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# THE MEDIATING ROLE OF INNOVATION ADOPTION FOR ECONOMIC EFFICIENCY IN THE MANUFACTURING SECTOR OF VIETNAM

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## ABSTRACT

The purpose of this study was to investigate the mediating role of innovation adoption in enhancing economic efficiency within Vietnam's manufacturing sector. A mixed-methods approach was employed for this study. Qualitative methods, including in-depth interviews, were utilized to gather insights, while a comprehensive survey instrument was administered to industry stakeholders, collecting a substantial number of responses. Quantitative techniques such as Structural Equation Modeling (SEM) and Partial Least Squares (PLS) analysis were employed for data analysis. The findings of this study indicated that Industry Forward, 6Ps Maturity, 6Ss Smart Manufacturing, 6Rs Operational Resilience, and Block-Chain Leadership played significant roles in contributing to economic efficiency within the manufacturing sector in Vietnam. The study also highlighted the pivotal role of innovation adoption across various levels including individual, departmental, organizational, and inter-organizational in driving improvements in economic efficiency. Common challenges faced during the adoption of innovation, including financial constraints, technological gaps, and resistance to change, were also recognized. Recommendations were proposed based on these results, encompassing strategies to strengthen top management commitment, enhance supply chain integration, and promote continuous improvement culture, smart manufacturing practices, and skill development initiatives. The research provides valuable insights for practitioners and policymakers seeking to enhance economic efficiency and competitiveness within Vietnam's manufacturing industry.

**Keywords**: Economic Efficiency, Manufacturing Sector, Mediating Role, Innovation Adoption, Vietnam.

**JEL Classification Code:** M11, O14, O32, L60

## INTRODUCTION

In the modern competitive business landscape, innovation adoption significantly impacts economic efficiency in organizations. This study explores how innovation adoption mediates economic efficiency in Vietnam. As the nation undergoes transformation, grasping innovation's role is crucial. Vietnam's recent trends in its economy and integration make it ideal for studying innovation adoption's link to economic efficiency. The manufacturing sector propels economic growth, attracting investments and creating jobs. Yet, it must tackle challenges like tech advancement, skills, and sustainability.

Vietnam's industrial sector drives its economy, contributing to employment and value-added, but services contribute less. To achieve equitable growth, Vietnam must diversify, support SMEs, and nurture the services sector (OECD, 2021). In Vietnam, innovation adoption in manufacturing boosts economic efficiency. Innovations enhance processes, resource use, and productivity. This includes advanced tech, new products, and efficient supply chains (Molinaro et al., 2022). Innovation helps firms remain competitive, fosters growth, and achieves efficiency in the global market. In a global context, organizations across various industries are increasingly recognizing the significance of embracing innovation as a strategic imperative to enhance their competitiveness, drive productivity gains, and elevate overall performance. (Sahoo et al., 2023). Vietnam's growth and transformation make it a prime context for exploring innovation's role (WB, 2021). Vietnam's dynamic economy attracts investments, making it crucial to understand innovation's impact on economic efficiency (Cirera et al., 2021).

While existing literature has established a connection between innovation adoption and its subsequent outcomes, there remains a notable gap in comprehensively exploring the mediating role of innovation in the context of Vietnam. This research endeavors to address this gap and contribute insights into the intricate relationship between innovation and the economy. By delving into the mediation role of innovation adoption for economic efficiency within Vietnam's manufacturing sector, this study offers valuable knowledge that can inform policymakers and industries alike. The findings hold the potential to guide the development of strategic initiatives aimed at fostering innovation-driven growth, thereby contributing to the overall advancement of various sectors and the broader economy (Phuoc, 2022). Policymakers can leverage these insights to design targeted measures that cultivate a culture of innovation across sectors, facilitating sustainable economic development and competitiveness.

This research aims to examine how innovation adoption mediates economic efficiency in Vietnam by investigating the link between organizational factors, innovation, and efficiency. The study will employ empirical methods to draw meaningful conclusions, offering actionable insights for Vietnam's organizations.

This study seeks to assess the economic efficiency of Vietnam's manufacturing firms, pinpoint influencing factors, examine innovation's role between organizational elements and economic efficiency, offer efficiency-enhancing recommendations, address innovation adoption challenges, and propose corresponding strategies. Addressing these goals promises valuable insights for promoting economic efficiency and sustainable growth in Vietnam's manufacturing sector.

