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The Influence Of Rumah Bumn's Innovation Strategy On Msme's Competitiveness: The Quadruple Helix Approach

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in Indonesia's economic development, contributing significantly to employment, GDP, and innovation. However, they face persistent challenges related to financial access, technological adoption, and market expansion. This study examines the impact of Helix Rumah BUMN's innovation strategy on MSMEs' competitiveness, with a focus on the moderating role of academia, the Ministry of State-Owned Enterprises (SOEs), and business communities within the Quadruple Helix framework. A mixed-method explanatory sequential design was employed, incorporating quantitative survey data from 260 MSMEs engaged in Rumah BUMN programs and qualitative interviews with MSME owners, facilitators, and policymakers. The results confirm that innovation capability serves as a critical mediator in strengthening MSMEs' competitiveness ($\beta = 0.250$, $p = 0.005$), demonstrating that structured mentorship, financial support, and digital transformation initiatives positively influence market positioning and business sustainability. Government support ($\beta = 0.217$, $p < 0.001$) and business community engagement ($\beta = 0.174$, $p = 0.002$) significantly enhance MSMEs' innovation-driven competitiveness. However, academic institutions showed an insignificant role ($\beta = 0.029$, $p = 0.566$), suggesting weak university-industry collaboration. The study highlights Helix SOEs and the Ministry of SOEs as key enablers, providing MSMEs with market access, knowledge transfer, and regulatory support. This research underscores the importance of a well-integrated innovation ecosystem, where collaboration among government agencies, industry stakeholders, and research institutions is essential to maximize the impact of innovation strategies. The study recommends strengthening academia-industry partnerships, expanding government-

backed incentives, and fostering peer learning through business communities to enhance MSMEs' innovation potential and long-term competitiveness. Future research should explore industry-specific innovation strategies, longitudinal MSME innovation progress, and the role of emerging technologies such as AI, blockchain, and IoT in enhancing MSME growth and sustainability.

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economic development, contributing significantly to employment, income distribution, and innovation. According to the Economic Research Institute for ASEAN and East Asia (ERIA, 2023), MSMEs account for approximately 99% of all business entities, contribute 61% to Indonesia's GDP, and employ nearly 97% of the national workforce. These figures highlight MSMEs' crucial role in fostering economic resilience, reducing poverty, and promoting sustainable growth. However, despite their importance, MSMEs face several challenges, particularly in financial accessibility, technological adoption, and market expansion. The increasing globalization of trade and rapid digital advancements have intensified competition, making innovation capability a key determinant of MSMEs' competitiveness and sustainability (Ulubeyli et al., 2018).

To address these challenges, the Indonesian government has introduced Rumah BUMN, a strategic initiative designed to support MSMEs through innovation-driven programs, digitalization efforts, and market integration. Rumah BUMN provides business mentoring, access to financing, technology transfer, and networking opportunities with state-owned enterprises (SOEs). While this initiative has demonstrated potential benefits, its overall impact remains underexplored in academic literature, particularly regarding the role of academia and government institutions in strengthening MSME innovation ecosystems.

The Quadruple Helix model offers a theoretical framework for understanding innovation-driven economic development through collaboration between government, industry, academia, and society (Carayannis & Campbell, 2010). Academia plays a crucial role in research-driven innovation, knowledge dissemination, and technology transfer, while government institutions, particularly the Ministry of State-Owned Enterprises (SOEs), provide policy support and regulatory frameworks to enhance MSME capabilities (Etzkowitz & Leydesdorff, 2000). However, empirical studies examining the interaction between these key actors within the Rumah BUMN ecosystem are limited. Previous research has focused on either government-led innovation policies (Rahman, 2023) or financial support mechanisms for MSMEs (Ng et al., 2019), but few studies integrate these dimensions into a comprehensive analytical framework assessing their combined effects on MSME innovation and competitiveness. Additionally, Hamidah et al. (2021) highlight the lack of research on community-driven initiatives, such as Rumah BUMN, in promoting MSME innovation.

