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Enhancing SME Performance through Collaborative Networks, Digitalization Technology, Competence, and Business Resilience: A Study of the Chip Industry in Malang Raya

Riyanti Isaskar[1], Alya S. Puteri[2], Budi Setiawan[3], Fitria D. Riana[4], Wisynu A. Gutama[5], Dwi Retno Andriani[6]

Department of Socio-Economics Lecturers, Faculty of Agriculture, Universitas Brawijaya, Indonesia[1, 3, 4, 5,6]
Department of Socio-Economics Student, Post Graduate on Agribusiness Program, Faculty of Agriculture, Universitas Brawijaya, Indonesia[2]

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Abstract

This research aims to fill the knowledge gap by understanding that strategic resources such as collaboration networks, technology digitalization, and financial literacy contribute to improving performance through financial and business competencies and resilience in the perspective of a Resource-Based View (RBV). The study was conducted in Malang Raya, which has a dynamic agro-tourism area but is facing market pressure and high competition. It involved 50 chip MSME players who have been operating for at least two years. The research method uses the SEM-PLS on seven main variables: collaboration network, digitalization, financial literacy, competence, financial resilience, business resilience, and business performance. The results show that the three main resources have a significant effect on performance improvement, either directly or through strengthening competence and resilience. This research provides a theoretical contribution by expanding the application of RBV in the context of traditional food MSMEs, as well as presenting an integrative model to improve the competitiveness of MSMEs. Further research is recommended to explore external variables such as regulation and the dynamics of the growing digital market.

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Abstrak

Penelitian ini bertujuan untuk mengisi kesenjangan pengetahuan dengan memahami bahwa sumber daya strategis seperti jaringan kolaborasi, digitalisasi teknologi, dan literasi keuangan berkontribusi dalam meningkatkan kinerja melalui kompetensi dan ketahanan keuangan dan bisnis, dalam perspektif Resource-Based View (RBV). Kajian dilakukan di Malang Raya dengan kawasan agrowisata yang dinamis namun menghadapi tekanan pasar dan persaingan yang tinggi serta melibatkan 50 pelaku UMKM chip yang telah beroperasi setidaknya selama dua tahun. Analisis menggunakan metode SEM-PLS pada tujuh variabel utama: jaringan kolaborasi, digitalisasi, literasi keuangan, kompetensi, ketahanan keuangan, ketahanan bisnis, dan kinerja bisnis. Hasil penelitian menunjukkan bahwa ketiga sumber daya utama tersebut memiliki pengaruh yang signifikan terhadap peningkatan kinerja, baik secara langsung maupun melalui penguatan kompetensi dan ketahanan. Penelitian ini memberikan kontribusi teoritis dengan memperluas penerapan RBV dalam konteks UMKM pangan tradisional, serta menghadirkan model integratif untuk meningkatkan daya saing UMKM. Penelitian lebih lanjut direkomendasikan untuk mengeksplorasi variabel eksternal seperti regulasi dan dinamika pasar digital yang sedang berkembang.

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✉Correspondence Address
Institutional address: Universitas Brawijaya, Malang, Indonesia
Email: riyanti.fp@ub.ac.id

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INTRODUCTION

Micro, Small, and Medium-Sized Enterprises (MSMEs) play a fundamental role in driving economic development, both in developed and developing countries, including Indonesia. As engines of economic progress, MSMEs contribute significantly to job creation, poverty alleviation, and local economic growth (Ghergina et al., 2020). In the Indonesian context, MSMEs remain the most prevalent economic activity undertaken by citizens to support their livelihoods. Beyond their capacity to absorb approximately 90% of the national workforce, MSMEs also serve as vital agents in promoting local products on a global scale (Suyadi et al., 2018).

East Java stands out as one of the provinces with the most dynamic growth in MSME development. According to data from BPS (2024), the region has seen a substantial increase in the number of business units across all scales—micro, small, medium, and large. The province is home to a total of 874,497 micro and small enterprises, with the majority engaged in the food processing industry (241,215 units). In comparison, there are 6,286 medium and large businesses, also predominantly operating in the food sector (1,659 units), as shown in Table 1.

In addition to its reliance on MSMEs, Indonesia's economy also heavily depends on the tourism sector, as it offers recreational opportunities for both local and foreign communities and enhances business opportunities for local entrepreneurs. There is a mutual dependency between MSMEs and the tourism sector in Indonesia because MSMEs can support tourism by providing services and goods to tourists, while the tourism sector can offer more potential customers for MSMEs in tourist areas. MSMEs are essential for supporting local tourism because tourist destinations are incomplete without local food and souvenir vendors. The availability of unique local food and souvenirs is crucial for enhancing tourism (Febrianita et al., 2022).

Malang Raya is among the most well-known tourist attractions in East Java. Because of its enormous potential for tourism, Malang Raya is well-known as a travel destination. Malang City, Malang Regency, and Batu City make up the Malang Raya tourism area. As a tourist destination, Malang Raya effectively contributed 528 to the medium-large business sector and 53,652 to the micro-small company sector. Table 2 illustrates this by presenting the findings of the BPS-conducted industry survey on East Java.