## LITERATURE REVIEW

Vietnam's manufacturing sector is pivotal for economic growth, attracting investment with its favorable conditions and strategic location (Long, Huy, et al., 2022). Spanning electronics, textiles, automotive, machinery, and so much more, the manufacturing sector fosters progress through job creation, aided by government policies, infrastructure, and incentives. Expansion relies on workforce, global integration, and tech adoption, while challenges include skills and sustainability. Automation and AI are examples of innovation that are crucial for efficiency in

enhancing productivity, reducing costs, and remaining competitive in a rapidly evolving global market. Research can guide sustainable growth and innovation adoption, ensuring the sector's lasting economic success.

**Industry Forward**

Industry Forward propels modernization through innovation, enhancing efficiency, reducing costs, and ensuring competitiveness (Huy et al., 2023). Leadership's commitment facilitates innovation, resource allocation, and positive change (Trang et al., 2019). Seamless supply chain integration optimizes coordination, visibility, and innovation (Jayashree et al., 2021; Le et al., 2022). IT infrastructure drives digital transformation, automation, and innovation (Anh et al., 2022). Skill development enhances capabilities and innovation (Trang, 2023). Collaboration and partnerships accelerate progress through knowledge sharing (Van & Long, 2022). A culture of continuous improvement encourages adaptability and competitiveness (Duong et al., 2022). These factors collectively steer Industry Forward by fostering innovation adoption, operational efficiency, and adaptability in a dynamic business landscape.

**6Ps Maturity in Innovation Adoption**

The 6Ps maturity framework evaluates innovation adoption through six dimensions: Product-Services, Processes, Platform, People, Partnership, and Performance (Spaltini et al., 2022). This assessment delves into each dimension's importance and roles in successful innovation integration. Product-Services examines advanced offerings and customer value (Lan & Long, 2018). Processes assess internal workflows and idea management (Van et al., 2021). Platform evaluates IT support and data analytics (Lan et al., 2022). People emphasize human capital's innovation role (Long et al., 2017, 2018). Partnership analyzes collaborative relationships. Performance gauges innovation impact (Huy et al., 2023). Enhancing these dimensions cultivates innovation, competitiveness, and growth. This literature review highlights their significance and lays the foundation for further research and practical innovation management application.

**Smart Manufacturing and Key Dimensions**

Smart Manufacturing represents a transformative paradigm in the manufacturing sector, capitalizing on technology and digitalization. The focus on self-awareness, self-prediction, self-comparison, self-configuration, self-maintenance, and self-organization (Valero et al., 2022) is pivotal, as elucidated by this analysis, highlighting their role in enhancing efficiency, flexibility, and competitiveness (Hung et al., 2017). Self-awareness facilitates real-time system monitoring, bolstering fault detection and decision-making. Self-prediction employs historical data for anticipatory actions against future events. Self-comparison enables continuous enhancement by benchmarking performance against predefined standards. Autonomous adaptation to evolving conditions characterizes self-configuration, nurturing flexibility. Self-maintenance undertakes independent upkeep, curtailing downtime. Lastly, decentralized coordination for adaptable production and collaboration characterizes self-organization. By harnessing these facets of Smart Manufacturing, organizations can attain operational excellence, agility, and heightened productivity. This review sets the foundation for prospective exploration and pragmatic application of Smart Manufacturing principles.

**The 6R Operational Resilience Model**

Utilizing a stakeholder-centered disaster resilience approach for transportation infrastructure, the modified 6R model ensures streamlined production in the context of automotive parts manufacturing (Morshed et al., 2021). This model encompasses attributes such as Resourcefulness, Reliability, Robustness, Responsiveness, Recoverability, and Replacement.

Additionally, the impact of Information and Communication Technology (ICT) on sustainable manufacturing and Lean Six Sigma reveals Industry 4.0's transformative effect on modern manufacturing through improved data accessibility (Titmarsh et al., 2020). Resourcefulness optimizes resource utilization, Reliability ensures consistent performance, Robustness enables operation under adverse conditions, Responsiveness adapts to market shifts, Recoverability accelerates recovery, and Replacement facilitates timely equipment substitution. Integrating the 6R model enhances resilience, productivity, waste reduction, and adaptability within automotive parts manufacturing, ensuring efficient production systems.

**Blockchain Leadership and its Key Dimensions**

Blockchain's growing importance has underscored effective leadership's role. This study explores dimensions like Agility, Flexible Thinking, Innovation, Inspirational Motivation, Technology-Oriented Thinking, and Human Values in Block-chain leadership (Long, Ooi, et al., 2022). Agility adapts to market changes; Flexible Thinking embraces new ideas. Innovation fosters inventive approaches, Inspirational Motivation guides teams, Technology-Oriented Thinking understands tech, and Human Values ensure ethics. These qualities drive blockchain's transformation and responsible governance. This review lays the groundwork for practical use and future study in blockchain leadership (Long, Mackechnie, et al., 2023).

