

Production, innovation, and creativity management model of MSMEs F&B service in Makassar City, Indonesia



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ABSTRACT

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This study aims to develop and test a production management model that mediates innovation and creativity to improve the performance of MSMEs in Makassar City. This study uses a quantitative approach with data collection techniques through a structured survey of 193 food and beverage (F&B) service MSME actors. It was analyzed using SmartPLS-based *Structural Equation Modeling* (SEM) to identify the relationship between production management variables, innovation, creativity, and business performance. The research findings of the study create a strategic model that includes three main components: (1) Increasing operational efficiency through standardization of production processes and application of technology. (2) Development of product and service innovations based on market needs. (3) Strengthening creativity through training, cross-sector collaboration, and human resource empowerment. This model is expected to be a strategic reference for F&B MSMEs to improve operational efficiency, innovation, and competitiveness in facing the challenges of the ever-evolving market. Contributing significantly to the MSME management literature, especially in the context of integrating production management, innovation, and creativity in the F&B service sector. The Makassar City government needs to provide access to innovation and creative assistance to encourage an integrated business ecosystem.

Contribution/ Originality: This research can contribute to a management model that contextually integrates aspects of production, innovation, and creativity in the F&B MSME sector, especially in urban areas such as Makassar.

1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) in the food and beverage (F&B) service sector in Makassar City play a very important role in boosting the local economy and empowering the community. As the main pillar of job creation and regional economic growth, MSMEs in the F&B sector contribute to preserving local culinary diversity and introducing local products to a wider market (Nam, Kim, & Carnie, 2018). The sector faces major challenges in improving operational efficiency, responding to the dynamics of consumer trends, and adapting to changing markets that are increasingly competitive and digitalized. Based on data from the Ministry of Cooperatives and SMEs in 2023, around 60% of MSMEs in the F&B sector in Indonesia are experiencing difficulties in maintaining business

sustainability (Hermawati et al., 2024). Most of these challenges are due to the low level of innovation and limited managerial capacity in managing the business efficiently.

Data from the Makassar City Cooperatives and MSMEs Office in 2023 also shows that there are more than 50,000 MSMEs operating (Daga, Karim, Nawir, Lutfi, & Jumady, 2024). The F&B sector accounts for about 30% of the total MSMEs. MSMEs that adopt technology-based innovations have a greater opportunity to survive and thrive in an increasingly competitive global market (Hasniati, Indriasari, Sirajuddin, & Karim, 2023). This study emphasizes the importance of increasing operational efficiency through the use of technology and product innovation as strategies to improve the quality and competitiveness of micro, small, and medium enterprises. Creativity in product and service development has been shown to have a significant impact on customer satisfaction and consumer loyalty, which ultimately contributes to business sustainability, especially in the culinary sector. Service innovations such as developing unique menus and creating different customer experiences are key factors in winning market competition and building long-term relationships with consumers (Setiawan, Effendi, Indiastuti, & Fahmi, 2022). It has been proven to increase consumer perception of brand value and improve MSME marketing performance.

Good managerial skills, coupled with the right innovation strategy, can be a key element in the success of MSMEs (Hutahayan, 2019). Integrating creativity and innovation into their operational strategies has the potential to provide a stronger competitive advantage and enable them to survive amidst increasingly complex market challenges (Sari, Alfarizi, & Ab Talib, 2024). Innovation in the service sector, including personalized menus and customized customer experiences, is a key factor in improving the competitiveness of F&B MSMEs. Creativity and innovation not only play a role in product development but also in creating engaging experiences for customers (Lukito-Budi, Manik, & Indarti, 2023).

Cross-sector collaboration and business networks play a crucial role in driving innovation and boosting creativity. MSMEs that are able to build strategic alliances with various other sectors, including technology and distribution (Chen & Huan, 2022), have more opportunities to develop innovative products and services as well as expand their markets (Wicaksono, Hossain, & Illés, 2021). Although various studies have addressed aspects of production management, innovation, and creativity separately, there is still an urgent need to develop a comprehensive model that integrates these three elements holistically, especially for MSMEs in the F&B sector in Makassar City. A model that combines efficient production management, continuous innovation, and strategic creativity provides clearer guidance for business actors in improving their operational performance and the competitiveness of MSMEs (Saleh, Zaid, & Omar, 2024).

This study aims to develop an integrated management model that includes aspects of production, innovation, and creativity to improve the performance and competitiveness of MSMEs in the food and beverage (F&B) sector in Makassar City. This model is expected to serve as a strategic framework that can be applied by MSMEs to manage the production process efficiently, encourage product and service innovation, and optimize creativity to create sustainable added value (Telaumbanua et al., 2023). The resulting model, named *the Production Management, Innovation, and Creativity (PMIC) Model*, is expected to be a strategic guide for MSMEs to improve operational efficiency, develop innovative products and services, and increase competitiveness in facing market challenges. It aims to optimize their potential to achieve business sustainability and improve overall performance.

In addition, this model is also expected to be a reference for the government and other stakeholders in designing more effective policies and programs to support MSMEs. Providing production management training, access to the latest technology, and funding for innovation can help MSMEs overcome resource limitations and increase their capacity. Collaboration between MSMEs, educational institutions, and the private sector can also be facilitated to create an ecosystem that supports innovation and creativity. The research also highlights the importance of sustainability in production management practices and product development. As consumers' awareness of environmental and social issues increases, F&B MSMEs need to adopt environmentally friendly and socially

responsible business practices. The use of sustainable local raw materials, waste reduction, and the implementation of the zero-waste concept can be attractive added values for consumers.

MSMEs that integrate sustainability principles into their operations tend to be more competitive and are in demand by markets that are increasingly concerned about environmental issues. Thus, this research not only contributes to the development of management and entrepreneurship theories but also provides practical implications that can be applied directly by F&B MSME actors in Makassar City. Through a holistic and integrated approach, F&B MSMEs can achieve sustainable growth and contribute more to the local and national economy (Chahyono, Azis, & Nuryadin, 2023). The PMIC model is expected to be an innovative solution that helps MSMEs face today's challenges and take advantage of future opportunities more effectively.

The theoretical contribution of this research can provide a local understanding of production and innovation management theories by considering work culture, social capital, and market dynamics in Makassar City. Connecting operational management approaches with creativity and innovation as a strategy for MSME sustainability (Ansar, Tsusaka, & Syamsu, 2025). This research provides a basis for local governments in formulating MSME support policies, especially in the F&B sector—for example, in terms of training, innovation assistance, or production digitalization. If the innovation developed is based on local cuisine, this research also contributes to the preservation and development of Makassar City's typical food culture. It cultivates an entrepreneurial spirit and creativity, especially among the younger generation and women who are widely involved in the F&B sector.

2. CONCEPTUAL FRAMEWORK AND HYPOTHESES

The production model in this study is a model of integration of production management, innovation, and creativity. This model combines the three important elements of production management, innovation, and creativity to improve the performance of F&B MSMEs. Production management indicators (operational efficiency, production time, production costs, and product quality), innovation (number of new products, changes in production processes, and consumer responses), creativity (number of new ideas, implementation of ideas, and product differentiation), and the performance of F&B MSMEs (profitability, business growth, and customer satisfaction), as shown in Figure 1.

