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# Analyzing the Role of the Quadruple Helix in Improving MSME Management Performance

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## Abstract

This study aims to determine whether the variables of the Quadruple Helix model can enhance the management performance of MSMEs during the new normal era. The study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) for the quantitative design. The research encompasses a sample of 100 MSMEs from Banten Province, Indonesia. Among the four pillars of the Quadruple Helix model—academic, business, local community, and government—business exhibit the most significant influence on management performance, as evidenced by a coefficient value of 0.311. Additionally, government (0.290), academic (0.201), and local community (0.160) display lower coefficients. These findings imply that local community should engage more actively with MSMEs, while the government should enhance its support through policies. Furthermore, MSMEs should seek to gain valuable insights into management practices from academic. The Quadruple Helix model serves as a comprehensive framework that provides government decision-makers with a holistic perspective. Ultimately, this study has the potential to enhance management practices and shed light on strategies for the survival and resilience of MSMEs in a changing economic landscape during the new normal era. It underscores the critical importance of adopting Quadruple Helix thinking for the continued viability of MSMEs.

## Keywords

## JEL Classification

## Introduction

Indonesia's economic growth plummeted to -2.19% by the end of 2020, down from 4.96% at the end of 2019 (BPS, 2021). According to data from the Indonesian micro, small, and medium-sized enterprises (MSMEs) association in 2020, there was a significant reduction in MSMEs' contribution to Gross Domestic Product (GDP), accounting for only 37.3% of the total GDP. The MSME sector is the backbone of Indonesia's economy and plays a vital role in economic resilience, contributing to 97% of the workforce and 61.9% of the GDP (Jové-Llopis and Segarra-Blasco, 2018). However, MSMEs continue to face challenges in developing and improving their businesses, particularly in the aftermath of the COVID-19 pandemic. A survey conducted by the Indonesian Business Development Services Association, with 6,405 respondents, revealed that all MSMEs felt the impact of declining sales. Approximately

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36.7% of respondents reported zero sales, while 26% experienced a reduction of more than 60%. Conversely, only 3.6% reported increased sales (ABDSI, 2020).

In Indonesia, national development in the economic sector is a top priority, with a particular focus on empowering MSMEs. MSMEs have proven to be a viable solution to various economic problems, including poverty and high unemployment. The significant role of MSMEs in economic development is well-documented (Xie and Xinrui, 2018; Wickramasinghe, 2016), as they have a direct impact on the economic growth of both developed and developing countries. Therefore, it is imperative that MSMEs operate effectively and efficiently. The government has implemented policy measures to support MSMEs during the current 'new normal' era, recognizing the strategic importance of MSMEs in bolstering the economy and reducing unemployment and poverty (Sarfiah et al., 2019). Nevertheless, a significant number of MSMEs remain unaware of these policies. To bridge this gap, leveraging innovation systems—particularly through the application of the Quadruple Helix concept—is necessary. Evaluating the effectiveness and efficiency of this innovation system is crucial to establish comprehensive benchmarking systems in knowledge-based economies (Carayannis et al., 2016).

The Quadruple Helix concept is the collaboration of four interconnected and synergistic parties in fostering innovation: government, business, academia, and the community/society (Halibas et al., 2017). It integrates policies from the top-down and initiatives from the bottom-up, collaboratively generating knowledge and value (Yun and Liu, 2019). This collaboration is anticipated to play a pivotal role in boosting the local economy by empowering MSMEs to enhance their management performance. Previous studies have demonstrated the impact of Triple Helix on management performance (Ribeiro and Nagano, 2022; Rantala et al., 2021; Guerrero and Urbano, 2017), whereas research on the effect of Quadruple Helix on management performance is limited. Furthermore, while performance management has been a focal point in both academic discourse and practical applications (van Helden and Reichard, 2013), the emphasis has predominantly revolved around the Triple Helix model. Our research bridges this gap by shedding light on the critical and, as of yet, underexplored relationship between Quadruple Helix collaboration and management performance. In doing so, we contribute not only to the theoretical foundations of Quadruple Helix but also offer practical insights that are crucial for the sustainable growth and advancement of MSMEs. Notably, the social community variable is a novel addition to this analysis, and the use of Partial Least Squares (PLS) in explaining the smallest details has not been explored before. Therefore, this study aims to assess the magnitude of Quadruple Helix's role and identify the specific contributions required from government, academia, and society to enhance MSME management performance in Serang, Banten, Indonesia.

## Literature Review and Hypotheses

Small and medium-sized enterprises (SMEs) are widely recognized as major employers in developing and emerging economies. The definitions and requirements for SMEs vary from one country to another. In Indonesia, the definition of SMEs and MSMEs is outlined in Law No. 20 of 2008. This law categorizes MSMEs based on specific criteria related to the nature of their business operations. Additionally, the law regulates the roles of both the government and regional governments in fostering a favorable business environment. This includes addressing aspects such as funding and facilities to support MSMEs. For example, in this law, it is explained regarding the roles of the central and regional governments in fostering a business-friendly environment through the provision of funding, infrastructure, business information, partnerships, business permits, entrepreneurial opportunities, trade promotion, and institutional support. The financing aspect mentioned herein refers to the government's role in expanding funding sources for MSMEs through bank loans and non-banking financial institutions, as well as facilitating access to funding. The government's role is also demonstrated in the partnership aspect, such as preventing market domination and business concentration by certain groups that could harm MSMEs. Additionally, the government supports business facilities, including production and processing, marketing, HR, and technology design.

Indonesia has regulated financing and guarantees for MSMEs in Law No. 20 of 2008, which explains that the central and regional governments provide special financing for MSMEs, regulate State-Owned Enterprises to provide financing, and allocate annual profits to MSMEs. Furthermore, the government, regional governments, and businesses can provide assistance in the form of grants, foreign aid, or other non-binding assistance to MSMEs. In this context, an innovation system has been implemented, involving partnerships between the government and MSMEs in the form of core-peripheral partnerships, subcontracting, franchises, general trade, agency distribution, and other forms of partnerships such as profit-sharing, operational cooperation, joint ventures, and outsourcing. Despite the government's support for various aspects of MSMEs, the government also imposes administrative and criminal sanctions on those falsely claiming to be MSMEs to obtain the mentioned benefits, with a maximum fine of approximately $644,000.