**Innovation Adoption Measures**

When assessing innovation adoption, Lam et al. (2023) identified four key measures: Adoption Rate, showing the speed and extent of acceptance; Time to Adoption, measuring the duration to achieve full integration; Level of Adoption, assessing implementation depth; Perceived Benefits and Satisfaction, gauging subjective positive outcomes (Lam et al., 2023a).

**Innovation Adoption Levels**

Innovation adoption occurs at multiple organizational levels (Lam et al., 2023b): Individual, reflecting employee acceptance; Team or Department, indicating group coordination; Organizational, showcasing alignment with strategy and culture; Interorganizational, representing cross-entity collaboration. Addressing challenges across these levels enhances innovation capabilities and competitiveness.

**Economic Efficiency**

Economic efficiency, a cornerstone of business and economics, optimizes resource allocation for maximum output. Explored factors include cost reduction, resource optimization, productivity enhancement, quality elevation, innovation, technology adoption, and efficient supply chain management. Insights in these areas drive economic efficiency, ensuring growth and competitiveness (Long, Duong, et al., 2022; Long, Tuan, et al., 2023). Cost reduction and resource optimization enhance performance. Boosted productivity and quality products sustain growth. Innovation and technology adoption adapt to change. Effective supply chain management ensures timely logistics. Embracing these principles positions organizations for success amid contemporary challenges, contributing significantly to the economy (Thiet et al., 2023).

**Literature Gaps**

Despite extensive research, gaps in understanding the relationship between innovation adoption and economic efficiency persist. These gaps include limited exploration of innovation's mediating role, contextual factors, comprehensive frameworks, leadership's impact, specific outcomes, and obstacles hindering adoption. Addressing these gaps enhances scholarly understanding and offers actionable insights for organizations aiming to improve

innovation capabilities and achieve lasting economic success. Future research should focus on bridging these gaps to advance the field's knowledge. The study aims to comprehensively understand economic efficiency factors and provide strategies for enhancing organizational performance. Ethical considerations will ensure validity and reliability.

## METHODOLOGY AND RESEARCH MODEL

The study's methodology involves surveying 205 participants using a Likert 5-point scale questionnaire. The survey covered constructs such as Industry Forward, 6Ps Maturity, Smart Manufacturing, 6Rs Operational Resilience, Block-Chain Leadership, Innovation Adoption, and Economic Efficiency. Diverse industry participants ensured representativeness. Smart-PLS 3.0 analysis included descriptive stats, construct quality measurement, discriminant validity assessment, Predictive Accuracy, and Relevance evaluation, Effect Size determination, Collinearity Statistics check, and path coefficient analysis.