Sunaryo et al. (2019) highlight that Malang City has grown into a prominent domestic tourist destination, particularly known for its shopping tourism. This transformation is strongly supported by the rise of micro-scale culinary industries that process local horticultural products into distinctive food souvenirs. These products have become essential elements of the tourism experience, as tourists increa-

Table 1. Number of Companies and Workers by Industry Classification in East Java Province in 2021-2022

Category	Company	Worker
Micro and Small Industries	874.497	2.438.770
Medium and Large Industries	6.286	936.592
Number of Companies	880.783	3.375.362

Source: BPS East Java Province (2024)

Table 2. Number of MSMEs and Large Industrial Companies in Malang Raya

Category	Malang City	Batu City	Malang Regency	Total
Micro and Small Industries	10.837	3.094	39.721	53.652
Medium and Large Industries	184	34	310	528
Total	11.021	3.128	40.031	54.180

Source: BPS East Java Province, (2024).

singly perceive the act of buying food souvenirs not merely as a purchase but as part of a memorable cultural encounter. This phenomenon is in line with Febrianita et al. (2022), who emphasize the strategic role of MSMEs in supporting tourism by providing unique, localized products that enhance the attractiveness of tourist destinations.

In Malang Raya, which includes Malang City, Batu City, and Malang Regency, the food souvenir industry is largely dominated by MSMEs, which face both growing opportunities and persistent challenges. These include intense market competition, seasonal demand fluctuations, and limited digital engagement. Hanum & Worokinasih (2019) classify food souvenirs into bakery and pastry items, crackers, processed foods, and snacks—product categories largely produced by MSMEs. Among these, various types of chips such as fruit, vegetable, tuber, and particularly tempeh chips have gained popularity as iconic Malang products.

By integrating the insights from Sunaryo et al. (2019) and Febrianita et al. (2022) within this local business context, it becomes evident that MSMEs in Malang Raya play a critical role in linking culinary heritage with tourism-driven economies. At the same time, they must continuously adapt to improve business performance in the face of dynamic consumer trends and market disruptions, making them a compelling subject of study for resilience and innovation strategies in the tourism sector.

Despite its vibrant tourism and growing MSME sector, Malang Raya continues to present significant challenges for local micro and small business actors. While Indonesia's large population offers a vast consumer base, the intense competition from both domestic and international players pushes MSMEs to evolve constantly and differentiate their products to remain relevant in the market. In tourism-driven areas like Malang Raya, MSME owners are increasingly aware that sustaining business operations requires more than just product quality. It demands continuous attention to business performance in highly dynamic and competitive environments.

Several key factors influence business performance, including the strength of collaboration networks, the extent of digital technology adoption, the competency of business owners, and overall business resilience. These variables are particularly relevant in the context of tourism-based economies, where consumer demand and market access can fluctuate rapidly. As suggested by Tanaamah et al. (2017) and Rahmatullah et al. (2023), drawing from the Resource-Based View (RBV) framework, a firm's ability to survive and remain competitive is closely linked to its internal resources and capabilities—such as competencies, knowledge, and adaptive efforts.

However, prior studies have rarely positioned these factors within the specific context of MSMEs operating in Malang

Raya's tourism economy. While RBV has been widely applied in MSME research, limited attention has been given to how collaboration networks, digitalization, and entrepreneurial competency interact to shape MSME performance and resilience in regions like Malang, where tourism and local industry intersect. This study seeks to address that gap by offering an integrative analysis grounded in the local business realities of Malang Raya.

Therefore, this study aims to provide insights into the key drivers of business performance among chip-producing SMEs in Malang Raya by examining the roles of collaboration networks, digitalization technology, competencies, and business resilience. By focusing on these strategic variables, the research seeks to contribute to the broader discourse on SME performance enhancement in tourism-based local economies. Additionally, the findings are expected to offer practical guidance for MSME actors in the snack production sector to strengthen their resilience and sustain competitive business performance amid dynamic market conditions.

Hypothesis Development

Resource-Based View Theory (RBV)

The Resource-Based View (RBV) offers a foundational framework for understanding how internal organizational factors influence long-term competitiveness. Initially introduced by Wernerfelt (1984) and later refined by Barney (1991), this perspective emphasizes that a firm's sustainable advantage stems from its unique resources and capabilities. These include not only tangible assets but also intangible elements such as skills, knowledge, and organizational competencies. The greater and more distinctive these capabilities, the more resilient a firm is in maintaining its position within a competitive market.

Barney et al. (2001) further expanded the RBV by highlighting its relevance over time and its evolving application in strategic management. They assert that valuable, rare, inimitable, and non-substitutable (VRIN) resources form the basis of sustained competitive advantage. Within the context of MSMEs, particularly those operating in dynamic environments such as the tourism-driven economy of Malang Raya, RBV provides a relevant lens through which to analyze how internal strengths—like digital competence, collaboration capacity, and adaptability—can contribute to improved business performance and resilience (Rahmatullah et al., 2023).