LITERATURE REVIEW

Rumah BUMN's Innovation Strategy

The innovation strategy of Helix Rumah BUMN refers to the organized efforts and programs that Helix Rumah BUMN has established in order to encourage innovation among MSMEs. Ueasangkomsate and Jangkot (2017) emphasize the significance of community groups in terms of their ability to supply MSMEs with resources and assistance, hence improving the latter's capacity for innovation. They explain how community participation may have a good influence on the innovation processes of MSMEs. The dimensions of measurement are training and workshop, access to digital resources, networking and financial support

MSMEs Innovation Capability

MSMEs innovation capability is the capacity of small and medium-sized businesses to create new goods, processes, or services that strengthen their competitive advantage. Innovation capability is defined by Salavou et al. (2004) as the capacity to generate and implement new ideas that lead to significant improvements in products or services. Saunila & Ukko (2012) emphasize that innovation capability is crucial for MSMEs to adapt to changing market demands and improve their performance. The dimensions of measurement are product innovation, process innovation, market adaptability, and technology utilization.

MSMEs Competitiveness

The competitiveness of MSMEs is a multidimensional notion that incorporates a variety of metrics, such as market share, customer satisfaction, operational efficiency, and profitability. To evaluate the success of MSMEs and their capacity to prosper in competitive marketplaces, it is vital to have a solid understanding of these indicators.

Quadruple Helix Model

The Quadruple Helix model is an evolution of the Triple Helix framework proposed by Etzkowitz and Leydesdorff (2000), which emphasizes the interactions between universities, industry, and government as key drivers of innovation. in the context of Indonesia, this model has shown limitations in addressing the unique challenges faced by MSMEs, such as cultural resistance and lack of community involvement (Dhewanto et al., 2017). The Quadruple Helix model addresses these gaps by incorporating civil society as a fourth helix, enabling a more inclusive and sustainable approach to innovation. Dhewanto's research on creative industries in Indonesia demonstrates how the Quadruple Helix model can foster innovation by leveraging community engagement and social capital. For instance, in the Indonesian batik industry, collaboration between local artisans (civil society), government agencies, universities, and private companies has led to the development of innovative designs and marketing strategies, enhancing the competitiveness of MSMEs in the global market.

Helix Rumah BUMN as an Innovation Hub

In order to bridge the gap between MSMEs and the other helices, community groups such as Helix Rumah BUMN play an essential role. They make it easier for stakeholders to communicate with one another, coordinate their efforts, and share their information. Communities have the potential to function as middlemen that channel the ambitions of MSMEs, therefore giving these businesses the essential assistance to innovate and develop, as Hadiyanto and Remi (2022) have pointed out. MSMEs can use Helix Rumah BUMN as a platform to get access to resources, mentorship, and possibilities for networking.

Helix Ministry of SOEs

When it comes to formulating policies that encourage innovation and entrepreneurialism among MSMEs, the government, which is represented by the Ministry of SOEs, plays a significant role. According to Mahyarni (2024), the policies of the government have the potential to create the required foundation for the success of MSMEs by providing financial assistance, regulatory guidance, and the development of infrastructure. It is vital for the government to be involved in order to provide a conducive atmosphere that supports collaboration among the other helices. This will ensure that the demands of the sector are satisfied through the implementation of research projects and individualized educational programs. According to Astuty (2024), who highlights the significance of government assistance in supporting innovation via joint efforts among universities, businesses, and communities.

Helix Academia's Role

In Quadruple Helix model, academic institutions play a crucial part since they are responsible for providing research, teaching, and training, all of which are necessary for the development of innovative ideas. They develop new ideas and technology, which may be passed to MSMEs and the community, and they function as information centres. According to Roman et al. (2020), universities are becoming more involved with both the private sector and the government in order to enable the transfer of information and to encourage innovation.