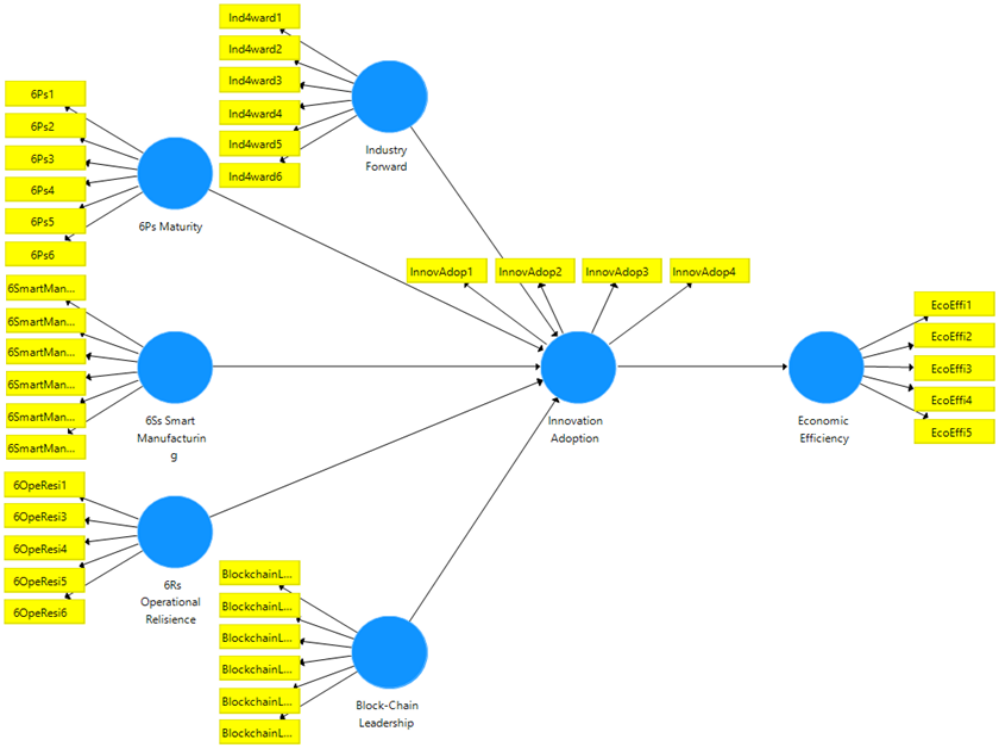


Figure 1. Theoretical Framework

Two hypotheses were developed for this research:

- H1: There are relationships between Organizational Internal factors including Industry Forward (1a), 6Ps Maturity (1b), Smart Manufacturing (1c), 6Rs Operational Resilience (1d), Block-Chain Leadership (1e) and Innovation Adoption.
- H2: Innovation Adoption plays a mediating role in influencing Economic Efficiency.

## RESULTS AND DISCUSSION

### Demographic Profile

Table 1 featured 203 respondents, providing insights into their demographics. Organization types showed local organizations at 50.2%, state-owned at 16.3%, and foreign and joint ventures each at 16.7%. Most participants were from organizations with <50 employees (74.9%), 50-200 employees (9.9%), 201-500 employees (10.3%), and >501 employees (4.9%). The manufacturing sector dominated (70.0%), services were 11.8%, government and education/training were 4.4% and 13.8% respectively. Enterprise managers constituted 75.4%, state officers 8.9%, and researchers 15.8%. Lean practices were adopted by 61.6%, 4.0 industry

practices by 22.2%, and both by 16.3%. These findings provide insights into the participants' diverse composition and contextualize the mediating role of innovation adoption for economic efficiency in Vietnam.

Table 1. Demographic Profile

| No. | Category | | Frequency (N=203) | Percent (%) |
|---|---|---|---|---|
| 1 | Organization Type | Local | 102 | 50.2% |
| | | State-owned | 33 | 16.3% |
| | | Foreign | 34 | 16.7% |
| | | Joint venture | 34 | 16.7% |
| 2 | Organization Size | less than 50 employees | 152 | 74.9% |
| | | from 50 to 200 employee | 20 | 9.9% |
| | | from 201 to 500 employee | 21 | 10.3% |
| | | above 501 employees | 10 | 4.9% |
| 3 | Industry | Manufacturing | 142 | 70.0% |
| | | Service | 24 | 11.8% |
| | | Government | 9 | 4.4% |
| | | Education & Training | 28 | 13.8% |
| 4 | Position | State officer | 18 | 8.9% |
| | | Enterprise manager | 153 | 75.4% |
| | | Researcher | 32 | 15.8% |
| 5 | Organization Characteristic | Lean Production Applied | 125 | 61.6% |
| | | 4.0 Industry Applied | 45 | 22.2% |
| | | Both | 33 | 16.3% |
| | | None | 0 | 0.0% |

## Construct Quality Measurement

Table 2 presents a comprehensive evaluation of various constructs through essential statistical measures that assess their reliability and validity. The outer loadings, ranging from 0.710 to 0.903, underscore the strong association between individual items and their respective constructs. High Cronbach's alpha coefficients (0.859 to 0.932) reflect robust internal consistency within constructs. Additionally, composite reliability scores (0.899 to 0.937) highlight the constructs' overall reliability. These findings collectively validate the constructs' measurement quality, ensuring a solid foundation for exploring their interrelationships and enhancing the credibility of the study's outcomes.