The Resource-Based View (RBV) conceptualizes a firm as a repository of tangible and intangible resources that, when properly managed, can serve as the foundation for achieving sustainable competitive advantage. These resources may include physical assets, human capital, organizational routines, and embedded knowledge—elements that are valuable, rare, inimitable, and non-substitutable (Barney et al., 2001). In line with this view, Ozdemir et al. (2023) and Ayadi et al. (2024) assert that a firm's unique and valuable internal resources are critical for generating long-term success, particularly when those resources are difficult for competitors to replicate or substitute.

For MSMEs operating in tourism-intensive areas like Malang Raya, where the market environment is highly dynamic, the RBV framework offers valuable insight into how internal strengths—such as digital competencies, collaborative networks, and adaptive capabilities—can shape business resilience and performance. However, the RBV alone may not fully capture the fast-paced changes these enterprises face. This is where the Dynamic Capabilities (DC) perspective complements the RBV by emphasizing a firm's ability to integrate, build, and reconfigure resources in response to shifting market and environmental conditions (Teece, 2007).

By synthesizing RBV and DC, this study positions both frameworks as essential to understanding how MSMEs can not only leverage existing strengths but also dynamically adapt in order to sustain competitiveness. This theoretical integration is especially relevant in the context of Indonesia's tourism-based MSMEs, where success often depends on how well firms can adjust to seasonality, digital transformation, and shifting consumer preferences—challenges that are prominent in the Malang Raya region. Thus, the use of RBV and DC in this research provides a solid foundation for analyzing the role of collaboration networks, technology adoption, and business resilience in enhancing MSME performance.

Collaboration and Business Resilience Network

Collaboration refers to the process of individuals or organizations working together to achieve shared objectives. For small and medium-sized enterprises (SMEs), collaboration commonly involves strategic partnerships with external entities—both domestic and international—to enhance various business outcomes, including new product development. These collaborative efforts enable SMEs to combine their internal strengths with external support, which can lead to more effective innovation and business growth (Lu et al., 2024).

Furthermore, collaborative networks facilitate the exchange of knowledge, experiences, and market information between SMEs and stakeholders such as suppliers, competitors, and governmental bodies. These networks not only promote innovation and competitive advantage but also contribute to improved overall business performance. By building strong social and professional relationships, SMEs gain access to critical resources and insights that support their long-term development and resilience in dynamic markets (Mulyana & Wasitowati, 2021).

The ability of SMEs to survive and adapt in changing business environments is strongly supported by the presence of collaborative networks. When SMEs build strong relationships with partners based on trust, communication, and shared goals, they become more prepared to face challenges and disruptions. Collaboration also helps businesses respond more quickly to economic changes, encourages creativity, and improves overall performance. Therefore, as shown in various studies, collaboration plays an important role in strengthening the resilience of SMEs over time (Saputra et al., 2022)

H1: Collaborative networks (CNs) have a positive influence on business resilience (BR).

Digitalization Technology and Business Resilience

The term "digitalization technology" describes the strategic use of digital devices and technologies to provide a competitive advantage for businesses. The system of ways to achieve certain goals through the use of technological objects and social knowledge (know-how) is referred to as technology. Technology consists of software (information needed to create and operate technological hardware) and hardware (manufactured goods such as machinery and containers). It includes what is produced, how it is produced, and the knowledge needed for production and consumption. Furthermore, technology is dynamic and constantly changing as new variations are introduced and then improved and modified. Digitalization, on the other hand, describes the technological shift from analog forms, such as mechanical and electronic forms, to digital forms. Digitalization represents modernization or renewal in the use of technology, especially with the advent of the internet and

information technology. This allows new possibilities with advanced devices that facilitate human activities (Wibowo et al., 2023; Ayadi et al., 2024).

Previous research has shown that digitalization technology significantly impacts business resilience by increasing adaptability, efficiency, and innovation in organizations. Digital transformation enables businesses to anticipate, respond, and adapt to change more effectively, thereby increasing their resilience in the face of challenges. Digitalization can help and increase the resilience of SMEs. The use of digital technology in SMEs can improve business performance, reduce risks, and ensure business continuity. By adopting digital technology in sales functions, SMEs can increase their revenue and financial stability. By implementing digital technology, SMEs can also improve their operational efficiency (Akib et al., 2022).

H2: Digitalization Technology (DT) has a positive effect on business resilience (BR).

Collaboration Networks, Digitalization Technology, Competencies and Business Resilience

Human resource competencies are a crucial component that must be owned by MSMEs. Apart from being a production instrument, human resources (HR) also directs and influences all organizational operations, including the production process. Human resources are very important in determining whether an organization will advance or develop. Therefore, the quality and potential of an organization's human resources determines its progress. The most valuable resource in a company or organization is its human resources, which have a huge impact on the overall success of the business on a small scale (Eka et al., 2022).

