, providing supply chain practitioners with actionable insights. Organizations may drive quality improvement efforts, adapt to technological improvements, and survive in the ever-changing landscape of modern supply chain management by deliberately embracing these aspects.

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