Table 2. Construct Quality Measurement

| No. | Construct | Item | Outer Loadings | Cronbach's Alpha | Composite Reliability |
|---|---|---|---|---|---|
| IV1 | Industry Forward | Ind4ward1 | 0.848 | 0.912 | 0.932 |
| | | Ind4ward2 | 0.843 | | |
| | | Ind4ward3 | 0.820 | | |
| | | Ind4ward4 | 0.796 | | |
| | | Ind4ward5 | 0.859 | | |
| | | Ind4ward6 | 0.836 | | |
| IV2 | 6Ps Maturity | 6Ps1 | 0.819 | 0.890 | 0.916 |
| | | 6Ps2 | 0.785 | | |

| | | | | | |
|---|---|---|---|---|---|
| | | 6Ps3 | 0.770 | | |
| | | 6Ps4 | 0.768 | | |
| | | 6Ps5 | 0.816 | | |
| | | 6Ps6 | 0.859 | | |
| IV3 | 6Ss Smart Manufacturing | 6SmartManu1 | 0.815 | 0.919 | 0.937 |
| | | 6SmartManu2 | 0.812 | | |
| | | 6SmartManu3 | 0.855 | | |
| | | 6SmartManu4 | 0.808 | | |
| | | 6SmartManu5 | 0.871 | | |
| | | 6SmartManu6 | 0.903 | | |
| IV4 | 6Rs Operational Relisience | 6OpeResi1 | 0.828 | 0.859 | 0.899 |
| | | 6OpeResi3 | 0.710 | | |
| | | 6OpeResi4 | 0.793 | | |
| | | 6OpeResi5 | 0.823 | | |
| | | 6OpeResi6 | 0.840 | | |
| IV5 | Block-Chain Leadership | BlockchainLead1 | 0.766 | 0.882 | 0.910 |
| | | BlockchainLead2 | 0.782 | | |
| | | BlockchainLead3 | 0.751 | | |
| | | BlockchainLead4 | 0.835 | | |
| | | BlockchainLead5 | 0.825 | | |
| | | BlockchainLead6 | 0.792 | | |
| MoV | Innovation Adoption | InnovAdop1 | 0.803 | 0.824 | 0.884 |
| | | InnovAdop2 | 0.826 | | |
| | | InnovAdop3 | 0.749 | | |
| | | InnovAdop4 | 0.857 | | |
| DV | Economic Efficiency | EcoEffi1 | 0.850 | 0.899 | 0.925 |
| | | EcoEffi2 | 0.831 | | |
| | | EcoEffi3 | 0.838 | | |
| | | EcoEffi4 | 0.857 | | |
| | | EcoEffi5 | 0.843 | | |

## Convergent and Discriminant Validity

Table 3. Convergent and Discriminant Validity

| **Construct** | **AVE** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|---|
| 6Ps Maturity (1) | 0.646 | 0.804 | | | | | | |
| 6Rs Operational Relisience (2) | 0.640 | 0.259 | 0.800 | | | | | |
| 6Ss Smart Manufacturing (3) | 0.713 | 0.310 | 0.360 | 0.845 | | | | |
| Block-Chain Leadership (4) | 0.628 | 0.285 | 0.121 | 0.114 | 0.792 | | | |
| Economic Efficiency (5) | 0.712 | 0.468 | 0.320 | 0.315 | 0.372 | 0.844 | | |
| Industry Forward (6) | 0.696 | 0.365 | 0.382 | 0.414 | 0.414 | 0.513 | 0.834 | |
| Innovation Adoption (7) | 0.656 | 0.533 | 0.453 | 0.478 | 0.449 | 0.733 | 0.798 | 0.810 |

Table 3 showcases the Fornell-Larcker criterion results for assessing discriminant validity. This criterion ensures that constructs measure distinct concepts, not the same underlying factor. The table displays correlations between constructs and the square roots of average variance extracted (AVE) for each. The AVE signifies variance explained by construct items. Diagonal AVE square roots should surpass correlations with other constructs, validating discriminant

validity. AVE square roots (e.g., 6Ps Maturity: 0.897, 6Rs Operational Resilience: 0.894) exceed inter-construct correlations (range: 0.121 to 0.468), validating distinctness. Findings affirm constructs' unique measurement and reinforce study robustness by capturing diverse aspects of the phenomenon under examination.

**Predictive Accuracy (R2), Predictive Relevance (Q2), Effect Size (f2) and Collinearity Statistics (VIF)**

The construct Economic Efficiency accounted for 53.4% of the variance in the model, with an adjusted R-squared value of 0.347. The $Q^2$ value, representing predictive relevance, was 0.347. Similarly, the construct Innovation Adoption explained 73.3% of the variance, yielding an adjusted R-squared of 0.44 and a $Q^2$ value of 0.44. These values indicate the proportion of variability explained and the model's predictive power for each respective construct.