In Indonesia, the growth of micro and small businesses is intricately connected with a range of challenges that exhibit variations in severity and nature across regions, locations, industries, subsectors, and types of activities, even within business units of the same sector or activity (Tambunan, 2012). These challenges, as identified by Tambunan (2012), encompass difficulties in marketing due to competitive pressures in domestic, import, and export

markets; financial constraints affecting MSMEs, including limitations in securing startup, working, and investment capital; human resource limitations, particularly in areas such as entrepreneurship, management, production, product development, design, quality control, accounting, business organization, data processing, marketing, and market research; constraints related to the availability and cost of raw materials and other inputs; and technological limitations that result in low overall productivity and inefficiencies in the production process. Furthermore, a detailed summary of the barriers to MSME innovation is presented in Table 1.

**Table 1.** Barriers to MSME Innovation.

| Aspects | Challenges |
| --- | --- |
| Economic | Lack of internal funding |
| | Lack of external funding |
| | High cost of innovation |
| Knowledge | Low quality of human resources |
| | Low understanding of technology |
| | Lack of market information |
| | Difficulty finding innovation partners |
| Market | Small market size |
| | Dominance by established companies |
| | Uncertain demand |
| Innovation | Limited innovation |
| | Lack of demand for innovations |
| Others | High bureaucracy in educational institutions |
| | Low government support |

**Source:** Compiled from Khouroh et al. (2021).

Management performance is integral to the achievement of MSME goals, specifically in overcoming innovation barriers. It encompasses the alignment and harmonization of various organizational subsystems, fostering an environment that identifies and addresses obstacles effectively (Trąpczyński et al., 2016). Dessler (2015) further highlights its involvement in the assessment and development of individual and team performance aligned with organizational objectives. In the context of competition, effective performance management becomes imperative. This involves the comprehensive management, analysis, assessment, and evaluation of companies and workers to boost overall effectiveness and productivity, generating economic value for all stakeholders.

The collaboration within the Quadruple Helix framework is anticipated to play a crucial role in enhancing the local economy by empowering MSMEs to enhance their management performance. Management performance is a significant organizational concern that has garnered considerable attention both in academia and in practical applications (van Helden and Reichard, 2013). Therefore, to promote sustainability and improve the performance of MSMEs, one approach is to encourage cooperation within the Quadruple Helix framework. The study conducted in a tourist town in the Trenggalek Regency, Indonesia found that Quadruple Helix synergy is the primary driver of creativity (Muzaqi and Hanum, 2020). Similarly, research in the MSME sector of Malang Regency, Indonesia demonstrates that the characteristics of the Quadruple Helix model enable more efficient and ideal innovation among its participants (Khouroh et al., 2021). Furthermore, other several studies have explored and provided evidence of the Quadruple Helix's role (Windhyastiti et al., 2022; Machado et al., 2018; Mulyaningsih, 2015). In Figure 1, the Quadruple Helix model is depicted, with distinct roles for academia, business, government, and community. University academics, government officials, businessmen, and community members each contribute to filling the gaps created by these four parties, all with the shared objective of enhancing the management effectiveness and competitiveness of MSMEs (Praswati, 2017).
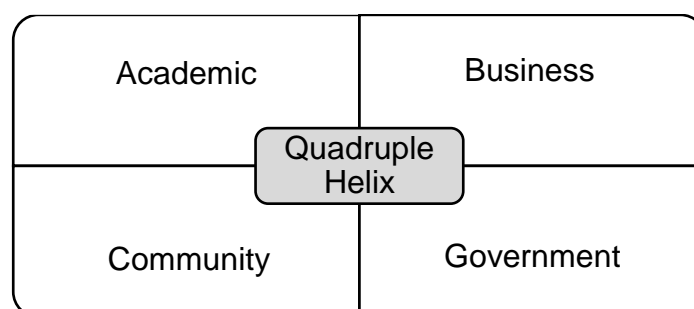


**Fig. 1.** Concept of Quadruple Helix Model.

Interactions within the Quadruple Helix typically arise from efforts to address emergencies, such as the COVID-19 crisis, and transition towards the new normal. These interactions aim to create solutions for enhancing management in the face of innovation challenges that may not be determined by specific trends (Campanella et al., 2017; Fayolle and Liñán, 2014). For example, it could manifest in the development of new products, processes, and services through which MSMEs can address and overcome market challenges (Guerrero et al., 2015). These accomplishments can stem from the interactions within innovation systems, which have broad applicability across various business sectors. Demonstrating the universality of this concept, (Hernández-Trasobares and Murillo-Luna, 2020) found that the interaction of university, industry, and government increases the likelihood of innovation across different sectors, regardless of the type of innovation.

In the Quadruple Helix model, the government, in its regulatory and policy-making role, establishes the foundation for innovation by providing infrastructure and funding. Government interaction with other actors is manifested through the creation of an enabling environment for innovation, facilitating collaboration through policy frameworks, and engaging in partnerships with industry, academia, and civil society. Government entities should engage in collaboration with other helices to address societal challenges effectively. As policymakers worldwide seek to enhance public services and cater to the needs of their constituents through innovation, they must explore avenues to establish an environment conducive to co-creation, experimentation, and learning (Bharosa and Janssen, 2020). Essential to this endeavor is a foundation built on a sense of urgency and a readiness to open up public service innovation to the broader society.

The industry, representing the private sector, propels economic growth through the implementation of innovations and investments in research and development. Industry's collaboration with government takes shape as it aligns its innovation strategies with public policies. Additionally, industry engages with academia to access cutting-edge research and talent, while collaboration with civil society ensures that industry practices are sustainable and socially responsible. As an example, the collaboration between industry and academia may take the shape of a program known as Tandem Industry-Academia (TIA). This research initiative allocates funds for joint projects involving industrial and academic participants, aiming to encourage labor mobility and facilitate the exchange of knowledge (Shin et al., 2023).