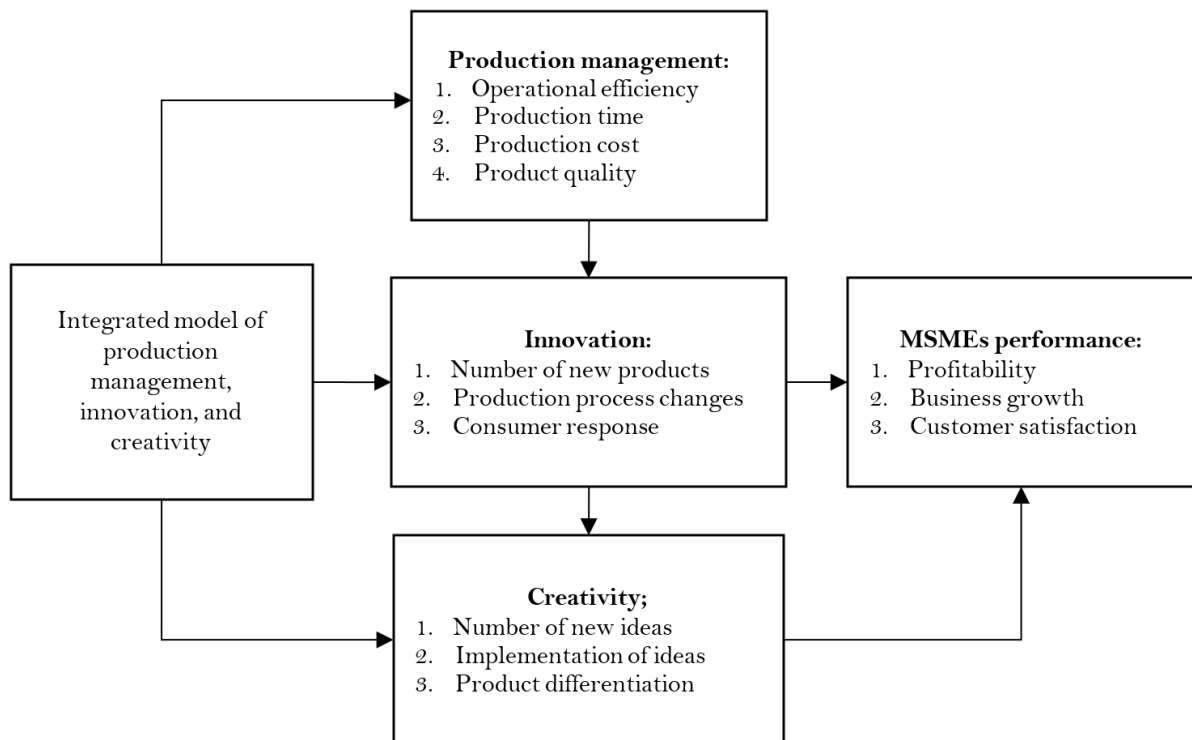


Figure 1. The conceptual framework of the PMICP model.

Figure 1 is a conceptual framework for research on the production management model, innovation, and creativity of MSME F&B services, which explains: (1) Production management serves as a basis to support operational efficiency and product quality, contributing directly to innovation and creativity; (2) Innovation includes the development of new products and responses to market needs that have a direct impact on improving the performance of MSMEs; (3) Creativity encourages unique ideas and product differentiation to create added value and help MSMEs achieve competitive advantages that contribute to performance; (4) MSME performance is the final result of production management, innovation, and creativity, with the main indicators including profitability, business growth, and customer satisfaction.

2.1. Production Management

Production management focuses on managing resources and production processes to achieve efficiency and effectiveness (Jabeen, Belas, Santoro, & Alam, 2023). Indicators used in this model include operational efficiency to optimize the use of resources to reduce waste, and production time to minimize the time needed to produce products (Paiola, Agostini, Grandinetti, & Nosella, 2022). Production costs can be controlled to improve profitability, and product quality must ensure that products meet the quality standards expected by consumers. Effective production management can improve operational efficiency and reduce production costs, which ultimately has a positive impact on business performance (Chahyono, Karim, Ruslan, & Idris, 2024). Product quality and production efficiency are key factors in maintaining business competitiveness, especially in the MSME sector (Mardjuni, Thanwain, Abubakar, Menne, & Karim, 2022).

Production management is the process of planning, organizing, directing, and controlling production activities to create efficient and effective goods or services (Dahinine, Chouayb, & Bensahel, 2023). Production management indicators include: (1) Operational efficiency, which involves optimizing the use of resources to reduce waste. (2) Production time, aimed at minimizing the time needed to produce products. (3) Production costs, focusing on controlling production costs to increase profitability. (4) Product quality, ensuring that the product meets the quality standards expected by consumers.

2.2. Innovation and Creativity

Innovation is a key element in developing new products and processes to meet the changing needs of the market. Innovation indicators in this model include the number of new products, measuring how many new products are developed in a given period (Karim, Ahmad, & Syamsuddin, 2024). Changes in production processes adopt new technologies or methods to improve efficiency, consumer response, and measure the extent to which innovation is accepted by the market. Product and process innovation are key drivers of business growth, especially in the competitive F&B sector (Karim, Asrianto, Ruslan, & Said, 2023). Innovation is the process of developing new ideas, products, or processes that provide added value to a business. Innovation indicators include: (1) Number of new products; (2) Changes in the production process; and (3) Consumer response.

Creativity is related to the ability to generate new ideas and implement them in the form of unique products or services (Candra, Wiratama, Rahmadi, & Cahyadi, 2022). Indicators of creativity in this model include: the number of new ideas; measuring how many creative ideas are generated by the team, the implementation of ideas; measuring the extent to which these ideas are embodied in a product or process, and product differentiation; creating a product that is unique and different from competitors. Team creativity and the implementation of creative ideas are important factors in creating a competitive advantage (Novani & Rahmawati, 2024). Creativity is the ability to generate new ideas and implement them in the form of unique products, processes, or services (Hanifah, Abdul Halim, Ahmad, & Vafaei-Zadeh, 2019). Creativity indicators include: (1) The number of new ideas in measuring how many creative ideas a team produces. (2) Idea implementation, which is the extent to which these ideas are realized in the product or process. (3) Product differentiation in order to create a product that is unique and different from competitors.