Table 4. Predictive Accuracy (R2), Predictive Relevance (Q2), Effect Size (f2) and Collinearity Statistics (VIF)

| Construct | VIF | f Square | R Square Adjusted | $Q^2$ (=1-SSE/SSO) |
|---|---|---|---|---|
| 6Ps Maturity | 1.247 | 0.153 | | |
| 6Rs Operational Relisience | 1.258 | 0.044 | | |
| 6Ss Smart Manufacturing | 1.324 | 0.038 | | |
| Block-Chain Leadership | 1.253 | 0.045 | | |
| Economic Efficiency | | | 0.534 | 0.347 |
| Industry Forward | 1.591 | 0.794 | | |
| Innovation Adoption | 1.000 | 1.159 | 0.733 | 0.440 |

The construct 6Ps Maturity had a Variance Inflation Factor (VIF) of 1.247, indicating a moderate level of multicollinearity. Its f Square value is 0.153, suggesting a moderate effect size. Similarly, the construct 6Rs Operational Resilience had a VIF of 1.258, indicating acceptable multicollinearity, with an f Square value of 0.044 representing a small effect size. The construct 6Ss Smart Manufacturing shows a VIF of 1.324, indicating acceptable multicollinearity, with a small effect size denoted by an f Square value of 0.038. The construct Block-Chain Leadership has a VIF of 1.253, indicating acceptable multicollinearity, with an f Square value of 0.045 representing a small effect size. Industry Forward had a higher VIF of 1.591, indicating potential multicollinearity, and a significant f Square value of 0.794, indicating a large effect size. Innovation Adoption has a VIF of 1, indicating no multicollinearity concerns, and an f Square value of 1.159, representing a large effect size. These values provide insights into the potential impact of multicollinearity and the effect sizes of the constructs within the model.

**Hypothesis Results**

Table 5 displays the coefficients for the five predictors of innovation adoption in the Vietnam manufacturing sector. All independent variables exhibit significant and positive relationships with innovation adoption. Notably, Industry Forward demonstrates the highest significant relationship ($\beta$=0.573, P<0.05) with the dependent variable. 6Ps Maturity ($\beta$=0.223, P<0.05), Block-Chain Leadership ($\beta$=0.121, P<0.05), 6Rs Operational Resilience ($\beta$=0.120, P<0.05), and 6Ss Smart Manufacturing ($\beta$=0.115, P<0.05) also display significant positive relationships with innovation adoption. Innovation Adoption mediates the influence on Economic Efficiency, and its impact is most significant ($\beta$ = 0.733, P = 0.000). The results from the data analysis confirm the support for the two hypotheses in this research.

The path coefficients, original sample values, p-values, and decisions for each hypothesis are presented as follows:

Table 5. Path Coefficients

| No. | Path Coefficients | Original Sample (O) | P Values | Conclusion |
|---|---|---|---|---|
| H3 | Innovation Adoption → Economic Efficiency | 0.733 | 0.000 | Accepted |
| H1a | Industry Forward → Innovation Adoption | 0.573 | 0.000 | Accepted |
| H1b | 6Ps Maturity → Innovation Adoption | 0.223 | 0.000 | Accepted |
| H1e | Block-Chain Leadership → Innovation Adoption | 0.121 | 0.008 | Accepted |
| H1d | 6Rs Operational Relisience → Innovation Adoption | 0.120 | 0.009 | Accepted |
| H1c | 6Ss Smart Manufacturing → Innovation Adoption | 0.115 | 0.004 | Accepted |

## Discussions

The study's findings reveal a strong positive relationship between Innovation Adoption and Economic Efficiency, supporting the hypothesis that increased adoption of innovation leads to improved economic efficiency. This implies that organizations in Vietnam can enhance their economic performance by actively embracing innovative practices and technologies.