Academia, as the knowledge sector, generates essential knowledge through research and education. Its collaboration with government involves providing expertise and knowledge that informs policy decisions. In addition, academia engages with industry through technology transfer, joint research projects, and educational programs. Interaction with civil society ensures that research is aligned with societal needs and values. The effectiveness of a university's involvement in social inclusivity is potentially enhanced through the adoption of an expanding array of community engagement tools. These tools include Community-Based Research (CBR), service learning, science shops, deliberative science, bottom-up approaches to citizen participation in science, participatory technology assessment, and citizen science (Bellandi et al., 2021).

Civil society ensures that innovation is socially responsible and aligns with public interests. Interaction with government occurs through providing feedback on policies and advocating for public interest. Collaboration with industry involves ensuring responsible business practices, and engagement with academia ensures that research aligns with societal needs and values. This process exemplifies the interaction between the society and government helices, where all stakeholders, encompassing citizens and civil society, are afforded the opportunity to actively participate and offer feedback to the regional authorities overseeing the preparation (Roman and Fellnhofer, 2022). The regional committee ensures transparency by making all drafts of the regional program documents accessible for stakeholder comments via the committee's website. The opinions and views provided by the stakeholders are then managed by the board of the regional committee. Subsequently, the committee incorporates these perspectives in the decision-making process, accepting refined proposals to shape the final version of the regional program.

This research aims to analyze the applicability of the Quadruple Helix model in improving management performance for MSMEs in a developing economy. The exploration emphasizes the importance of innovation in enhancing MSME resilience in the new normal era. It illuminates the roles of various stakeholders in fostering innovations and underscores collaborative strategies for survival in this challenging period. With this context, the research specifically aims to assess the role of the Quadruple Helix in enhancing MSME management performance, with the proposed hypotheses as follow:

*H1:    The level of academic involvement significantly influences MSMEs' management performance.*

*H2:    Business engagement significantly influences MSMEs' management performance.*

*H3:    Local community participation significantly influences MSMEs' management performance.*

*H4:    Government interventions and support significantly influence MSMEs' management performance.*

## Methods

This study adopts a quantitative research approach, employing a questionnaire as the primary data collection

instrument. The target population for this research comprises owners of MSMEs operating in Banten Province, Indonesia. A simple random sampling technique was employed, resulting in a sample of 100 MSME owners who were selected as respondents. These individuals were chosen based on their consistent involvement in economic business activities for a minimum of 2 years. The types of MSME sectors involved in this research include the food industry, woodworking crafts, clothing, basic metals, non-machinery metal goods, non-metallic mineral goods, furniture, and textiles.

Complex relationships between variables are not uncommon, even when dealing with a small data sample. To address this issue, Partial Least Squares (PLS), an alternative to Structural Equation Modeling (SEM), can be employed. As noted by Hair et al. (2019), PLS-SEM provides a viable solution for models with numerous constructs and a substantial number of items, even when working with small sample sizes. Traditional SEM often requires a considerably larger sample size, typically recommended in the range of 100-200 samples. In contrast, PLS-SEM allows for the application of smaller sample sizes, with a minimum of 30-50 samples being considered acceptable (Purwanto and Sudargini, 2021). This flexibility is particularly advantageous in scenarios where obtaining a larger sample is challenging, enabling researchers to address complex relationships with more manageable data sizes.

The measurement items used in this study were constructed following Nunnally (1978), involving the determination of construct domains, creation of conceptual definition elements, and item testing on a sample to ensure their suitability for the research context. The Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), was employed in the questionnaire, and Table 2 presents a list of the indicator variables utilized in the survey.

**Table 2.** Measurement of Quadruple Helix Variables and Management Performance.

| Variable | Indicator | No. Item |
|---|---|---|
| Management Performance (Y) | Increase in customer base | 1, 2 |
| | Growth in sales | 3, 4 |
| | Profit enhancement | 5, 6 |
| Academic (X1) | Management literacy | 7, 8 |
| | Technology adoption | 9, 10 |
| | Training in management practices | 11, 12 |
| Business (X2) | MSMEs association membership | 13, 14 |
| | Distribution network information access | 15, 16 |
| Local Community (X3) | Idea sharing | 17, 18 |
| | Synergy creation among MSMEs | 19, 20 |
| Government (X4) | Mentorship | 21, 22 |
| | Local support provision | 23, 24 |
| | Policy formulation and implementation | 25, 26 |
| | Total items | 26 |