2.3. Performance of F&B MSMEs

The performance of F&B MSMEs can be defined as the level of success or achievement of businesses in reaching their business goals (Zahara, Ikhsan, Santi, & Farid, 2023). The performance of F&B MSMEs is measured through three key indicators: (1) Profitability, which aims to increase revenue and reduce costs to achieve higher profits. (2) Business growth, which refers to growth in terms of sales, market share, or expansion. (3) Customer satisfaction, which indicates the level of customer satisfaction with the product or service. The integration of production management, innovation, and creativity significantly enhances the performance of MSMEs, including profitability and business growth (Wahyuni, Kalsum, Asmara, & Karim, 2022). Customer satisfaction is a key indicator of business success, especially in the F&B sector, which relies heavily on customer loyalty. Based on the conceptual framework, the following research hypotheses will be proposed:

2.3.1. The Relationship between Production Management and Innovation

Effective production management creates an environment that supports innovation by providing adequate resources (Bahtiar & Karim, 2021). Efficient production management optimizes the use of resources (materials, labor, and technology), which can be allocated for innovation activities and creates operational flexibility. A structured and flexible production process allows MSMEs to experiment with new ideas without disrupting key operations and reduces the risk of innovation (Nambisan & Baron, 2021). Good production management reduces the risk of failure in innovation by ensuring that the production process can adapt to the changes brought about by innovation. Production management has a significant influence on innovation through (Ramdan et al., 2022). Optimizing the use of resources reduces waste, minimizes the time required to produce products, and controls production costs to increase profitability. In the context of F&B MSMEs in Makassar City, effective production management can be the key to encouraging sustainable innovation, which ultimately improves competitiveness and business performance (Munizu, Alam, Pono, Riyadi, & Alam, 2024). Thus, the first hypothesis that the author puts forward is.

H₁: Production management has a significant effect on innovation.

2.3.2. Production Management and Creativity

Effective production management creates an environment that supports creativity by providing adequate resources. Efficient production management optimizes the use of resources, allowing teams more time and funds to develop creative ideas (Nasir, Zakaria, Do, & Velasquez, 2024). The structured yet flexible production process allows teams to experiment with new ideas without disrupting key operations and reducing work pressure. Good production management alleviates work pressure by ensuring that the production process runs smoothly, enabling employees to think more creatively and encouraging collaboration (Rumanti, Sunaryo, Wiratmadja, & Irianto, 2021). Effective production management fosters collaboration between departments, facilitating the exchange of ideas and knowledge (Akinwale & Alshraim, 2024).

Effective production management creates an environment that supports creativity by providing resources, reducing work pressure, encouraging collaboration, and offering incentives. In the context of F&B MSMEs in Makassar City, effective production management can be the key to fostering sustainable creativity. Improving competitiveness and business performance in the context of F&B MSMEs in Makassar City (Priyono, Moin, & Putri, 2020). Thus, the second hypothesis proposed by the author is.

H₂: Production management has a significant effect on creativity.

2.3.3. Production Management and Performance of F&B MSMEs

Effective production management can improve the performance of F&B MSMEs through several mechanisms (Srimulyani & Hermanto, 2021). It optimizes the use of resources to reduce costs and increase profitability. Ensuring that products meet high-quality standards increases customer satisfaction. Minimizing production time enhances

production capacity and meets market demand, while controlling production costs increases profit margins (Dhewanto, Herliana, Yunita, Nur Rizqi, & Williamson, 2021).

Effective production management improves operational efficiency, product quality, cost reduction, and customer satisfaction (Mohamad, Mohd Rizal, Kamarudin, & Sahimi, 2022). In the context of F&B MSMEs in Makassar City, effective production management can be the key to improving business performance and competitiveness. The adoption of technology, sustainable practices, and effective supply chain management can strengthen these relationships (Moy, Cahyadi, & Anggraeni, 2020). Thus, the third hypothesis proposed by the author is.

H₃: Production management has a significant effect on the performance of F&B MSMEs in Makassar City.

2.3.4. Innovation and Creativity

Innovation and creativity are closely intertwined, where innovation often starts from creativity (Scuotto, Del Giudice, & Carayannis, 2017). However, innovation can also encourage creativity by providing a platform for experimentation. Innovation in the production process or product provides a platform for employees to experiment with new ideas, fostering a culture of creative thinking. An environment that supports innovation tends to encourage employees to think creatively and try new things, increasing motivation. Successful innovation can motivate employees to generate more creative ideas (Bivona & Cruz, 2021).

Innovation provides the necessary platform and resources to develop creative ideas, create a supportive environment, and increase employee motivation (Bresciani, 2017). In the context of F&B MSMEs in Makassar City, innovation can be the key to encouraging sustainable creativity, which ultimately improves competitiveness and business performance. Thus, the fourth hypothesis proposed by the author is.

H₄: Innovation has a positive and significant influence on creativity.

2.3.5. Innovation and Performance of F&B MSMEs

Innovation can improve the performance of F&B MSMEs through several mechanisms, and product quality improvement. Innovation in products enhances product quality and attractiveness (Jahari, French, & Ismail, 2022). Increasing customer satisfaction and process efficiency, innovation in the production process reduces costs and production time, increases profitability, and enhances product differentiation (Zaborek & Mazur, 2019). Innovation creates products that are unique and different from competitors, which increases business competitiveness and responsiveness to market demand (Rosyidiana & Narsa, 2024). Innovation allows MSMEs to respond quickly to changes in market demand, which fosters business growth.

Based on the study above, innovation has a positive and significant influence on the performance of F&B MSMEs (Hossain, Akhter, & Sultana, 2022). Innovation improves product quality, process efficiency, product differentiation, and responsiveness to market demand, which ultimately increases profitability, business growth, and customer satisfaction (Hartono & Ardini, 2022). In the context of F&B MSMEs in Makassar City, innovation can be the key to improving business performance and competitiveness. Thus, the fifth hypothesis proposed by the author is.

H₅: Innovation has a positive and significant influence on the performance of F&B MSMEs in Makassar City.

2.3.6. Production Management, Innovation and Performance of F&B MSMEs

Innovation acts as a mediator between production management and the performance of F&B MSMEs. This means that effective production management can encourage innovation, which ultimately improves business performance (Shandy, Mulyana, & Harsanto, 2023). Effective production management, such as good production planning and strict quality control, creates an environment that supports innovation. The use of sophisticated inventory management systems allows MSMEs to identify new product development opportunities (Margaretha & Suryana, 2023). Innovation in products or production processes improves product quality, efficiency, and business competitiveness, which ultimately enhances the performance of MSMEs. The adoption of new technologies in the

production process reduces costs and increases production capacity, which boosts profitability. Good production management does not directly improve performance, but it does so through innovation. Innovation acts as a bridge that connects production management with business performance. Effective production planning allows MSMEs to develop innovative new products, which then increases sales and customer satisfaction (Olaore, Adejare, & Udofia, 2021).

Based on the above study, innovation mediates the relationship between production management and the performance of F&B MSMEs in Makassar City. Effective production management creates an environment that supports innovation, which ultimately improves business performance through enhanced product quality, process efficiency, and responsiveness to market demand (Karim, Ruslan, Chahyono, Yunus, & Ahmad, 2024). Therefore, F&B MSMEs in Makassar can improve their performance by optimizing production management and encouraging innovation. Thus, the sixth hypothesis proposed by the author is.

H₆: Innovation mediates the relationship between production management and the performance of F&B MSMEs in Makassar City.

2.3.7. Creativity and Performance of F&B MSMEs

Unique and innovative product development; creativity allows MSMEs to create products that are different from competitors, thus attracting consumers' attention and increasing sales (Tardivo, Thrassou, Viassone, & Serravalle, 2017). Developing variants of traditional drinks with a modern touch, such as green banana ice with contemporary toppings (Wutthiya Aekthanate Srisathan, Ketkaew, & Naruetharadhol, 2020). Creative marketing approaches, such as interactive social media campaigns or collaborations with local influencers, can increase brand awareness and customer loyalty (Rahmawati, Hudayah, & Paminto, 2023). Holding a photo contest on Instagram with a special hashtag to promote new products, along with attractive and functional packaging designs (Bhatti, Sumbal, Ahmed, & Golgeci, 2024).