Collaborative networks allow for knowledge sharing, experience exchange, and information sharing among external partners such as customers, suppliers, competitors, and governments. They have a significant impact on SMEs' capacity to innovate, competitive advantage, and business performance. These partnerships drive improved company performance, competitive advantage, and innovative capabilities. Collaborative networking can provide SMEs with access to resources, knowledge, and market intelligence that supports their overall development and success. The performance of SMEs is greatly influenced by business ties and competencies. A key factor in increasing the success of SMEs is entrepreneurial ability, which includes knowledge and skills that allow them to proactively address the company's difficulties (Sugandi & Suhaeni, 2019; Mulyana & Wasitowati, 2021).

H3: Collaboration Network (CN) has a positive effect on competence (C).

Digital competencies, in particular, are heavily influenced by digitalization technologies and are needed to improve performance in a number of sectors, including project management and social media networks (Aulia, 2023). Business competence is greatly influenced by digitalization, especially in micro, small, and medium enterprises (MSMEs). MSMEs can improve overall business performance, increase market reach, and improve operational efficiency with the help of digitalization. Using digital marketing technologies and developing entrepreneurial skills, for example, are important components that can greatly improve marketing performance. Digitalization can also help MSMEs in taking proactive steps to deal with an increasingly complex business environment. MSMEs must improve their digital competencies to fully reap the benefits of digitalization. This includes the ability to use digital technologies such as social media, mobile apps, and e-commerce platforms,

Figure 1 illustrates the conceptual framework of this study.

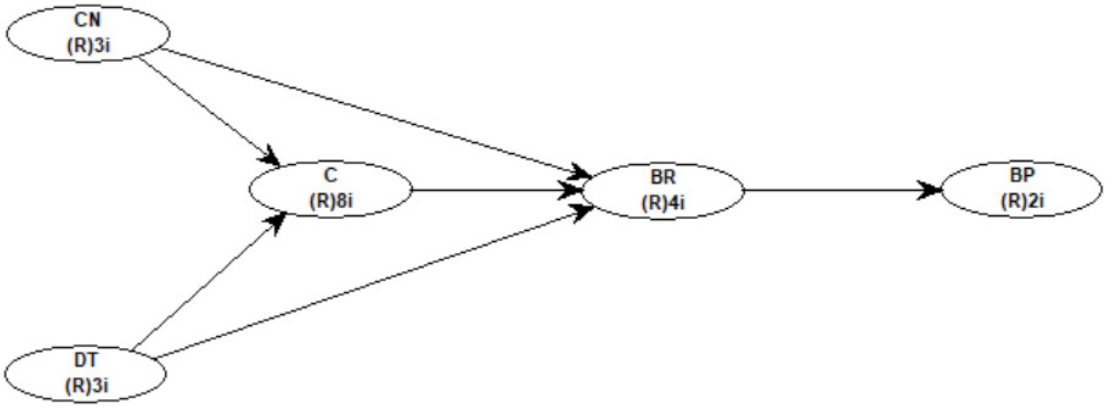

Figure 1. Conceptual Framework

as well as the ability to manage data and information (Chusumastuti et al., 2023).

H4: Digitalization Technology (DT) has a positive effect on competence (C).

Business resilience is a person's ability to face and prevent things that have the potential to harm their business. Business competence and resilience are intertwined in the context of business development. The ability to overcome challenges effectively, stay calm, and have the determination to always overcome challenges are important aspects of business development. Previous research has shown that competence can significantly affect business resilience (Dewinda & Khairiyah, 2021).

H5: Competency (C) has a positive effect on business resilience (BR).

Business Resilience and Business Performance

Resilience is a psychological concept that includes the capacity to recover from stressful events and the capacity to survive and thrive under stress. Resilience theory was first presented to the business and management community by Staw and his colleagues in 1981. They define resilience as the capacity to adapt and learn in potentially dangerous situations. Business resilience refers to an organization's ability to adapt quickly, bounce back quickly, or come up with creative methods to operate when things get tough. It is described as the capacity of a business to successfully handle uncertainty and take part in transformative initiatives to reduce possible risks. To maintain their survival, resilient organizations are able to manage uncertainty, accept risk, and adapt to changing environmental conditions. Surviving in a market characterized by sudden disruption requires the capacity to survive and adapt to changing and unfavorable conditions. In general, corporate resilience refers to an organization's capacity to overcome obstacles, adapt to change, and continue business as usual when faced with difficulties (Santoro et al., 2020; Akmal & Arifa, 2023). Business resilience and SME performance are significantly correlated, especially when it comes to Micro, Small, and Medium Enterprises (MSMEs). The resilience of small and medium-sized businesses can improve performance in a variety of ways, including proactive and the power of strategic diversity, all of which are positively correlated with organizational success (Rahmi & Sudarmiatin, 2022).

H6: Business resilience (BR) has a positive effect on business performance (BP).

METHOD

Data Source

The primary data for this study were collected in the Malang Raya area during July and August 2024 through a combination of structured interviews, direct observations, and survey questionnaires. The questionnaires were designed based on the theoretical framework and relevant literature and then reviewed by academic peers to ensure clarity and relevance. Prior to full deployment, a pilot test of the questionnaire was conducted with a small group of SME actors to assess the validity, clarity, and reliability of the instrument. Feedback from the pilot phase was used to refine the items to better fit the context of chip-producing SMEs in the region.