Helix SOEs

Helix SOEs serves as a vital link between the government and MSMEs, providing mentorship, resources, and market access. Dubina et al. (2011) emphasize that Helix SOEs can help MSMEs penetrate new markets and enhance their competitiveness by sharing knowledge and expertise. This collaboration can lead to improved innovation outcomes and increased performance for MSMEs. There are 15 (fifteen) SOEs that have Rumah BUMN in 24 (twenty-four) provinces in Indonesia.

METHODS

This study employs a mixed-method explanatory sequential design, which is particularly effective in analyzing the relationship between Rumah BUMN's innovation strategies, MSME competitiveness, and the moderating roles of academia and the Ministry of SOEs. According to Creswell & Creswell (2018), this method involves two phases: quantitative data collection and analysis, followed by qualitative data gathering to provide deeper insights. This approach ensures a comprehensive understanding of the research problem by validating statistical results with stakeholder perspectives.

The quantitative phase involves survey-based data collection from 40 MSMEs engaged in Rumah BUMN programs in Tebing Tinggi and Pabatu. The study employs purposive sampling and Likert-scale questionnaires to assess financial growth, innovation capability, and market expansion. Data analysis is conducted using Structural Equation Modeling (SEM) in AMOS or SmartPLS, allowing for direct and indirect effect testing (Merchant et al., 2013). The qualitative phase includes semi-structured interviews with MSME owners, facilitators, and policymakers, analyzed through thematic analysis to identify key themes.

To ensure validity and reliability, the study applies triangulation, integrating quantitative and qualitative findings for cross-verification. Ethical considerations, including informed consent and confidentiality, are maintained throughout the process. By combining quantitative modeling with qualitative insights, this study provides a holistic framework for evaluating the impact of Rumah BUMN's innovation strategies on MSME competitiveness, offering empirical recommendations for enhancing MSME innovation in Indonesia. The questionnaire was distributed to 15 Helix SOEs managing Helix Rumah BUMN across Indonesia using purposive sampling. A total of 291 responses were collected, but after validation, only 260 were deemed valid. Hair et al. (2019) recommend a minimum sample size of 200 for structural equation modeling (SEM) to ensure robust results. For PLS-SEM, the minimum should be 10 times the number of formative indicators or structural paths, with 200 as a general benchmark. The final sample of 260 exceeded this requirement. Of the respondents, 79.6% were women, and most were MSME owners.

After the quantitative phase is complete, qualitative data is gathered by conducting semi-structured interviews with important stakeholders. These stakeholders include owners of MSMEs, representatives from Helix Rumah BUMN, researchers from academic institutions, and government officials. The interviews aim to gather in-depth insights into stakeholders' experiences and perspectives on the effectiveness of innovation strategies and the roles of various actors within the Quadruple Helix model. The purposive sampling method is employed

to ensure the selection of relevant participants who can provide valuable contributions to the research.

RESULTS

Descriptive Statistice

The study highlights the significant role of Helix Rumah BUMN, Helix SOEs, and the Ministry of Helix SOEs in enhancing MSMEs' innovation capabilities and competitiveness. The findings confirm that Helix Rumah BUMN's innovation strategy directly influences MSMEs' ability to innovate (β = 0.413, p = 0.001), reinforcing the importance of structured initiatives such as mentorship, digital transformation programs, and financial support. Additionally, innovation capability serves as a critical mediator in translating innovation strategies into improved competitiveness (β = 0.250, p = 0.005), suggesting that MSMEs with strong innovation capabilities are more likely to sustain market growth and operational efficiency. Institutional support plays a crucial moderating role in strengthening MSMEs' innovation-driven competitiveness. The Ministry of Helix SOEs demonstrates the strongest impact on MSMEs' competitiveness (β = 0.217, p < 0.001), underscoring the significance of government-backed policies, funding, and regulatory support in fostering MSME development. Likewise, Helix SOEs positively influences MSMEs' Innovation Capability (β = 0.177, p = 0.012) and Competitiveness (β = 0.207, p = 0.002), suggesting that corporate mentorship and industry partnerships offer more practical benefits than academic involvement. This aligns with previous research emphasizing the role of state-owned enterprises in facilitating market expansion, business networking, and knowledge transfer for MSMEs.