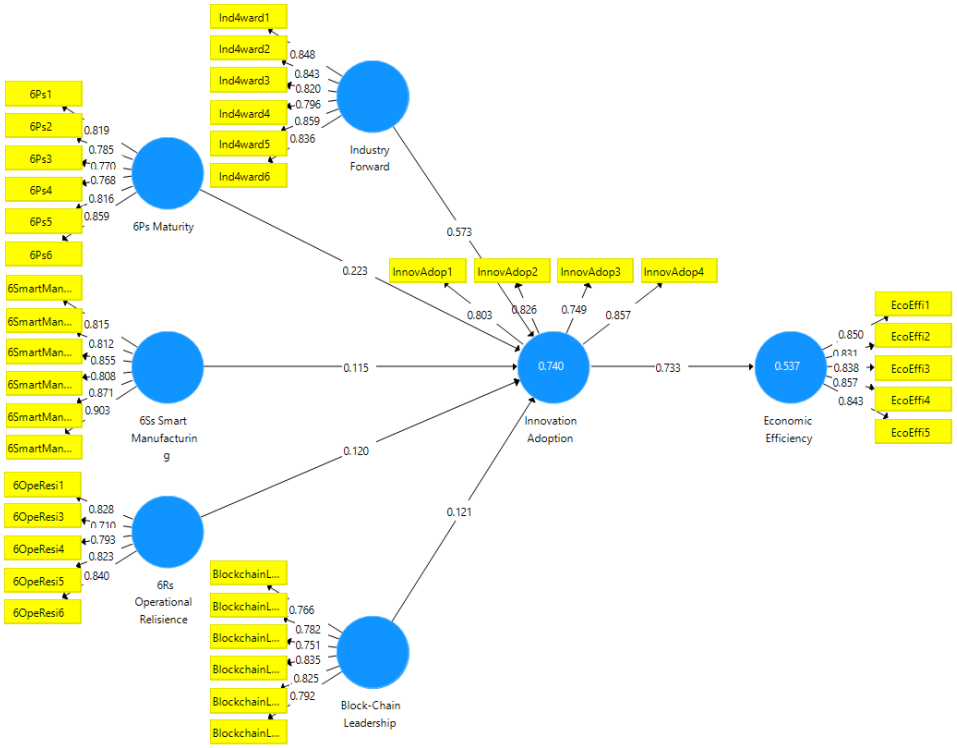


Figure 2. Structural Model

The significant path coefficient between Industry Forward and Innovation Adoption highlights the importance of industry-specific factors in driving innovation adoption. Industries that prioritize forward-thinking strategies and foster a culture of innovation are more likely to witness higher levels of adoption among their stakeholders.

The positive relationship between 6Ps Maturity and Innovation Adoption suggests that organizations with mature processes, including product, price, place, promotion, people, and physical evidence, are more inclined to embrace innovative practices. This finding underscores the significance of having a solid foundation in these areas to foster a conducive environment for innovation.

*"6Ps Maturity is foundational for sustainable business development, enabling innovation, efficiency enhancement, and fostering an engaging work environment." – Mr. Tran Van Lam, Director of Shinhan Bank Vietnam, Ho Chi Minh City Headquarters.*

The impact of Block-Chain Leadership on Innovation Adoption implies that effective leadership plays a crucial role in driving the adoption of blockchain technology in organizations. Leaders who demonstrate knowledge, vision, and support for blockchain initiatives can encourage their teams to embrace this emerging technology, leading to increased innovation adoption.

*"For survival and growth, businesses must prioritize innovation and new technology adoption," said Mr. Ly Sieng, Founder-Chairman of Nhon Hoa Scale Manufacturing Company.*

The positive relationship between the 6Rs Operational Resilience and Innovation Adoption suggests that organizations with strong operational resilience are more likely to be receptive to innovative practices. Resilient organizations are better equipped to adapt to change, manage risks, and seize opportunities, creating an environment conducive to innovation adoption.

*"After a crisis, applying 6Rs Operational Resilience is crucial for organizations to adopt innovation successfully," highlighted Mr. Ho Lu Lam Tran, President of Javihi Hi-tech R&D Center (JAVIHI).*

The significant relationship between 6Ss Smart Manufacturing and Innovation Adoption indicates that embracing smart manufacturing practices can facilitate the adoption of innovative technologies and processes. Smart manufacturing, which leverages advanced technologies like automation, data analytics, and IoT, enables organizations to optimize their operations and drive innovation.

*"Implementing 6Ss Smart Manufacturing bridges technology and innovation," said Mr. Nguyen Van Man, Director of Minh Man Manufacturing. The approach propelled Minh Man to prominence in supplying innovative products to global brands.*

The study's findings imply that while industry-specific factors, organizational maturity, leadership, operational resilience, and smart manufacturing contribute to Innovation Adoption, their combined effect is necessary to explain its variance fully. This underscores the complexity of innovation adoption and the need for a multifaceted approach to fostering innovation within organizations.

*"Innovating in organizations is complex, yet holds potential for performance achievements," said Mr. Nguyen Ngoc Huy, a Ph.D. Candidate and Manager at MKTP Company Limited. His statement highlights both challenges and positive impacts on manufacturing performance.*

The strong positive relationship between Innovation Adoption and Economic Efficiency suggests that organizations that effectively adopt and implement innovation practices will likely experience improved economic performance. This finding has practical implications for policymakers, industry practitioners, and organizational leaders in Vietnam, emphasizing the need to prioritize and support innovation initiatives.