**Source:** Modified from Nunnally (1978).

This study utilized SmartPLS 3, a software developed by Ringle and Sarstedt (2016), to conduct Partial Least Squares Structural Equation Modeling (PLS-SEM) instead of Covariance-Based SEM. The choice of SmartPLS 3 for hypothesis testing was made because PLS-SEM is well-suited for exploratory research, target prediction, and handling non-normal data and small sample sizes, as suggested by Ghozali (2014). The examination of the measurement and structural models adhered to a two-step approach, as suggested by Fornelli. The two-step approach was employed in this study, comprising a sequential analytical process involving distinct stages: measurement model assessment and structural model evaluation. The construct model for this analysis is depicted in Figure 2. In the initial phase, emphasis was placed on evaluating the measurement model, wherein the reliability and validity of selected measurement instruments (variables or constructs) were scrutinized. Key assessments, such as evaluating internal consistency using measures like Cronbach's alpha (CA) and conducting assessments of convergent and discriminant validity, including Average Variance Extracted (AVE), composite reliability (CR) and Outer Loadings, were undertaken to ensure the appropriateness and reliability of the selected measurement instruments. Additionally, Heterotrait-Monotrait Ratio (HTMT) analysis was performed to assess the relationships between constructs. Following the satisfactory evaluation of the measurement model, the study proceeded to the second step, concentrating on the assessment of the structural model. Subsequently, the analysis delved into the testing of hypotheses.
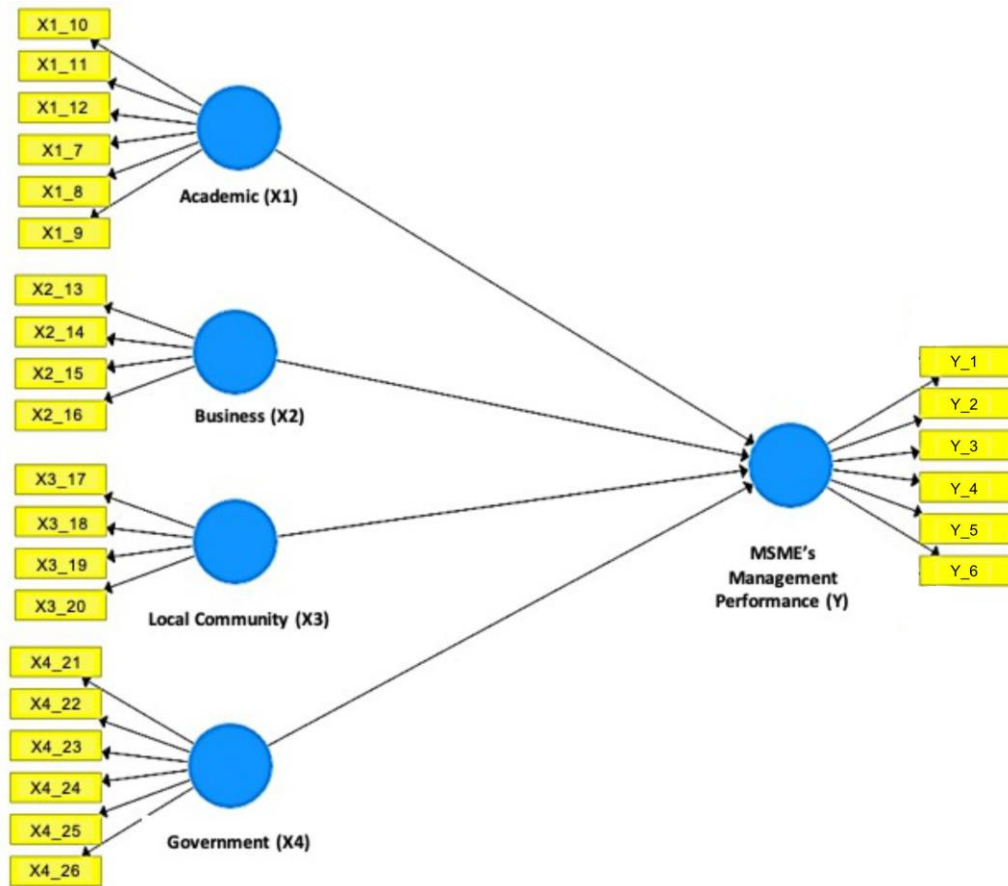
**Fig. 2.** Research Construct Model.

In Figure 2, the latent variable is represented by the variable Y, namely MSME's Management Performance, while the exogenous variables are Academic (X1), Business (X2), Local Community (X3), and Government (X4). Y1 to Y8 are manifest variables for the latent variable Y, whereas X1_7 to X1_12; X2_13 to X2_16; X3_17 to X3_20; and X4_21 to X4_26 each represent manifest variables for the constructs X1, X2, X3, and X4. The Appendix 1 provides a list of questions for each of these indicators.

The empirical model in this research assesses the extent to which the Quadruple Helix's role influences the enhancement of MSME management performance. The research model is illustrated in Figure 3.
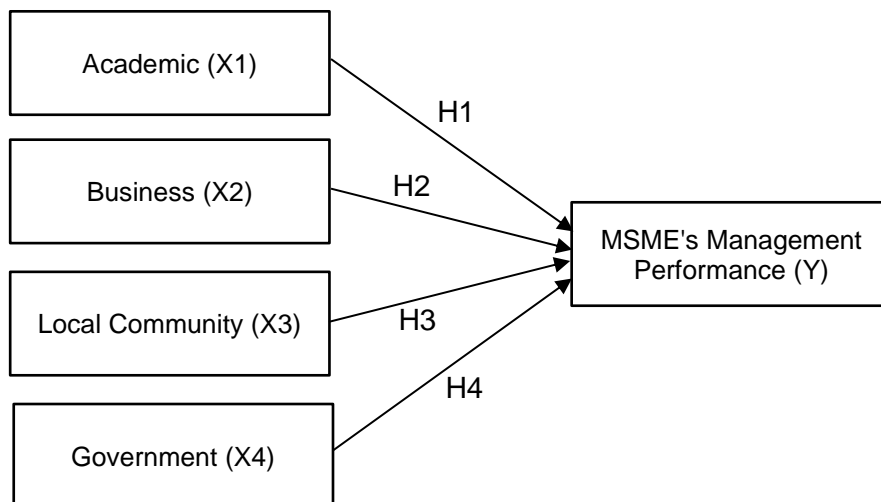


**Fig. 3.** Empirical Research Model.

## Results

### *The Proposed Mechanism*
This research contributes to society's adaptation to the new normal by identifying Quadruple Helix stakeholders capable of revitalizing MSMEs post-pandemic. Academics, business professionals, government bodies, and the