Table 1 Descriptive Statistice

No	Hypothesis	Path Coefficient	Statistic	P-Value	Decision
	Rumah BUMN Innovation Strategy → MSMEs Competitiveness through MSMEs Innovation Capability (Indirect Effect)	0.070	2.529	0.011	Accepted
a	Helix Academia (Moderator) x Rumah BUMN Innovation Strategy → MSMEs Innovation Capability	0.040	0.796	0.426	Rejected
b	Helix Academia (Moderator) x MSMEs Innovation Capability → MSMEs Competitiveness	0.070	1.081	0.280	Rejected
a	Helix Business/ SOEs (Moderator) x Rumah BUMN Innovation Strategy → MSMEs Innovation Capability	0.282	4.330	0.000	Accepted
b	Helix Business/ SOEs (Moderator) x MSMEs Innovation Capability → MSMEs Competitiveness	0.328	4.249	0.000	Accepted
a	Helix Community/ Rumah BUMN (Moderator) x Rumah BUMN	0.230	3.989	0.000	Accepted

	Innovation Strategy → MSMEs Innovation Capability				
b	Helix Community/ Rumah BUMN (Moderator) x MSMEs Innovation Capability → MSMEs Competitiveness	0.167	2.666	0.008	Accepted
a	Helix Ministry of SOEs (Moderator) x MSMEs Innovation Capability → MSMEs Competitiveness	0.290	6.115	0.000	Accepted
b	Helix Ministry of SOEs (Moderator) x Rumah BUMN Innovation Strategy → MSMEs Innovation Capability	0.268	4.807	0.000	Accepted

Despite the expected contribution of Helix Academia, the study reveals its limited impact on MSMEs' innovation and competitiveness. The statistical results indicate no significant effect of academic institutions in fostering MSME innovation ($\beta = 0.011$, $p = 0.850$) or competitiveness ($\beta = 0.029$, $p = 0.566$), suggesting weak university-industry collaboration. Respondent interviews further support this finding, with MSMEs expressing concerns that academic research remains too theoretical and lacks direct business application. This highlights a crucial gap in the MSME ecosystem, where stronger university-industry linkages, applied research initiatives, and practical business training programs are needed to enhance academia's role in supporting innovation adoption. The study also confirms that Helix Rumah BUMN serves as a critical innovation facilitator, strengthening MSMEs' capacity to adopt innovation through community-based initiatives. The moderation analysis demonstrates that Helix Rumah BUMN significantly enhances the relationship between innovation strategies and MSMEs' innovation capability ($\beta = 0.230$, $p < 0.001$), highlighting the importance of mentorship, peer learning, and networking opportunities. MSMEs actively participating in Helix Rumah BUMN programs exhibit higher adaptability, resilience, and sustainability compared to non-participating businesses.

Additionally, government support plays a crucial role in moderating the link between MSMEs' innovation capability and competitiveness ($\beta = 0.290$, $p < 0.001$). Government-funded financial assistance, regulatory frameworks, and business development programs lower barriers to innovation adoption, providing MSMEs with the necessary resources to integrate technology and expand market access. However, challenges persist, particularly in bureaucratic application processes and accessibility to funding, limiting the reach and impact of government-backed initiatives. Overall, the findings suggest that MSMEs benefit most from industry collaborations, government incentives, and community-driven mentorship programs, while the role of academia remains underutilized. Future strategies should strengthen academia-industry partnerships, expand access to funding, and enhance digital adoption programs to foster a more inclusive and sustainable innovation ecosystem for MSMEs.

DISCUSSION

The findings of this study highlight the significant role of institutional support, business networks, and digital transformation in enhancing MSME innovation and competitiveness. Government policies, SOEs involvement, and Rumah BUMN initiatives play a crucial role in fostering innovation adoption among MSMEs. The Ministry of SOEs provides regulatory frameworks and financial assistance, while SOEs facilitate market access, mentorship, and

business collaboration, enabling MSMEs to integrate innovation more effectively into their business models. This aligns with previous research indicating that strong institutional backing accelerates MSME growth and innovation diffusion.