Creative packaging not only attracts consumers' attention but can also improve the user experience (Rastrollo-Horrillo & Rivero Diaz, 2019). Using eco-friendly packaging with unique designs attracts environmentally conscious consumers through efficient and innovative production processes. Creativity in the production process can lead to more efficient methods, reduce costs, and improve product quality. Creativity allows MSMEs to respond quickly to changes in market trends, such as developing products that suit consumers' health or lifestyle preferences (Utaminingsih, Widowati, & Witjaksono, 2023). Creative products and services increase customer satisfaction, which in turn increases loyalty and repeat purchases.

Creativity increases business competitiveness through new product development, creative marketing strategies, attractive packaging designs, and innovative production processes. By adopting a creative approach, F&B MSMEs in Makassar can improve their business performance, including profitability, business growth, and customer satisfaction. Creativity is a key factor in achieving business success, especially in the competitive food and beverage industry (Karim, Musa, Sahabuddin, & Azis, 2021). Thus, the seventh hypothesis proposed by the author is.

H₇: Creativity has a positive and significant influence on the performance of F&B MSMEs in Makassar City.

2.3.8. Production Management, Creativity, and Performance of F&B MSMEs

Creativity acts as a mediator between production management and the performance of F&B MSMEs, encouraging creativity, which ultimately improves business performance (Cuerva, Triguero-Cano, & Córcoles, 2014). Effective production management, such as good production planning and strict quality control, creates an environment that supports creativity. The use of a sophisticated inventory management system allows MSMEs to identify new product development opportunities. Creativity in products or production processes improves product quality, efficiency, and business competitiveness, which ultimately enhances the performance of MSMEs (Long, Looijen, & Blok, 2018). The adoption of new technologies in the production process reduces costs and increases

production capacity, which boosts profitability. Good production management does not directly improve performance, but it does so through creativity. Creativity acts as a bridge that connects production management with business performance. Good production planning allows MSMEs to develop creative new products, which then increases sales and customer satisfaction (Belyaeva, Rudawska, & Lopatkova, 2020).

Based on the above study, creativity mediates the relationship between production management and the performance of F&B MSMEs in Makassar City. F&B MSMEs in Makassar City are one of the dominant sectors contributing to local economic growth. However, challenges such as limited production management and low innovation often hamper competitiveness. In this context, business actors' creativity is a key element in bridging operational efficiency and improving business performance (Suhartanti & Prasetyanto, 2022). By optimizing production management and encouraging creativity, F&B MSMEs in Makassar can enhance their competitiveness and business performance in an increasingly competitive market. Thus, the eighth hypothesis proposed by the author is.

H₈: Creativity mediates the relationship between production management and the performance of F&B MSMEs in Makassar City.

3. RESEARCH METHODOLOGY

3.1. Research Approach

This study uses a quantitative approach to analyze the production management model, innovation, and creativity in F&B (Food and Beverage) service UMKM in Makassar City. This approach was chosen because it can objectively measure and analyze the relationship between variables through numerical data, resulting in conclusions that can be generalized to a wider population. There are several main reasons for choosing a quantitative approach in this study: (1) Structured measurement of variables: A quantitative approach allows researchers to measure variables such as production management, innovation, creativity, and MSME performance in a structured and systematic manner using standardized instruments, such as Likert-based questionnaires. (2) Statistical analysis capabilities: Numerical data collected from respondents can be analyzed using inferential statistical methods, such as regression tests, path analysis, or Structural Equation Modeling (SEM), to identify patterns, relationships, and influences between variables. (3) Generalizability of research results by using a representative sample of the F&B service UMKM population in Makassar City. The results of this study are expected to be generalized and provide an empirical picture that is relevant to the conditions of a wider population. (4) Efficiency in data collection: The quantitative approach allows data collection from a large number of respondents in a relatively short time, making it more efficient and supporting the reliability of research results. Thus, the quantitative approach is considered most appropriate to achieve the objectives of this study, namely, testing the relationship and building a structural model between production management, innovation, creativity, and the performance of F&B MSMEs in Makassar City.

3.2. Type of Research

3.2.1. Explanatory Research

This research is included in the type of explanatory research, which aims to explain the causal relationship between independent variables (innovation and creativity) and dependent variables (production management and performance of MSME F&B). It identifies the extent to which innovation and creativity affect the production management and performance of MSMEs in the F&B sector. Additionally, it explains the mechanism or process behind the relationship between these variables. The analysis method uses SemPLS 4.1.0 to test the hypothesis and determine the strength of the relationship between the variables.

3.2.2. Descriptive Research

This research is also included in the descriptive type, which aims to provide a detailed overview of production management practices, innovation levels, and creativity applied by F&B MSMEs in Makassar City. It describes the characteristics of F&B MSMEs in Makassar City, such as business profile, scale of operation, and types of products offered. It describes the production management practices applied, including production processes, inventory management, and quality control. It measures the level of innovation and creativity possessed by MSMEs, including the frequency of new product development, technology adoption, and adaptability to market changes (Subagyo, Saraswati, & Trilaksono, 2019). Descriptive statistics such as mean, median, mode, and percentage are used to present data. The results are presented in the form of tables, graphs, or diagrams for easy interpretation.

3.2.3. Integration of Explanatory and Descriptive Research

The combination of explanatory research and descriptive research in this study allows researchers not only to explain the relationship between variables but also to provide a comprehensive overview of the actual condition of F&B MSMEs in Makassar City. This research is not only theoretical (examining relationships) but also practical (describing the reality on the ground) (Ahmad et al., 2024; Sugiyono, 2010).

3.3. Population and Sample

3.3.1. Population

The population in this study consists of all MSMEs in the F&B (Food and Beverage) service sector operating in Makassar City. Based on data from the Makassar City Cooperatives and MSMEs Office, the number of registered F&B MSMEs until 2023 is 372. This population includes micro, small, and medium enterprises engaged in food and beverages, both home-scale and those that already have a permanent place of business (Ahmad, Malik, & Handayani, 2023; Subhaktiyasa, 2024).

3.3.2. Sample

The sampling technique in this study used purposive sampling, which is a method of selecting samples based on certain considerations or criteria that have been set by the researcher. This approach was chosen to ensure that the samples used are truly representative and relevant to the research objectives, especially in the context of MSMEs in the F&B (Food and Beverage) sector in Makassar City. To determine the minimum number of samples, the Slovin formula is used with an error rate of 5%. The Slovin formula is as follows:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

Where: n = Number of samples, N = Number of population (372 MSMEs), e = Error rate (5% or 0.05).
Account:

$$n = \frac{372}{1 + 372(0.05)^2}$$

$$n = \frac{372}{1 + 0.93}$$

$$n = \frac{372}{1.93}$$

$$n = 192.7461$$

$$n = 193$$

Based on these calculations, the minimum number of samples needed is 193 F&B MSMEs. The sampling procedures are: (1) Collecting data on F&B MSMEs registered with the Makassar City Cooperatives and MSMEs Office. (2) Selecting MSMEs that meet the criteria (operating for at least 2 years, having a business license, and

willing to participate). (3) Using the Slovin formula to determine the minimum number of samples (193 MSME actors). (4) Sampling by randomly selecting samples from the list of MSMEs that meet the criteria.