During the main data collection, the researchers used a Likert scale to measure respondents' levels of agreement or disagreement with various statements related to the study variables. This scale, ranging from 1 (strongly disagree) to 5 (strongly agree) – as seen in Table 3, was selected for its simplicity and effectiveness in capturing perceptions, attitudes, and opinions. The use of multiple data collection techniques, questionnaires, interviews, and field observations was intended to enhance the depth and accuracy of the findings by triangulating the information gathered.

Selection of Respondents

The target population in this study consists of MSMEs located in the Malang Raya area that are engaged in the production and sale of chips. To determine the appropriate sample size, this study follows the recommendation by Hair et al. (2014) for Structural Equation Modeling using Partial Least Squares (SEM-PLS), which suggests a minimum of 48 respondents to accommodate the highest number of construct arrows at a 5% significance level and a minimum R^2 value of 0.50. Based on this guideline, a total of 50 MSME owners in the chip industry were selected as research respondents.

The sampling technique employed was purposive sampling, where participants were chosen based on specific criteria—in this case, MSMEs with at least two years of operational experience. This criterion was used to ensure that the selected respondents possessed adequate insight into the resources and processes involved in their business operations. However, it is important to acknowledge that purposive sampling may introduce a degree of selection bias, as the sample may not fully represent the broader population of chip-producing MSMEs in other regions or stages of development. Consequently, while the findings provide valuable insights into the context of Malang Raya, caution should be exercised when attempting to generalize the results beyond the study area.

Variable Measurement

The selection of indicators should be explained in more depth, especially for the competency variable, which is measured

Table 3 . Likert Scale Criteria

No.	Criterion	Score
1	Very Good/Strongly Agree	5
2	Good/Agree	4
3	Fair	3
4	Bad/Disagree	2
5	Very Bad/Very Disagree	1

Source: Scott (2016)

using eight indicators. While comprehensive, some indicators (e.g., "personality characteristics" and "emotional issues") may require further explanation of how they are directly related to the business performance or resilience of MSMEs.

The digitalization of technology refers to the transformation of traditional business processes through digital tools, aiming to improve efficiency, market access, and overall business performance. The digitalization variable is measured using three indicators: the application of digital marketing strategies (X2.1), the use of digital transaction systems (X2.2), and the level of digital skills possessed by business owners or staff (X2.3) (Lestari & Muttaqin, 2023). These aspects reflect how far MSMEs have embraced digital tools to support growth and resilience in a dynamic business environment.

Competency, on the other hand, is defined as an individual's core attribute that influences their behavior and decision-making processes across various contexts. In this research, competency is seen not only as a personal trait but also as an organizational resource critical to navigating financial and operational challenges. It is measured through eight indicators: beliefs and values (Z1.1), knowledge (Z1.2), skills (Z1.3), personality characteristics (Z1.4), motivation (Z1.5), emotional issues (Z1.6), intellectual ability (Z1.7), and organizational culture (Z1.8) (Mukhtar et al., 2023). Although broad in scope, each of these components is considered to influence MSME performance directly or indirectly. For instance, personality characteristics such as openness to innovation or risk tolerance can drive strategic change, while emotional stability supports decision-making under pressure—both of which are essential for resilience and business sustainability.

Business resilience is understood as an organization's ability to anticipate, respond to, and recover from external pressures while maintaining operational continuity. This variable is evaluated using four indicators: preparedness (Z2.1), agility in responding to change (Z2.2), elasticity in absorbing shocks (Z2.3), and redundancy, or the capacity to maintain backups and alternatives (Z2.4) (Rahmawati & Nahartyo, 2023).

Lastly, business performance is defined as the measurable outcomes of a company's activities, particularly in terms of productivity and financial results. This study is measured using two practical indicators: sales growth (Y1.1) and profit increase (Y1.2), which reflect the firm's ability to expand its market reach and improve revenue over time (Wibowo, 2017).

Data Analysis Methods

Both descriptive analysis and structural equality modeling -partial least squares (SEM-PLS) analysis were used as data analysis techniques in this study. In data analysis, descriptive statistics are used to characterize or illustrate the data collected to generalize conclusions (Sugiyono, 2018). In this study, 50 participants' responses were analyzed using descriptive statistics.

This study also uses SEM for data processing. SEM is an advanced pathway analysis technique that allows further identification of causal relationships between exogenous and endogenous variables. Using SEM analysis, not only the direct and indirect causal relationships between the observed variables or constructs can be identified, but also their components (Hair et al., 2022).

This study employs a quantitative analysis approach using the Partial Least Squares (PLS) method. PLS is particularly suitable for exploring complex models and is advantageous in confirming theoretical relationships between latent variables, especially when the theoretical framework

is still developing. One of the main strengths of PLS is its flexibility—it does not require the data to follow a multivariate normal distribution, and it remains effective even with relatively small sample sizes (Solihin & Ratmono, 2013; Hair et al., 2022).