wider community collaborate to identify, analyze, prioritize, and develop strategies aimed at enhancing MSME management performance in this evolving environment. The proposed mechanisms through which the Quadruple Helix enhances managerial performance are illustrated in Figure 4.
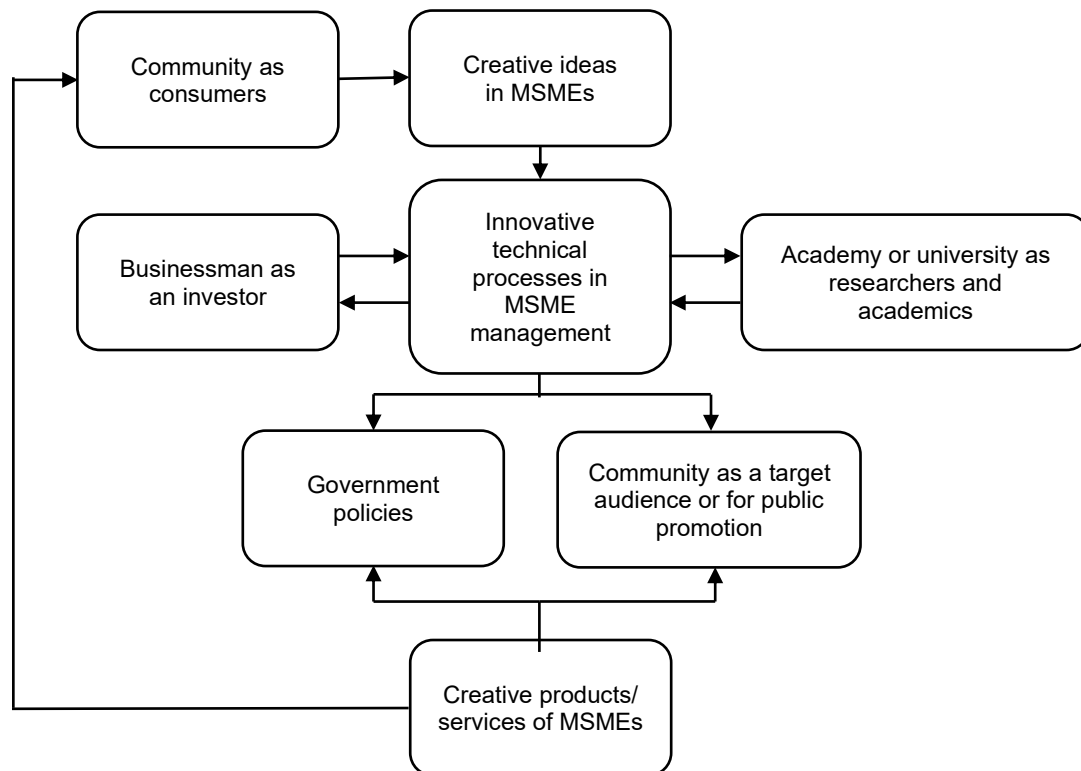


**Fig. 4.** Mechanism of the Quadruple Helix Role in Improving Management Performance of MSMEs.

Improving the creative products and services of MSMEs involves a comprehensive strategy within the Quadruple Helix model. Collaborating with academia proves instrumental as researchers and academics contribute valuable insights, infusing innovative ideas into MSME offerings. Simultaneously, the support of businessmen as investors plays a pivotal role, providing the necessary financial resources for the implementation of these creative concepts. The core of this improvement lies in adopting innovative technical processes within MSME management, integrating cutting-edge methodologies and ideas from the community and academia. Engaging the community as consumers and involving them in the creative process ensures that products and services align with market demands. Moreover, government support, through favorable policies and incentives, fosters an environment conducive to creativity. Public promotion, achieved through collaborative efforts with the community, further enhances the visibility and acceptance of MSMEs' unique offerings. This holistic approach, involving academia, business, government, and the community, ensures a well-rounded enhancement of the creative capabilities of MSMEs.

### *Measurement Model and SEM Assessment*
This study estimated CA and CR to measure internal consistency. High internal consistency variables exhibit closely related indicators. In Figure 5, the results of outer loading, which represent discriminant validity, consist of the indicators used in this study after the elimination process. However, during the initial stage of the structural model, no indicators fell below the specified criteria (0.5), so none were eliminated. For example, for the latent variable Y, the Outer Loadings for each indicator are 0.898, 0.735, 0.839, 0.807, 0.797, and 0.832, all of which are greater than 0.5, indicating that these indicators are suitable in the model. In addition, the value on the arrow from each exogenous variable to the latent variable (Y) indicates the strength and direction of the relationship between each independent variable and the dependent variable. For example, the effect of X2 on Y is the strongest (0.311), while the effect of X3 on Y is the weakest (0.160). Detailed Outer Loadings values are also shown in Table 3, where all variables have CA and CR values exceeding the acceptable threshold of 0.7, indicating strong internal consistency. Convergent validity, as per Hair Jr et al. (2021), necessitates outer loadings greater than 0.708 and an AVE greater than 0.5. Table 3 displays all outer loadings exceeding 0.7. The loadings and AVE values for all constructs meet threshold of 0.655, confirming convergent validity (Hair Jr et al., 2021).
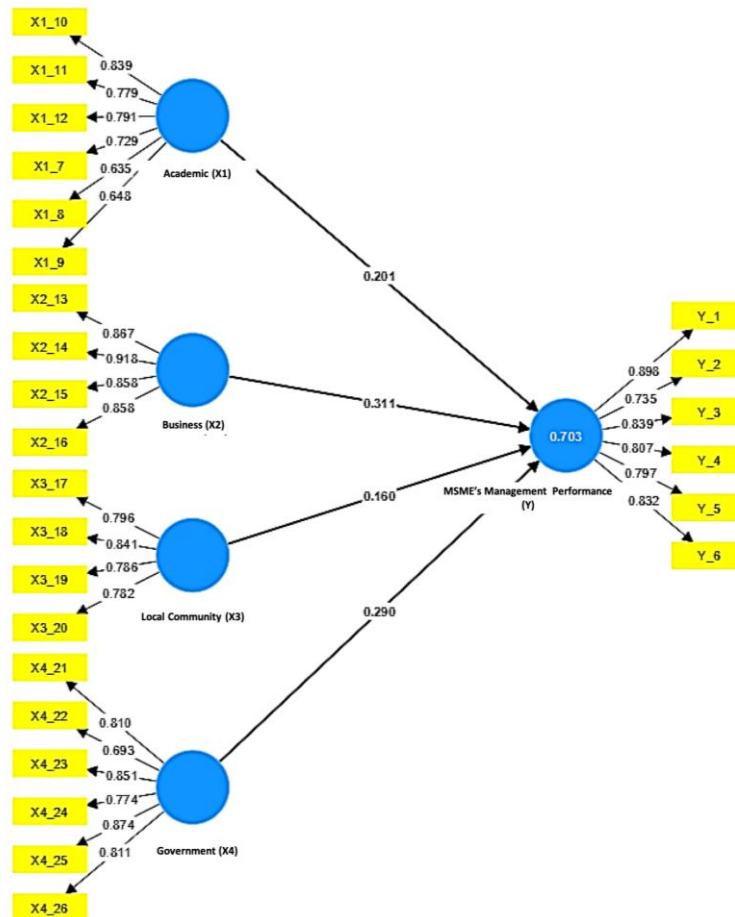
**Fig. 5.** Outer Loading Results.