3.4. Data Analysis

3.4.1. Quantitative Analysis

Descriptive statistics were used to describe the characteristics of respondents and research variables. This analysis includes: (1) Mean (average) to measure the average value of the data. (2) Median to identify the middle value in the data distribution. (3) Mode to determine the value that appears most often. (4) Standard deviation to measure the dispersion of data from the average value. (5) Percentage to describe the proportion of respondents in a certain category.

Mean Formula:

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n} \quad (1)$$

Where; \bar{X} = average, X_i = value of the i th data, n = amount of data.

Structural Equation Modeling (SEM) is used to comprehensively test the relationships between variables, including mediation effects. In this study, SEM was run using SmartPLS 4.1.0 software to analyze the relationship between: (1) Production management (X); (2) Innovation (M1) as Mediator 1; (3) Creativity (M2) as Mediator 2; and (4) MSME performance (Y).

3.4.2. Mediation Model

The mediation model is an approach in statistical analysis used to understand how or why an independent variable (X) affects a dependent variable (Y) through an intermediate variable or mediator (M). This model helps explain the underlying mechanism of the relationship between the two main variables.

$$Y = \beta_0 + \beta_1 X + \beta_2 M_1 + \beta_3 M_2 + \varepsilon \quad (2)$$

Where; Y = MSMEs performance, X = Production management, M_1 = Innovation, M_2 = Creativity, β_0 = Intercept, $\beta_1, \beta_2, \beta_3$ = Regression coefficient, ε = Error term.

3.4.3. SEM Analysis Steps

- 1) Convergent Validity: Measured using Average Variance Extracted (AVE) with a minimum value of 0.5.

$$AVE = \frac{\sum \lambda_i^2}{n} \quad (3)$$

Where; λ_i = loading factor of the i th indicator, n = number of indicators.

Reliability: Measured using Composite Reliability (CR) with a minimum value of 0.7.

$$CR = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum (1 - \lambda_i^2)} \quad (4)$$

Discriminant Validity: Tested using the Fornell-Larcker Criterion, where the square root of the AVE for each construct must be greater than the correlation between the other constructs in the model.

- 2) Testing of the mediation effect was carried out using the variance accounted for (VAF) method, which is calculated using the formula.

$$VAF = \frac{\text{Indirect effects}}{\text{Indirect effects} + \text{direct effects}} \quad (5)$$

Where; If $VAF < 20\%$: No mediation, If $20\% \leq VAF \leq 80\%$: Partial mediation, If $VAF > 80\%$: Full mediation.

3.4.4. Qualitative Analysis

Qualitative data from in-depth interviews were analyzed using content analysis and thematic analysis. Content analysis was used to identify patterns and themes from interview transcripts. Thematic analysis was employed to group data into main themes that are relevant to the research objectives. By using the above data analysis methods, this study is expected to provide a deep and accurate understanding of the relationship between production management (X), innovation (M1), creativity (M2), and MSMEs performance (Y).

3.5. Validity and Reliability

Validity is the extent to which an instrument can measure what it is intended to measure. In this study, validity was tested using the construct validity approach, namely validity that measures the extent to which indicators in the questionnaire truly represent the intended theoretical construct. In Structural Equation Modeling (SEM) analysis, construct validity is evaluated through two main types of validity, namely: (1) Convergent validity, which shows the extent to which indicators that measure the same construct have a high correlation. Convergent validity is declared adequate if the Average Variance Extracted (AVE) value ≥ 0.5 . The AVE value shows the average variance that is successfully explained by the construct compared to the variance due to measurement error. (2) Discriminant validity, which shows the extent to which the constructs in the model are truly different from each other. Discriminant validity is tested to ensure that each construct has a unique identity and does not overlap conceptually.

Reliability is a measure of the internal consistency of a research instrument, namely the extent to which the instrument produces consistent results in repeated measurements. In this study, the reliability test was conducted using Cronbach's Alpha, a statistical measure that assesses internal reliability between items in one construct. The Cronbach's Alpha value that is considered acceptable is ≥ 0.7 , which indicates that the indicators in the construct have good internal consistency and can be relied upon in the measurement process. Thus, the instrument used in this study will be declared valid and reliable if it meets the criteria of AVE ≥ 0.5 for validity and Cronbach's Alpha ≥ 0.7 for reliability.

4. RESULTS

4.1. Respondent Description

The distribution of respondents by gender showed a fairly even balance, with men slightly more dominant (52.9%) than women (47.1%). This indicates that the F&B Service sector in Makassar City is not dominated by one particular gender but involves the active participation of both genders. The participation rate of women, which is almost equal to that of men (47.1%), reflects the existence of gender equality in the MSMEs sector in Makassar City, as shown in Table 1.

Table 1. Respondent characteristics by gender.

Gender	Percentage
Male	52.9%
Female	47.1%

The balanced gender distribution among the study respondents (52.9% male and 47.1% female) reflects the active participation of both genders in the F&B Service sector in Makassar City. These findings show that the innovation, creativity, and performance of MSMEs do not depend on a specific gender, but rather on factors such as production management models, diversity of perspectives, and collaboration. This can be seen in the following Table 2.

Table 2. Respondent characteristics by age.

Age	Percentage
17 – 25 years	19.4%
26 – 35 years	34.7%
36 – 45 years	30.8%
> 45 years	15.1%

The dominance of the productive age (26-45 years), where the age groups of 26-35 years (34.7%) and 36-45 years (30.8%) jointly dominate with a total percentage of 65.5%. This productive age generally has maturity in decision-making, work experience, and a wide business network. They tend to be better able to manage risk and optimize resources to improve business performance. The younger generation of respondents aged 17-25 years accounted for 19.4%, which reflects the active participation of the younger generation (Generation Z and young Millennials) in the F&B sector. They are also more open to global trends and changing consumer preferences.

In the local context, the findings of this study indicate that Makassar City is dominated by the productive age group (26-45 years) among the respondents, reflecting the economic dynamics of Makassar City, which is driven by the younger generation and those in the productive age range. This aligns with the trend of urbanization and the growth of the business sector in Indonesia's major cities. The participation of the young generation (17-25 years old) also demonstrates the interest and support from the government and educational institutions in encouraging entrepreneurship among young people. The >45-year-old age group may represent businesses that have been in the F&B sector for a long time and have established strong networks and reputations in the local market. This is further reinforced by the marital status of the respondents, as shown in Table 3.

Table 3. Respondent's marital status.

Status	Percentage
Married	71.1%
Unmarried	28.9%

Most of the respondents in this study were married individuals (71.1%). This shows that the F&B service sector in Makassar City is dominated by business actors who already have family responsibilities. Marital status is often associated with a level of financial stability and motivation to build a sustainable business. Married individuals tend to be more motivated to develop businesses to meet family needs. Additionally, married respondents are likely to have access to additional resources, such as financial support or networking from a spouse or extended family.