PLS is also capable of handling various types of measurement models, including formative, reflective, or mixed (formative-reflective) indicators, making it highly adaptable to diverse research contexts. For this study, the structural model was analyzed using WarpPLS 8.0, a software specifically chosen for its ability to model both linear and non-linear relationships, which is often necessary when dealing with behavioral data in social science research. Compared to other SEM software such as SmartPLS or LISREL, WarpPLS offers user-friendly features and graphical outputs that assist in understanding model fit and path coefficients, making it especially suitable for researchers working with relatively small datasets and complex mediation structures.

RESULT AND DISCUSSION

Respondent Profile

Gender, age, highest level of education, number of family dependents, length of operation, type of company unit, and licensing status are demographic information of respondents. The demographic data presented in Table 4 show that 62% of respondents were male, and 46% were between the ages of 31 and 40. The majority of respondents (56%) completed high school, and 46% of them had four or more dependents in an average family. Four out of five respondents have been in business for two to five years, and the majority of the company's units (48%) are classified as micro-enterprises. 100% of business owners have obtained a business license.

Results of PLS-SEM (Partial Least Square – Structural Equation Modeling) Analysis

Due to its reliable approach to survey data analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM) is used in many management studies (Hair et al. 2017). The study used WrapPLS 8.0 software for data analysis. Structural model testing (inner model), measurement model testing (outer model), and hypothesis testing are all included in the analysis.

Outer Models

The purpose of the outer model is to evaluate the reliability and validity of the research tool. In a study, the relationship between variables and their indicators was shown by designing an outer model. The findings of the outer model of this study are as follows:

Convergent Validity

The purpose of the convergent validity test is to evaluate the reliability of the research variables. The factor loading value provides convergent validity by showing the relationship between the construct/variable and the variance of the indicator. According to Hair et al. (2020), the minimum path coefficient is 0.70, and the stronger the convergent validity, the greater the coefficient. Strong convergent validity is indicated by a path coefficient greater than 0.70, as shown by the results of the convergent validity test in Table 5.

The Average Variance Extracted (AVE) value, which indicates the average variance described by the indicator's construct in relation to the indicator's overall variance, is another way to evaluate the validity of the convergence. It must

Table 4. Respondent Profile (n=50 **)**

Respondent Profile	Frequency	Percentage (%)
Gender		
Man	31	62%
Woman	19	38%
Total	50	100%
Age		
21-30	9	18%
31-40	23	46%
41-50	14	28%
Above 50	4	8%
Total	50	100%
Education		
Primary school	3	6%
Junior High School	6	12%
High School	28	56%
Bachelor	13	26%
Total	50	100%
Family Dependents		
1	0	0%
2	3	6%
3	12	24%
4	23	46%
5	7	14%
> 5	5	10%
Total	50	100%
Business Duration		
2-5 years	21	42%
5-10 years	20	40%
10-15 years	6	12%
> 15 years	3	6%
Total	50	100%
Business Unit Categories		
Micro	24	48%
Small	20	40%
Keep	6	12%
Total	50	100%
Licensing		
Existing	50	100%
None	0	0%
Total	50	100%

Source: Processed data (2024)

Table 5. Validity Convergent

Variable	Loading Factor	P value
X1.1	0.967	<0.001
X1.2	0.976	<0.001
X1.3	0.941	<0.001
X2.1	0.948	<0.001
X2.2	0.974	<0.001
X2.3	0.966	<0.001
Z1.1	0.870	<0.001
Z1.2	0.868	<0.001
Z1.3	0.884	<0.001
Indonesian: Z1.4	0.831	<0.001
Z1.5	0.856	<0.001
Z1.6	0.842	<0.001
Z1.7	0,878	<0.001
Z1.8	0.886	<0.001
Z2.1	0.788	<0.001
Indonesian: Z2.2	0.851	<0.001
Z2.3	0.821	<0.001
Z2.4	0.856	<0.001
Y1.1	0.980	<0.001
Y1.2	0.980	<0.001

Source: Processed data (2024)

be more than 0.50. The AVE value exceeds 0.50 and meets the requirements, as shown by the results of the analysis shown in Table 6. When the variance of the indicator is explained by more than half of the construct, it is indicated by an AVE value greater than 0.50 (Cheung, 2023).

Reliability Test

Through the use of Cronbach's Alpha and Composite Reliability (CR), the external model also evaluates the reliability of internal consistency. According to Hair et al. (2019), Cronbach's Alpha value is at least between 0.60 and 0.70. The CR and Cronbach's Alpha values exceeded 0.70, meeting the minimum requirements for reliability, according to the analysis in Table 6.

Inner Model

Based on substantive theory, the internal model in this study describes the relationship between latent variables (Solimun & Nur Jannah, 2017). The findings of the internal model of this study are as follows:

Path Coefficients

Finding the path coefficient is the initial stage in testing the internal model. The direction of the relationship between the variables is indicated by the path coefficient. Standard values for path coefficients range from -1 to 1, with values close to 1 indicating a strong and positive relationship (Hair et al., 2020). On the other hand, a number close to zero indicates a weaker relationship and usually does not need to be noticed.