Furthermore, Table 3 reveals the lowest value of outer loading at 0.635 for the X1_8 indicator. In addition, the lowest CR value is 0.818 for the local community variable, while the highest is 0.909 for the management performance variable. These results indicate that all variables exhibit strong reliability within their respective constructs. To assess the predictive potential of this model, we consider the route coefficients and the coefficient of determination ($R^2$) for the endogenous constructs. The model can account for 69% ($R^2$ adjusted management performance = 0.690) of the variance in management performance, with the remaining 31% attributed to other factors.

**Table 3.** Quadruple Helix Role Measurement Model.

| Variable | Items | Outer Loadings | Cronbach's Alpha (CA) | Composite Reliability (CR) | AVE |
|---|---|---|---|---|---|
| Management Performance | Y_1 | 0.898 | 0.901 | 0.903 | 0.672 |
| | Y_2 | 0.735 | | | |
| | Y_3 | 0.839 | | | |
| | Y_4 | 0.807 | | | |
| | Y_5 | 0.797 | | | |
| | Y_6 | 0.832 | | | |
| Academic | X1_7 | 0.729 | 0.833 | 0.846 | 0.549 |
| | X1_8 | 0.635 | | | |
| | X1_9 | 0.648 | | | |
| | X1_10 | 0.839 | | | |
| | X1_11 | 0.779 | | | |
| | X1_12 | 0.791 | | | |
| Business | X2_13 | 0.867 | 0.898 | 0.909 | 0.766 |
| | X2_14 | 0.918 | | | |
| | X2_15 | 0.858 | | | |

| Variable | Items | Outer Loadings | Cronbach's Alpha (CA) | Composite Reliability (CR) | AVE |
|---|---|---|---|---|---|
| | X2_16 | 0.858 | | | |
| Local Community | X3_17 | 0.796 | 0.814 | 0.818 | 0.642 |
| | X3_18 | 0.841 | | | |
| | X3_19 | 0.786 | | | |
| | X3_20 | 0.782 | | | |
| Government | X4_21 | 0.810 | 0.890 | 0.905 | 0.647 |
| | X4_22 | 0.693 | | | |
| | X4_23 | 0.851 | | | |
| | X4_24 | 0.774 | | | |
| | X4_25 | 0.874 | | | |
| | X4_26 | 0.811 | | | |

Table 4 displays the results of the HTMT analysis. It examines the extent to which two distinct constructs in a model—measured by different variables (heterotrait)—differ from two identical constructs in the same model, measured by the same variables (monotrait). This ratio offers an indication of how genuinely different the diverse constructs are and whether they exhibit a strong correlation with identical constructs. The threshold employed is set at less than 0.90, signifying that different constructs are more disparate than identical constructs. Consequently, all constructs are deemed reliable for inclusion in the model.

**Table 4.** Heterotrait-Monotrait Ratio (HTMT) – Matrix.

| Variable/Construct | Y | X1 | X2 | X3 | X4 |
|---|---|---|---|---|---|
| Y | - | - | - | - | - |
| X1 | 0.863 | - | - | - | - |
| X2 | 0.859 | 0.704 | - | - | - |
| X3 | 0.852 | 0.722 | 0.877 | - | - |
| X4 | 0.872 | 0.751 | 0.863 | 0.842 | - |

### *Hypothesis Testing*
Following the validation of item statements, the reliability of variables, and the goodness-of-fit of the structural model, a t-statistical test was conducted. This study utilizes the t-statistical test, specifically the partial t-test (Table 4), to evaluate the influence of academics, businesses, local communities, and government on management performance.

**Table 5.** Hypothesis Testing Results

| Hypothesis | Direct Effect | Original-Sample (O) | T-Statistic ($|O/STDEV|$) | P Values (0.05) | Decision |
|---|---|---|---|---|---|
| H1 | Academic (X1) → Management Performance (Y) | 0.201 | 2.692 | 0.007* | Accepted |
| H2 | Business (X2) → Management Performance (Y) | 0.311 | 3.719 | 0.000* | Accepted |
| H3 | Local Community (X3) → Management Performance (Y) | 0.160 | 2.090 | 0.002* | Accepted |
| H4 | Government (X4) → Management Performance (Y) | 0.290 | 2.455 | 0.014* | Accepted |

**Note:** *p value < 0.05 = significant; t-statistic > t-table = significant.

According to the findings in Table 5, it is evident that all components of the Quadruple Helix model significantly impact management performance, as indicated by p-values < 0.05. Notably, when examining the original sample values, it becomes apparent that business actors exert the most substantial influence on MSME management performance, whereas local communities play the least prominent role in enhancing MSME management performance. As demonstrated in Table 5, the original sample values show that businesspeople (0.311) and government (0.290) wield greater influence compared to other actors within the Quadruple Helix.

## Discussion

This study has identified that the role of academics within the Quadruple Helix significantly influences MSME management performance. However, it is noteworthy that the impact on MSME performance is not as pronounced as the influence wielded by businesspeople. This finding aligns with prior research conducted by Dewandaru et al. (2021), which similarly did not observe a significant relationship between MSME collaborations with academics. This may be attributed to the perception that academics from universities primarily engage in fundamental research, while MSMEs seek practical knowledge transfer. Nonetheless, the effectiveness of academics can be optimized through collaboration with government entities (Khouroh et al., 2021; McAdam et al., 2016).

Additionally, Mardiatmi and Pinem (2021) stated that academics are valuable stakeholders who possess up-to-date and pertinent knowledge (literacy) encompassing the latest theories and concepts. Collaborative efforts between academics and the government can facilitate risk-sharing and collaborative problem-solving to address various challenges effectively. Furthermore, the role of academics is instrumental in enhancing the management performance of MSMEs. Academic involvement in the Quadruple Helix framework includes providing literacy and education to MSME stakeholders, assisting in the effective preparation of activity plans, overseeing financial report management and monitoring, facilitating knowledge transfer on technology-driven product development, promoting online product marketing, offering education and training in HR knowledge and skills to enhance MSME performance, and providing instruction on production management, inventory, distribution, and logistics.