*"Government must prioritize innovation for economic development," stressed Dr. Nguyen Thi Thu Phuong, Tax Declaration Head at the General Department of Taxation, Ho Chi Minh City. This highlights the government's role in fostering growth through innovation.*

The findings provide empirical evidence for the importance of innovation adoption as a means to enhance economic efficiency in Vietnam. Policymakers can leverage these insights to develop strategies and policies that encourage innovation adoption across industries, fostering economic growth and competitiveness.

*"Innovation adoption is transformative for policymakers, enabling targeted strategies and boosting economic growth. Dr. Tran Duc Anh, Ministry of Construction,*

*underscores its role in economic advancement."*

The significant role of leadership in driving innovation adoption highlights the need for organizations to invest in leadership development programs that cultivate a culture of innovation and equip leaders with the knowledge and skills to navigate the complexities of adopting new technologies and practices.

> *"Leaders require skills for innovation. Ongoing training, fostering an innovative culture are crucial. Dr. Le Quoc An, Green Ocean Institute, emphasizes leadership competence, cultural cultivation for successful innovation adoption."*

The study's results underscore the importance of organizational factors, such as operational resilience and smart manufacturing, in influencing innovation adoption. Organizations should focus on building resilience and embracing smart manufacturing principles to create an environment that encourages experimentation, collaboration, and continuous improvement, fostering innovation adoption.

> *"Mr. Nguyen Quoc Thang, SMC Phu My Steel, stresses innovation, smart manufacturing, and resilience link. Resilience development via innovation stressed, underlining their integral role in building a robust business."*

Future research could explore additional factors that influence innovation adoption and economic efficiency in Vietnam, such as organizational culture, external environmental factors, and the role of government policies. Understanding the broader context and dynamics surrounding innovation adoption can provide a more comprehensive grasp of its impact on economic efficiency and inform targeted strategies for promoting innovation-led growth.

**Challenges Faced by Vietnam Manufacturing Firms in Innovation Adoption**

Vietnamese manufacturing firms encounter challenges such as limited financial resources, a shortage of skilled personnel, resistance to change, technological infrastructure gaps, regulatory complexities, and limited collaboration. To overcome these obstacles and foster innovation adoption, potential solutions include government funding, vocational training programs, change management strategies, infrastructure investments, streamlined regulations, and promoting collaboration. Addressing these challenges can empower Vietnamese manufacturers to embrace innovation, enhance their global competitiveness, and drive sustainable growth.

**Recommendations**

To enhance innovation adoption in Vietnam, organizations should prioritize cultivating an innovative culture, invest in leadership development, encourage collaboration and knowledge sharing, embrace emerging technologies, establish strategic partnerships, and foster an environment that promotes risk-taking and experimentation. Creating a culture that values innovation, providing resources for exploring new ideas, and facilitating cross-functional collaboration can drive the adoption of innovative practices. Effective leadership, coupled with strategic partnerships, can accelerate innovation diffusion and knowledge transfer. Embracing emerging technologies and fostering experimentation further contribute to innovation adoption. By implementing these recommendations, Vietnamese organizations can enhance their economic efficiency and competitiveness in a rapidly changing business landscape.

**Implication for Practice**

The research findings have important implications for manufacturing sector practitioners, offering insights to enhance economic efficiency strategies. Prioritizing innovation adoption and nurturing a culture of continuous improvement can lead to better economic outcomes. Strategically allocating resources to areas influencing efficiency, promoting adaptability, and embracing change are essential. Collaborations and partnerships can facilitate innovation and

efficiency, making cross-industry cooperation valuable. Addressing adoption challenges through training, supportive climates, and government initiatives can ensure successful innovation implementation. These implications guide practitioners in making informed decisions for organizational growth, competitiveness, and sustainability in the dynamic business landscape.

## CONCLUSION

In conclusion, this research offers valuable insights into the nexus of innovation adoption and economic efficiency within Vietnam's manufacturing firms. It yields several key findings: firstly, assessing current economic efficiency, and providing a benchmark for future analysis. Secondly, identifying influential factors for performance enables informed decisions. The study underscores innovation adoption's pivotal mediating role, in enhancing competitiveness. Recommendations include fostering an innovation culture, R&D investment, collaboration, and tech adoption. The study also addresses adoption challenges with potential solutions. Practically, it emphasizes supportive innovation environments and human capital development. The research has broader implications, suggesting future research directions. Overall, this study significantly advances the understanding of innovation's role in economic efficiency for Vietnam's manufacturing, offering actionable insights for progress.

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