Industry collaborations and knowledge-sharing platforms further enhance MSMEs' innovation diffusion and market adaptability. Findings suggest that MSMEs engaged in business mentoring programs and networking initiatives report higher adoption rates of new technologies and business strategies. The ability to learn from industry peers, participate in collaborative ventures, and gain access to sector-specific expertise contributes significantly to enhancing innovation capabilities. This reinforces the need for expanding strategic alliances and business development programs to ensure MSMEs benefit from collective learning and market intelligence.

Despite its potential, academia's role in MSME innovation remains limited. The findings indicate that academic institutions have yet to establish strong industry linkages that effectively support applied research, technology transfer, and skill development tailored to MSME needs. The absence of structured university-industry collaboration has resulted in low engagement levels between MSMEs and academia, suggesting the need for targeted interventions to bridge this gap. Future initiatives should focus on practical research partnerships, business incubation programs, and curriculum alignment with industry demands to enhance academia’s contribution to MSME innovation.

The study also emphasizes digital transformation as a key driver of MSME competitiveness. MSMEs adopting digital tools, automation, and e-commerce strategies experience greater operational efficiency, improved customer engagement, and expanded market reach. The integration of digital solutions allows MSMEs to optimize their business processes, making them more resilient in a rapidly evolving market. This finding highlights the need for increased digital literacy, technology funding, and digital business training programs to enable wider adoption among MSMEs.

CONCLUSION

The study confirms the critical role of Helix Rumah BUMN’s innovation strategy in enhancing MSMEs' competitiveness, with innovation capability serving as a key mediating factor. The findings demonstrate that while direct interventions such as mentorship programs, financial support, and digitalization initiatives improve MSMEs’ performance, their long-term competitiveness is largely dependent on their ability to innovate. The mediation analysis ($\beta = 0.250$, $p = 0.005$) highlights that MSMEs with stronger innovation capabilities achieve better market positioning, operational efficiency, and business sustainability.

Furthermore, the study finds that external ecosystem actors significantly moderate the effectiveness of Rumah BUMN innovation strategies. Government support ($\beta = 0.217$, $p < 0.001$) and business community engagement ($\beta = 0.174$, $p = 0.002$) play crucial roles in strengthening MSMEs’ innovation-driven competitiveness. Respondent interviews reinforce these findings, with MSMEs reporting that financial assistance, mentorship, and networking opportunities provided by Helix Rumah BUMN were instrumental in improving MSMEs market reach and product development.

However, the role of Helix Academia in fostering MSME innovation remains statistically insignificant ($\beta = 0.029$, $p = 0.566$), suggesting that academic institutions have yet to establish strong collaborative ties with MSMEs. Respondents noted limited engagement with universities, emphasizing the need for more industry-relevant training and applied research collaborations. In contrast, Helix SOEs and the Ministry of SOEs demonstrated strong positive effects on MSMEs' innovation capabilities, particularly in terms of market access, knowledge transfer, and regulatory support.

The study underscores the importance of a well-integrated innovation ecosystem in driving MSMEs' sustainable growth. While Rumah BUMN provides a foundational platform for innovation, collaboration with government agencies, industry stakeholders, and research institutions is necessary to maximize its impact on MSMEs competitiveness. The findings suggest that strengthening academia-industry partnerships, expanding government support, and fostering peer learning within business communities can further enhance MSMEs' innovation potential and competitiveness.