Business actors, seasoned practitioners in the business world, possess a wealth of experiences that they can impart to MSME entrepreneurs. Their aim is to empower these entrepreneurs with knowledge and expertise, nurturing the aspiration that their MSMEs can eventually flourish into larger enterprises. MSME stakeholders highly value the role of business actors in bolstering their marketing performance. To access valuable business insights, some MSME players engage by becoming members of MSME association in Indonesia, participate in communities that unite MSME players and seasoned entrepreneurs, collaborate with governmental agencies to facilitate business operations and expand networks, and gather valuable data for reseller selection, identifying potential distributors, and designing promotional programs. The interaction within the Quadruple Helix framework in this case is closely intertwined between businesses and the government, leading to an improvement in management performance.

Large corporations and financial institutions also play a pivotal role in fostering MSME growth. These institutions offer support by addressing capital-related challenges faced by MSMEs. Particularly in Serang Regency, Indonesia, a concerted effort is expected from prominent companies in taking their Corporate Social Responsibility (CSR) initiatives seriously, contributing to MSME development. They can provide capital through established partners and deliver training and mentorship, often in collaboration with universities. These findings affirm the observations made by Dewandaru et al. (2021), indicating that the SME sector perceives businesses and industries as vital pillars of MSME advancement. Business actors can cultivate environments and communities to facilitate knowledge sharing and skill enhancement, while financial institutions provide essential resources for MSME development. In addition, investors play a critical role in bridging the early-stage capital gap, commonly referred to as the 'Valley of Death' (Wessner, 2005), thereby enabling MSMEs to thrive. Furthermore, business actors may extend their networks to promote effective MSME management, facilitating knowledge exchange and connecting MSMEs with potential investors.

In this study, the role of the community in influencing MSME management performance has been found to be significant, although it has the lowest effect compared to other helices. This observation aligns with research by Carayannis and Rakhmatullin (2014), which emphasize that the community serves as a driving force and loyal customer capable of contributing to MSME improvement. Factors such as globalization, democratic governance, telecommunications, and economic conditions have led to the expanded role of civil society, as noted by the Commonweath Foundation (2009). Windhyastiti et al. (2022) also underscore the essential role of the community in supporting MSMEs, emphasizing the community's capacity to share expertise, collaborate in promoting products through shared bazaars and exhibition booths, and disseminate information about MSME programs while offering mutual advertising support and problem-solving. Additionally, pandemics have reinforced the importance of communities, as they come together to provide support. Furthermore, the community can harness the extensive reach of social media platforms to share valuable and trustworthy information about MSME offerings, bolstering consumer confidence and trust (Hassan and Shahzad, 2022).

The role of the community with a relatively modest impact on MSMEs' performance can be attributed to the challenges posed by the new normal era, where many individuals have experienced deteriorating economic conditions and prioritize self-help measures. Despite this relatively small effect, it is noteworthy that the local community still wields a significant influence in enhancing management performance. This is primarily due to the robust social bonds within the local community, which sociologically represents a form of social capital frequently harnessed by various livelihoods, including MSMEs. In accordance with the findings of Nissa et al. (2018), Nissa and Suadi (2022), and Suadi et al. (2021), it is evident that small-scale businesses, such as MSMEs, rely extensively on social capital to navigate and withstand various socio-economic and ecological pressures. Local

communities effectively function as safety nets for their livelihoods, underscoring the sociological importance of these social connections.

Local communities are expected to play a pivotal role in fostering the growth of MSMEs by actively promoting MSME products, fostering a culture of consuming these products, and serving as potential customers to expand domestic offerings. They have the capacity to stimulate creativity and innovation. As an integral part of the Quadruple Helix, local community contributes to the integration of media, culture, and consumer perspectives. Furthermore, communities serve as both the target audience and vanguard for MSME development and guidance. Communities can establish cooperatives to provide a more focused and cohesive approach to MSME activities. Beyond cooperative members, individuals outside the cooperative can also contribute by utilizing MSME products and engaging in advertising or advocacy campaigns. The community's prioritization of MSME products is essential due to the segment's inherent adaptability and resilience, enabling it to swiftly respond to the dynamic and fast-paced changes in the broader business landscape.

This study underscores the significant impact of government involvement on MSME management performance. Governments play a pivotal role in stabilizing MSME conditions and providing crucial capital assistance, thus aiding in business stabilization. They often serve as 'problem solvers' or catalysts for innovation within the MSME sector. Governments also facilitate the pursuit of business growth objectives by MSMEs, offering support through various means. For instance, MSMEs may require government-sponsored training programs when their production capabilities are underdeveloped. It is essential, however, that such assistance is provided without fostering excessive dependence. Khurana et al. (2021) emphasize the government's capacity to stimulate the economy and inspire stakeholders within the MSME sector to establish sustainable enterprises. In the new normal, government decisions and economic stimulus packages have proven beneficial (Sarkar et al., 2021; Shaw et al., 2020; Juniar and Rahmawati, 2018). At the local level, the Regional Government of Serang Regency (Banten Province, Indonesia), for instance, plays a vital role in regulating policies that facilitate MSMEs' access to universities, colleges, major corporations, and banks. Therefore, local government policies targeting MSMEs should be designed with a sole focus on supporting and nurturing this sector.

Based on the comprehensive findings regarding the Quadruple Helix's role, it is evident that each actor plays a highly significant role in enhancing management performance. This observation resonates with the research conducted by Hadi et al. (2023), affirming that every actor, including financial institutions, research centers, local governments, related agencies, universities, and the community, can serve as a driving force for programs or organizations. Amidst ongoing economic challenges, understanding the roles of Quadruple Helix actors in revitalizing MSMEs to enhance their resilience remains imperative. The results of this study emphasize that all components of the Quadruple Helix, comprising academics, business actors, the local community, and government, wield significant influence in shaping the management performance of MSMEs. Bordieu's theory underscores that social capital acts as the fabric that interconnects individuals within a group, enhancing the quality of resources available to each member. Moreover, as articulated by Coleman (1986), networks form the foundation of social capital, driven by the principles of reciprocity within networks or groups aimed at achieving personal and collective goals. Furthermore, the presence of collective consciousness, manifested through the roles assumed by each actor within the Quadruple Helix, can effectively contribute to enhancing MSME performance.