Table 6. Validity and Reliability

Variable	Alpha Cronbach	Composite Reliability	Average Extracted Variance (AVE)
Collaboration Network	0.959	0.974	0.925
Digitalization Technology	0.960	0.974	0.927
Competence	0.952	0.959	0.747
Business Resilience	0.848	0.898	0.688
Business Performance	0.959	0.980	0.960

Source: Processed data (2024)

The path coefficients are shown in Figure 2, which illustrates the structural model of the study based on the findings of the study. Each route coefficient (β) is classified as about 1, which indicates that there is only a positive correlation between latent variables. On the other hand, a number close to zero indicates a weaker relationship and usually does not need to be noticed.

R-Square

R-squared values serve as key indicators of predictive accuracy in statistical modeling, ranging from 0 to 1, with higher values suggesting stronger explanatory power. It is worth noting, however, that the interpretation of these values necessarily varies across disciplines and model complexities, requiring contextual assessment rather than universal thresholds. Our analysis in Table 7 reveals an R-squared value of 0.496 for business performance, which aligns moderately well with similar studies in the business analytics domain where values between 0.4 and 0.6 are commonly observed. This moderate coefficient indicates that competency constructs, digitalization technologies, collaboration networks, and business resilience collectively explain 49.6% of the variance in business performance, while 50.4% remains attributable to factors beyond our model's scope.

This finding suggests opportunities for future research to identify additional determinants of business performance. More impressively, the business resilience construct demonstrates a robust R-squared value of 0.722, indicating that collaboration networks, digitalization technologies, and expertise substantially explain 72.2% of the variance in resilience outcomes,

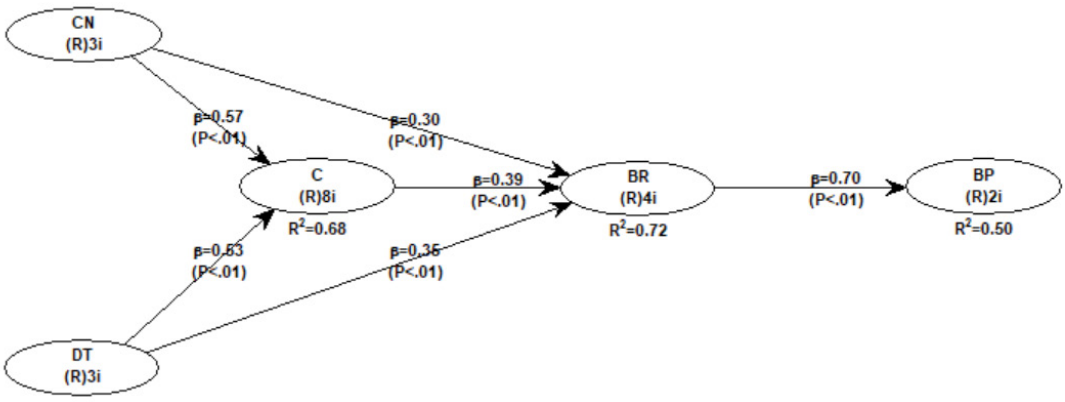

Figure 2. Model Path Coefficients Structural

Source: WrapPLS 8.0 processed data (2024)

Table 7. R- Squares

Variable	R-Square	Percentage (%)
Competence	0.684	68.4%
Business Resilience	0.722	72.2%
Business Performance	0.496	49.6%

Source: Processed data (2024)

with only 27.8% determined by external factors.

Similarly, the competency variable exhibits a strong explanatory model with an R-squared value of 0.684, where collaboration networks and digital technologies account for 68.4% of its variance, while 31.6% is explained by constructs outside our model. These relatively high R-squared values for resilience and competency variables suggest that our theoretical framework effectively captures their core determinants, providing a solid foundation for practitioners seeking to enhance these organizational attributes.

Hypothesis Testing

In this study, the significance of the relationship between latent variables was ascertained using hypothesis testing using t-statistics. According to Solimun & Nur Jannah (2017), the significance level (alpha) used in hypothesis testing is classified as follows: a p-value of < 0.10 indicates weak significance, a p-value < 0.05 indicates significance, and a p-value < 0.01 indicates extreme significance. The findings of the operational hypothesis testing are shown in Table 8. Table 8 shows that the first hypothesis is accepted, meaning that collaborative networking has a positive and significant impact on the resilience of the company. The first hypothesis has a p-value of 0.010 and a coefficient value of 0.304. Previous research has also provided support for this result (Saputra et al., 2022)

With a p-value of 0.004 and a coefficient value of 0.346, the second hypothesis analysis shows that digitalization technology greatly affects the resilience of companies. This is in line with previous research (Akib et al., 2022)

The analysis of the third hypothesis showed that, with a p< value of 0.001 and a coefficient value of 0.565, the cooperative network had a significant impact on competence. These results are consistent with previous research (Mulyana & Wasitowati, 2021).

The fourth hypothesis, with a p< value of 0.001 and a coefficient value of 0.526, shows that digitalization technology significantly affects competence. These results are in line with previous research (Aulia, 2023)

The fifth hypothesis, which has a p-value of 0.001 and a coefficient value of 0.393, suggests that competency has a considerable impact on business resilience. Previous research supports this conclusion (Dewinda & Khairiyah, 2021).