Implications for the research variables of the production management model indicate that married respondents (71.1%) tend to adopt a more stable and sustainability-oriented production management model because they have the responsibility to meet the needs of their families. Meanwhile, unmarried respondents (28.9%) may be more likely to adopt a flexible and experimental management model, reflecting their characteristics of being more open to risk. Most of the respondents have a high school/equivalent education background (50.2%). This shows that the F&B Service sector in Makassar City is dominated by business actors with a secondary education level. This is illustrated in Table 4.

Table 4. Respondents' education level.

Education level	Percentage
Primary school	1.6%
Junior high school	5.4%
Senior high school	50.2%
Diploma	6.6%
Bachelor	34.5%
Master	1.4%
Doctor	0.4%

Despite not having a higher education, this group tends to possess enough practical skills and experience to manage a business. Secondary education is often sufficient to start a small business, especially in sectors that require basic technical and management skills. However, limited access to more structured management knowledge may pose a challenge for this group in adopting new innovations and technologies. Respondents with a higher education background (Diploma: 6.6%, S1: 34.5%, S2: 1.4%, S2 and above: 0.4%) contributed a total of 42.9%. This group tends to have access to more structured management knowledge, analytical abilities, and a better understanding of innovation and technology. Respondents with low educational backgrounds (junior high school and below: 1.6%, junior high school/equivalent: 5.4%) contributed a total of 7%. Despite the small percentage, the group still contributes to the F&B sector, especially in micro-enterprises that require basic skills. Meanwhile, the other part is to support the sustainability of MSME businesses, so it can be seen how long the business has been running. This can be seen in the following Table 5.

Table 5. Duration of business.

Duration of business	Percentage
< 1 year	4.4%
< 2 years	5.4%
> 3 years	90.3%

Most respondents (90.3%) have been running their businesses for more than 3 years. This shows that the F&B Service sector in Makassar City is dominated by established businesses that have sufficient operational experience. Businesses that have been in operation for more than 3 years tend to have financial stability, a strong market network, and a deep understanding of local market dynamics. Businesses that last more than 3 years have a higher level of sustainability due to their ability to manage risks and adapt to market changes. Additionally, established businesses tend to have higher customer loyalty and better access to resources, such as capital and supplier networks.

Businesses with monthly revenues exceeding 10 million rupiah accounted for 25% of the total respondents. This group represents a relatively successful medium-sized business in the F&B service sector in Makassar City. High-income businesses tend to have access to better technology, a wide market network, and the ability to invest in innovation, as shown in Table 6.

Table 6. Revenue per month.

Total revenue	Percentage
< 5 million	40%
5 – 10 million	35%
> 10 million	25%

Most respondents (40%) have a monthly income of less than 5 million rupiah. This group is dominated by micro and small businesses that usually have a limited operational scale. Businesses with low income tend to face challenges such as limited capital, limited access to markets, and fierce competition. Low-income businesses often find it difficult to scale up their operations due to limited access to financial resources (Afum, Agyabeng-Mensah, Baah, Asamoah, & Yaw Kusi, 2023). However, these businesses have the potential to grow if given the right support, such as financial management training and access to a wider market. Respondents with a monthly income of 5-10 million rupiah accounted for 35% of the total respondents. This group includes small and medium-sized enterprises that have achieved a certain level of financial stability. Businesses with middle incomes tend to have the capacity to invest in product quality improvement, marketing, and basic technology.

4.2. Measurement Model Analysis

In the Structural Equation Modeling approach based on Partial Least Squares (SEM-PLS) version 4.1.0, an idea or research framework cannot be directly tested in the form of a predictive model that describes the causal or relational relationship between latent variables unless it has gone through a refinement stage in the measurement model. Therefore, before entering the structural analysis (inner model), it is necessary to evaluate the measurement model (outer model). The evaluation of the outer model aims to ensure that the indicators used in the study have sufficient validity and reliability to represent the construct being measured. In other words, this stage is used to assess the extent to which the indicators accurately and consistently reflect the latent variables in question.

Construct validity indicates the extent to which the results obtained from the use of a measurement are in line with the theories used to define a construct. To assess the extent to which the indicators used in this study are in accordance with the construct to be measured, a validity test is carried out. The validity test aims to measure how the research instrument is able to measure what it is supposed to measure. In this study, the validity test can be carried out with two approaches, namely convergent validity and discriminant validity.

4.2.1. Convergent Validity Test

Convergent validity aims to measure the extent to which the indicators used in the study can represent the constructs being measured consistently and accurately. In the context of Partial Least Squares Structural Equation Modeling (PLS-SEM), convergent validity tests are carried out using two main criteria, namely outer loading and Average Variance Extracted (AVE). Outer loading shows the strength of the contribution of each indicator to the latent construct. The ideal outer loading value is above 0.70, which indicates that the indicator is significantly correlated with the construct.

A loading value of 0.60–0.70 is still acceptable in exploratory research. A loading value of 0.50–0.60 can be considered for initial scale development, although it is less ideal for confirmatory studies. AVE is used to measure the proportion of indicator variance that is successfully explained by the construct. The recommended AVE value is greater than 0.50. This means that more than 50% of the indicator variance is successfully captured by the construct. Based on the output results from SmartPLS 4.1.0, it can be seen in Figure 2. All constructs show outer loading values above the minimum threshold and AVE values greater than 0.50, so it can be concluded that all constructs in the model meet the convergent validity criteria.

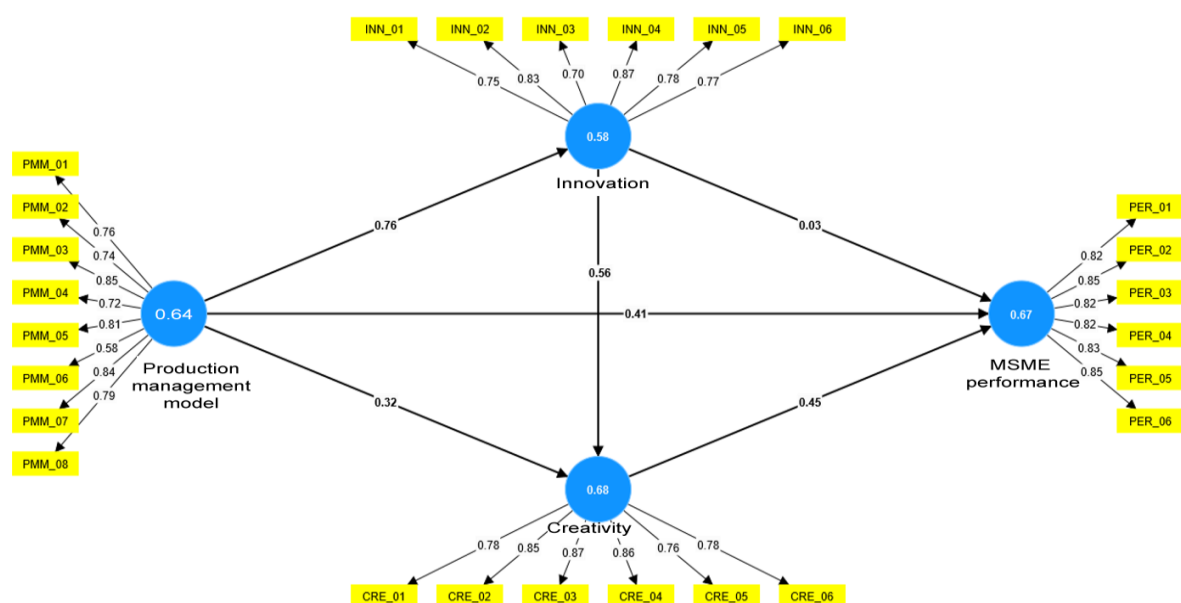


Figure 2. Algorithms in SmartPLS 4.1.0.