The present study not only enriches the existing theoretical understanding of the Quadruple Helix model's impact on MSMEs but also provides empirical validation, enhancing the robustness of the theoretical framework. The research underscores the distinctive role of business actors within the Quadruple Helix, attributing their substantial influence to shared experiences and commonalities within business domains. Additionally, the study highlights the vital theoretical role of the local community in enhancing MSME management performance. Recognizing the multifaceted contributions of local communities, whether as consumers, promoters, cultivators of MSME products, or even as MSME actors, the research expands theoretical perspectives on the diverse ways local communities positively impact the competitiveness and overall success of the MSME sector. Together, these contributions offer a nuanced and validated theoretical foundation for understanding how the Quadruple Helix collectively shapes and enhances MSME management performance.

## Conclusion

Our study aligns with prior research on the roles of the Quadruple Helix in MSMEs, particularly in terms of enhancing innovation, creativity, and productivity. Our results unequivocally demonstrate the significant influence of academics, businesspeople, local communities, and government on MSME management performance. Consequently, we can conclusively assert that the entire Quadruple Helix plays a pivotal role in enhancing MSME management performance, and our empirical evidence lends strong support to this assertion. Among the three additional helixes, the business actor's role is particularly noteworthy, given the substantial impact it exerts. This influence arises from the shared experiences and commonalities within the business domains, closely relating to the circumstances of MSME actors. Furthermore, our research underscores the vital role played by the local community in enhancing MSME management performance. Whether as consumers, promoters, cultivators of

MSME products, or MSME actors themselves, the local community contributes significantly. Their support encourages competence and bolsters competitiveness, ultimately benefiting the broader MSME sector.

Certainly, here's a combined version focusing on contributions related to empirical validation, the distinctive role of business actors, and the significance of the local community:

This study carries several normative implications pertaining to government policies that need to be oriented towards supporting MSMEs. Measures such as tax substitutions or relief and the efficient allocation of aid funds accompanied by routine assistance should be considered to make a more substantial contribution to regional economic improvement. Furthermore, it is evident that the role of academics in enhancing MSME management performance has been primarily limited to basic research. To optimize the role of academics, it is imperative to channel their expertise in financial management, human resource management, and effective marketing management through the sustainable community service initiatives. This will have a more direct and tangible impact on MSME performance. Therefore, fostering collaboration and synergy among all four actors within the Quadruple Helix is of utmost importance. Each actor must fulfill its role effectively to drive the development of MSMEs. In addition, achieving economic justice can be expedited through collaborative efforts that are optimal, consistent, knowledge-sharing, and inclusive.

This study, though insightful, has limitations. First, the small sample size of 100 MSMEs may limit how broadly we can apply these findings. Second, our research only provides a snapshot, which makes it harder to see how these roles change over time. Third, we relied on self-reported data from MSME owners, which might introduce bias or subjectivity. Also, these findings are mostly tied to Indonesia and may not fully apply to MSMEs in different countries. Therefore, we suggest opportunities to expand on this research. Further research could conduct longer studies to see how these roles evolve, especially during major events like economic crises. Comparative studies in different countries can help us understand the impact of local context. Mixing quantitative data with qualitative insights can give us a deeper understanding of how each role affects MSMEs. Further research can also examine how government policies can be optimized to better support MSMEs. Additionally, studying digitalization, sustainability, resilience, and diversity within this framework can deepen our understanding of how it influences MSMEs.

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**Appendix 1.**

**List of Statements**

| Variable/Indicator | Statements | Code |
|---|---|---|
| Management Performance (Y) | | |
| Increase in customer base | The customer base has increased over the past year. | Y_1 |
| | The strategies employed to attract and retain customers have been effective. | Y_2 |
| Growth in sales | I can quantify the growth in sales experienced by the organization recently. | Y_3 |
| | The initiatives taken have significantly contributed to the observed growth in sales. | Y_4 |
| Profit enhancement | The organization has successfully worked towards enhancing profitability. | Y_5 |
| | Specific areas or strategies have significantly contributed to profit enhancement. | Y_6 |
| Academic (X1) | | |
| Management literacy | The level of management literacy within the organization is satisfactory. | X1_7 |
| | Steps have been taken to improve management literacy among staff. | X1_8 |
| Technology adoption | The organization has effectively adopted technologies to streamline management processes. | X1_9 |
| | Technology adoption has positively impacted overall efficiency and performance. | X1_10 |
| Training in management practices | Management practices prioritized in employee training programs are beneficial. | X1_11 |
| | The effectiveness of management training initiatives is measurable. | X1_12 |
| Business (X2) | | |
| MSMEs association membership | Association membership has positively influenced the organization's business operations. | X2_13 |
| | Being a member of an MSMEs association is beneficial for the organization. | X2_14 |
| Distribution network information access | The organization ensures effective access to vital distribution network information. | X2_15 |
| | Challenges in obtaining or utilizing distribution network information have been minimal. | X2_16 |
| Local Community (X3) | | |
| Idea sharing | The organization actively promotes idea sharing within the local community. | X3_17 |
| | Successful collaborations have resulted from idea sharing initiatives. | X3_18 |
| Synergy creation among MSMEs | The organization effectively fosters synergy among local MSMEs. | X3_19 |
| | Collaborative projects with other MSMEs have been successful. | X3_20 |
| Government (X4) | | |
| Mentorship | The formal mentorship program in place within the organization is effective. | X4_21 |
| | Mentorship has positively impacted the professional development of employees. | X4_22 |
| Local support provision | The organization actively contributes to local support initiatives. | X4_23 |
| | Local support has been particularly beneficial in specific areas. | X4_24 |
| Policy formulation and implementation | The organization actively participates in policy formulation. | X4_25 |
| | Successful implementation of policies influenced by the organization is evident. | X4_26 |

**Note:** The Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) was utilized.