The sixth hypothesis, which has a p<value of 0.001 and a coefficient value of 0.704, suggests that a company's resilience has a significant impact on business performance. Previous research provides support for this (Rahmi & Sudarmiatin, 2022).

Mediation Variable Analysis

The mediation analysis results presented in Table 9 reveal significant relationships that enhance our understanding of business dynamics in ways that both support and extend previous literature. Collaboration networks demonstrate

Table 8 . Hypothesis Test Results

Hypothesis	Relationships between variables	Coefficient	p-value	Conclusion
H1	Collaboration Network → Business Resilience	0.304	0.010	accepted
H2	Digitalization Technology → Business Resilience	0.346	0.004	accepted
H3	Collaboration Network → Competency	0.565	<0.001	accepted
H4	Digitalization Technology → Competencies	0.526	<0.001	accepted
H5	Business Resilience → Competencies	0.393	0,001	accepted
H6	Business Resilience → Business Performance	0.704	<0.001	accepted

Source: Processed data (2024)

meaningful indirect effects on business resilience through competencies (coefficient= 0.222, p=0.010) and on business performance through resilience (coefficient=0.214, p=0.012). This finding aligns with Martínez-Sánchez et al. (2020), who found that collaborative networks enhance knowledge-sharing capabilities (β=0.31, p<0.01) in their study of 342 European SMEs, but our research extends their work by explicitly identifying resilience as a crucial mediating mechanism.

Similarly, Abeysekara et al. (2019) demonstrated the direct effects of collaboration on performance (r=0.27), yet our higher coefficient through the mediated path suggests that the resilience pathway offers stronger explanatory power than previously recognized models of direct influence.

Most notably, the competencies → business resilience → business performance pathway exhibits the strongest mediation effect (coefficient=0.277, p=0.002), empirically documenting how dynamic capabilities operate through organizational resilience to generate superior performance. This result significantly refines Teece's capabilities-based view and extends Battisti and Deakins' (2017) work, which found resilience directly impacting post-disaster performance (β=0.21, p<0.05) but did not explore its mediating role.

Our finding of digitalization technology's indirect effects on resilience through competencies (coefficient=0.207, p=0.015) and on business performance through resilience (coefficient=0.244, p=0.005) challenges Guo et al.'s (2020) conclusions that digital transformation directly enhances firm performance (β=0.38). Instead, our results reveal that digitalization benefits are often mediated by organizational factors—a finding that provides a potential explanation for the mixed results in Cenamor et al.'s (2019) meta-analysis of 87 studies on digital transformation outcomes.

Collectively, these results provide compelling evidence for complex causal pathways between collaboration, digitalization, competencies, resilience, and business performance, with resilience serving as a central nexus where various enabling factors convert into superior organizational performance.

Table 9 . Mediation Variable Analysis Results

Relationships between variables	Coefficient	p-value	Conclusion
Collaboration Network → Competencies → Business Resilience	0.222	0.010	Significant
Collaboration Network → Business Resilience → Business Performance	0.214	0.012	Significant
Digitalization Technology → Business Competencies → Resilience	0.207	0.015	Significant
Digitalization Technology → Business Resilience → Business Performance	0.244	0.005	Significant
Competencies → Business Resilience → Business Performance	0.277	0.002	Significant

Source: Processed data (2024)

CONCLUSION AND RECOMMENDATION

This study examines how MSME chip manufacturers in Malang Raya can improve the resilience and performance of their companies by leveraging collaborative networks, digitalization technology, and expertise. Collaboration networks and digitalization technologies have a major impact on the resilience of companies, both directly and through greater expertise, according to an analysis conducted using the SEM-PLS approach. In addition, business performance and resilience are positively influenced by competencies gained through digitalization technology and collaboration networks.

In today's increasingly competitive business environment, organizational resilience emerges as a fundamental determinant of enterprise sustainability and success. Small and medium-sized enterprises can enhance their operational efficiency and productivity while simultaneously developing greater adaptability and resilience in addressing business challenges through the strategic deployment of digital technologies and robust collaborative networks.

This research conclusively demonstrates the strategic significance of collaborative networks and digital transformation initiatives for micro, small, and medium-sized enterprises operating within the Malang Raya industry. The findings systematically establish that these factors serve as critical antecedents that (1) substantially enhance organizational competencies through knowledge transfer and resource optimization, (2) significantly strengthen business resilience by improving adaptive capacity and response mechanisms, and (3) ultimately drive superior business performance through these mediated pathways. These structured relationships provide a comprehensive framework for understanding how MSMEs can achieve sustainable competitive advantage in specialized high-technology sectors

To enhance the performance of MSMEs in the chips' productions in Malang Raya, actions such as expanding collaboration networks, adopting digital technologies, developing human resource competencies, and focusing on business resilience should be taken. Additionally, it is recommended that the government and other stakeholders implement policies

to support these efforts, such as providing incentives for digital transformation, offering training to enhance skills, and promoting industry collaboration. This collective approach aims to foster sustainable growth and competitiveness for MSMEs in both local and global markets.

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