Figure 2 is the algorithm result of SmartPLS 4.1.0, which will first be described in relation to the *outer loading results*, in Table 7.

Table 7. Outer loading values in SmartPLS 4.1.0 algorithm.

Variables	Indicator	Outer loadings	Cutoff loading factor	Conclusion
Creativity	CRE_01 <- Creativity	0.78	0.70	Valid
	CRE_02 <- Creativity	0.85	0.70	Valid
	CRE_03 <- Creativity	0.87	0.70	Valid
	CRE_04 <- Creativity	0.86	0.70	Valid
	CRE_05 <- Creativity	0.76	0.70	Valid
	CRE_06 <- Creativity	0.78	0.70	Valid
Innovation	INN_01 <- Innovation	0.75	0.70	Valid
	INN_02 <- Innovation	0.83	0.70	Valid
	INN_03 <- Innovation	0.70	0.70	Valid
	INN_04 <- Innovation	0.87	0.70	Valid
	INN_05 <- Innovation	0.78	0.70	Valid
	INN_06 <- Innovation	0.77	0.70	Valid
Performance MSMEs	PER_01 <- MSMEs performance	0.82	0.70	Valid
	PER_02 <- MSMEs performance	0.85	0.70	Valid
	PER_03 <- MSMEs performance	0.82	0.70	Valid
	PER_04 <- MSMEs performance	0.82	0.70	Valid
	PER_05 <- MSMEs performance	0.83	0.70	Valid
	PER_06 <- MSMEs performance	0.85	0.70	Valid
Production management model	PMM_01 <- Production management model	0.76	0.70	Valid
	PMM_02 <- Production management model	0.74	0.70	Valid
	PMM_03 <- Production management model	0.85	0.70	Valid
	PMM_04 <- Production management model	0.72	0.70	Valid
	PMM_05 <- Production management model	0.81	0.70	Valid
	PMM_06 <- Production management model	0.58	0.70	Valid
	PMM_07 <- Production management model	0.84	0.70	Valid
	PMM_08 <- Production management model	0.79	0.70	Valid

Table 2 presents the outer loading value of each construct indicator based on the results of data processing using SmartPLS version 4.1.0. This outer loading shows the contribution of each indicator in measuring the latent construct and serves as the basis for assessing convergent validity. The creativity construct is measured using six indicators. The loading factor value for each indicator ranges from 0.76 to 0.87, all of which exceed the minimum cut-off limit of 0.70. This indicates that all indicators in the creativity construct have met the convergent validity requirements very well. The innovation construct also consists of six indicators. The outer loading results show values ranging from 0.75 to 0.87, and all are above the threshold of 0.70. It can be concluded that these indicators have met convergent validity and accurately reflect the innovation construct. The MSME performance construct is measured through six indicators. All indicators have loading factor values between 0.82 and 0.85, which are consistently above 0.70.

This indicates that the performance construct has very good convergent validity. The production management construct consists of eight indicators; the outer loading results show values ranging from 0.58 to 0.85. Although most indicators have values above 0.70, one indicator (the sixth indicator) has a loading value of 0.58. However, based on the PLS methodology literature, an outer loading value between 0.50 and 0.60 is still acceptable, especially if the construct as a whole shows a good reliability value. Based on the results of the outer loading test, all indicators of the four research constructs of creativity, innovation, MSMEs performance, and production management have loading factor values that meet the convergent validity criteria, which are above 0.70, or are still acceptable if they are in the range of 0.50-0.60. Therefore, all indicators are declared valid and suitable for use in the hypothesis testing process at the next stage.

4.2.2. Validity of Discrimination

Discriminatory validity involves the concept that two different constructs should not have a high correlation. The validity of discrimination can be confirmed when two different instruments, which measure two different constructs, do not show a significant correlation in producing scores that should not be correlated. The validity test of discrimination is usually carried out by looking at *cross-loading* measurements, where the results of *the algorithm* in SmartPLS 4.1.0 are shown in Table 8.

Table 8. Cross loading values in SmartPLS 4.1.0 algorithm.

Indicators	Creativity	Innovation	MSMEs performance	Production management model
CRE_01	0.78	0.64	0.53	0.52
CRE_02	0.85	0.73	0.59	0.61
CRE_03	0.87	0.73	0.66	0.63
CRE_04	0.86	0.67	0.63	0.63
CRE_05	0.76	0.56	0.71	0.64
CRE_06	0.78	0.59	0.66	0.60
INN_01	0.54	0.75	0.43	0.46
INN_02	0.63	0.83	0.57	0.56
INN_03	0.56	0.70	0.44	0.43
INN_04	0.74	0.87	0.58	0.61
INN_05	0.63	0.78	0.65	0.76
INN_06	0.67	0.77	0.58	0.72
PER_01	0.63	0.58	0.82	0.63
PER_02	0.67	0.62	0.85	0.64
PER_03	0.61	0.57	0.82	0.57
PER_04	0.66	0.61	0.82	0.64
PER_05	0.64	0.55	0.83	0.67
PER_06	0.62	0.54	0.85	0.63
PMM_01	0.53	0.59	0.54	0.76
PMM_02	0.56	0.57	0.62	0.74
PMM_03	0.60	0.63	0.60	0.85
PMM_04	0.42	0.52	0.48	0.72
PMM_05	0.65	0.67	0.61	0.81
PMM_06	0.46	0.44	0.38	0.58
PMM_07	0.62	0.59	0.66	0.84
PMM_08	0.68	0.63	0.69	0.79

Table 3 of the cross-loading value in the algorithm in SmartPLS 4.1.0 shows that the *loading* value of each indicator item against its construct is greater than *the loading value*. Thus, it can be concluded that all constructs already have *discriminant validity*, where the indicators in the construct indicator block are better than the indicators in other blocks.

4.2.3. Reliability Test

Reliability refers to the consistency, accuracy, and precision of a measuring instrument in producing stable and consistent results. In the context of this study, reliability is used to assess the extent to which a measuring instrument (indicator) can produce consistent measurements of the same construct under different conditions or at different times. Cronbach's Alpha is the most common method used to measure the reliability of a construct. This method measures internal consistency between indicators used to measure a construct. A good Cronbach's Alpha value is ≥ 0.70 . Values below 0.70 are still acceptable in exploratory research, but values ≥ 0.70 are more recommended for confirmatory research because they indicate stronger reliability. The results of the Cronbach's Alpha test processed with the SmartPLS 4.1.0 application can be shown in Table 9.