PRACTICAL IMPLICATIONS AND RECOMMENDATIONS

The findings of this study highlight several practical implications for policymakers, business support organizations, and MSMEs aiming to enhance innovation capabilities and competitiveness. First, strengthening collaboration within the innovation ecosystem is essential for sustainable growth. Policymakers should integrate the quadruple helix model—academia, government, business (SOEs), and communities (Rumah BUMN)—to foster structured collaboration and knowledge transfer. Innovation grants, research partnerships, and incubator programs can provide MSMEs with access to advanced technology and expertise. Rumah BUMN can take the initiative by conducting surveys to identify MSMEs' most pressing needs and potential academic collaborations. If findings indicate a demand for student internships, academic research, or joint projects, Rumah BUMN can facilitate formal partnerships with universities and research institutions. Establishing Memorandums of Understanding (MoUs) can ensure structured cooperation, aligning MSMEs' needs with academic contributions. By integrating these initiatives into annual work plans and budget allocations, Rumah BUMN can systematically enhance the competitiveness of MSMEs through academia-driven innovation strategies.

Enhancing business support strategies is another critical factor in strengthening MSMEs' innovation capabilities. Organizations like Rumah BUMN should refine their support mechanisms by focusing on digital transformation, industry-specific training, and structured mentorship programs. Expanding sector-specific guidance on digital adoption, product development, and market expansion will help MSMEs navigate the evolving business landscape. Strengthening academic collaboration can further refine innovation strategies, ensuring they are research-based and practical. Joint research projects, knowledge-sharing sessions, and capacity-building programs can provide MSMEs with insights into market trends, technological advancements, and best practices. Additionally, Rumah BUMN can facilitate workshops, mentorship initiatives, and industry-academia forums where students, researchers, and MSME owners co-develop innovative solutions. By incorporating these efforts into its innovation strategy, Rumah BUMN can play a pivotal role in fostering MSME adaptability and long-term growth in a dynamic market environment.

Expanding government support and incentives is crucial for enabling MSME innovation and financial sustainability. Financial mechanisms such as tax incentives for R&D, subsidized technology adoption, and low-interest innovation loans can encourage businesses to invest in long-term strategies. However, financial constraints remain a significant barrier, necessitating structured funding programs to support ambitious MSME innovation efforts. Beyond funding, the government should prioritize transforming unbankable MSMEs into bankable entities through financial literacy programs. Many MSMEs struggle to access formal financial services due to a lack of records, credit history, or banking knowledge. State-owned enterprises (SOEs) and government programs can bridge this gap by integrating MSMEs into financing schemes like PUMK (TJSL/CSR BUMN funds), Kredit Usaha Rakyat (KUR), Mekaar, ULaMM, and other alternative options. Strengthening financial literacy alongside these funding initiatives ensures MSMEs can maximize financial resources effectively, enhancing their competitiveness and contributions to the national economy.

FUTURE RESEARCH DIRECIONS

Future research should focus on industry-specific innovation strategies to understand how different sectors require tailored approaches, allowing policymakers to design more effective support mechanisms. Conducting longitudinal studies tracking MSMEs' innovation progress over time would provide deeper insights into the sustainability and evolution of innovation strategies. Additionally, as digital transformation accelerates, further research should explore the role of emerging technologies such as AI, blockchain, and IoT in enhancing MSMEs' competitiveness. Understanding how MSMEs leverage these technologies in different economic contexts can guide the development of more adaptive innovation policies and strategic interventions.

LIMITATION

This research has several limitations that should be acknowledged. First, the study is limited in scope, as it focuses on MSMEs engaged in the Rumah BUMN initiative, which may not fully represent the broader MSME landscape in Indonesia. This limits the generalizability of the findings to MSMEs operating outside of this program. Second, while the study explores the role of government, academia, and business communities in supporting MSME innovation, the engagement of other potential stakeholders, such as private investors and multinational corporations, is not examined in depth. This may overlook additional factors that influence MSME innovation and competitiveness.

Furthermore, the study relies on cross-sectional data, which captures insights at a single point in time. This approach does not account for long-term changes in MSME innovation strategies and performance, potentially limiting the understanding of sustained innovation impact. Future research should aim to address these limitations by conducting longitudinal studies, incorporating a more diverse sample of MSMEs, and exploring the role of additional stakeholders in strengthening MSME innovation ecosystems.

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