Table 9. Cronbach's alpha and composite reliability results.

Variable	Cronbach's alpha	Composite reliability	Information
Creativity	0.90	0.90	Reliable
Innovation	0.88	0.89	Reliable
MSMEs performance	0.91	0.91	Reliable
Production management model	0.90	0.91	Reliable

Table 9 presents the Composite Reliability (CR) values of each research construct, namely Creativity, Innovation, MSME Performance, and Production Management. Based on the results of processing using SmartPLS 4.1.0, the Composite Reliability values for all constructs are in the range of 0.89 to 0.91. This value is higher than the minimum limit of 0.70, which is the reference value (rule of thumb) in reliability testing. This value indicates that each construct has very good internal consistency, and the instrument used has a reliable ability to measure the intended construct consistently. Based on all the results of the evaluation of the measurement model (outer model), both in terms of convergent validity (outer loading and AVE values) and reliability (Composite Reliability and Cronbach's Alpha), it can be concluded that the four constructs in this study—Creativity, Innovation, MSME Performance, and Production Management—have met the criteria for good measurement. Thus, the indicators used in this study are valid and reliable and are suitable for use in the hypothesis testing stage of the structural model (inner model).

4.2.4. Research Hypothesis Testing Analysis

Hypothesis testing of the research through inner model analysis refers to the specification of the relationship between latent variables built based on substantive theory and the conceptual framework in this study. Inner model testing is carried out to determine the extent of influence between constructs in the structural model, both directly and indirectly. Testing is conducted using the bootstrapping method in the SmartPLS application version 4.1.0, with a total of 193 MSME actors and a significance level of 5% (p-value Figure 3, which shows the appearance of the bootstrapping process results in SmartPLS 4.1.0).

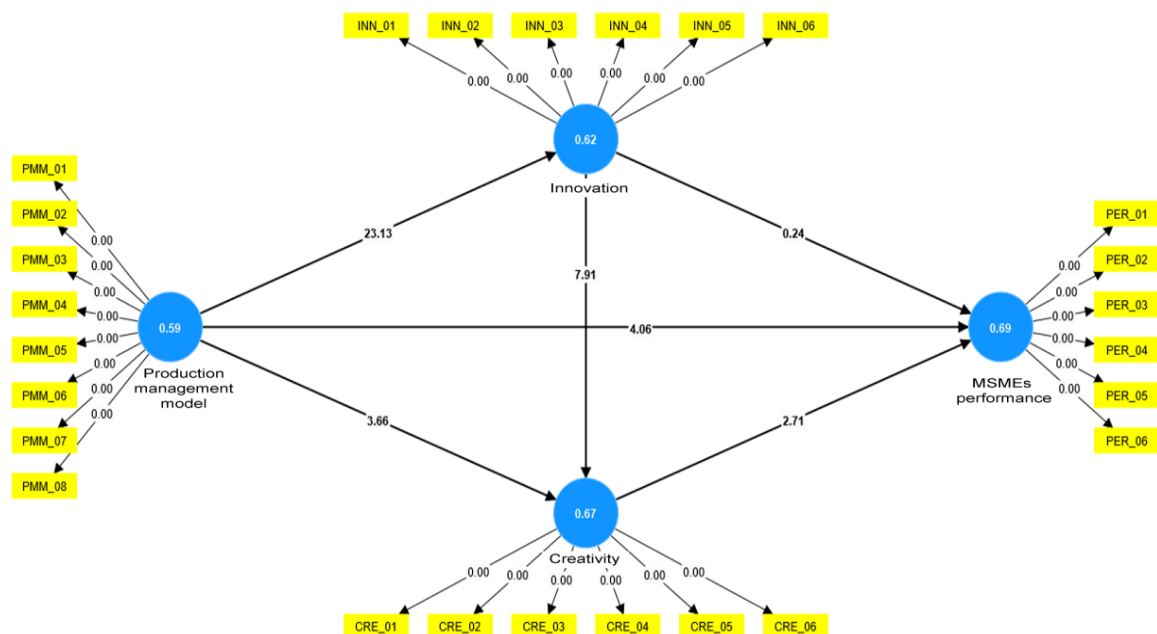
**Figure 3.** Bootstrapping in SmartPLS 4.1.0.

Figure 3 of the bootstrapping results of SmartPLS 4.1.0 will first present the R-square and adjusted R-square analysis, which can be shown in Table 10.

Table 10. The magnitude of the R-squared and adjusted R-squared values.

Variables	R-square	R-square adjusted
Creativity	0.685	0.682
Innovation	0.583	0.581
MSMEs performance	0.675	0.669

Table 10 is the *R-squared* value for creativity, which is 0.685 or 68.50%. Creativity can be explained by *the innovation* and *production management model*, while the remaining 0.315 or 31.50% can be explained by other factors that are not included in this study. Then the *R-squared* Innovation value is 0.583, which shows that 58.30% of Innovation can be explained by *the production management model*, while the rest is 0.417 or 41.70%. Finally, the *R-squared* MSMEs Performance value of 0.675 shows that 67.50% of MSMEs Performance can be explained by creativity, Innovation, and the Production Management Model, while the rest is 0.325 or 32.50%.

After evaluating the measurement model (outer model), the next stage in SEM-PLS analysis is to assess the ability of the structural model (inner model) to explain and predict endogenous variables. One of the measures used is Q^2 (predictive relevance), which aims to measure the extent to which the model built has predictive ability against observational data. The Q^2 value is calculated using the blindfolding technique in SmartPLS. In general, the Q^2 calculation formula is as follows:

$$Q^2 = 1 - (1 - R^{1^2}) - (1 - R^{2^2}) \dots \dots \dots (1 - R^{n^2})$$

From the formula mentioned above, the magnitude of the predictive *relevance* (Q^2) value can be determined through the following calculations.

$$Q^2 = 1 - (1 - 0.685) (1 - 0.583) (1 - 0.675).$$

$$Q^2 = 1 - (0.315 \times 0.417 \times 0.325).$$

$$Q^2 = 1 - 0.042.$$

$$Q^2 = 0.958.$$

Based on the calculation results using the blindfolding technique on SmartPLS 4.1.0 software, the Q-Square (Q^2) value obtained in this study was 0.958 or 95.80%. This value is far above the threshold of 0, which means that the structural model built has very good predictive relevance to the endogenous constructs in the study. Thus, it can be concluded that this research model has met the predictive relevance criteria, and overall, the model used is considered fit and feasible to proceed to the hypothesis testing stage through path analysis. Furthermore, testing of the direct relationship between latent variables in the structural model was carried out using bootstrapping in SmartPLS. The test results are shown through the path coefficient, mean, t-statistics, and p-values. This information is summarized in Table 11, which is the basis for decision-making on each hypothesis in the study.

Table 11. The magnitude of the path coefficient value, mean, std. dev T-values and P-values.

No.	Relationship between variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
H1	Production management model -> Innovation	0.76	0.77	0.03	25.33	0.00
H2	Production management model -> Creativity	0.32	0.32	0.09	3.66	0.00
H3	Production management model -> MSMEs performance	0.41	0.43	0.10	4.06	0.00
H4	Innovation -> Creativity	0.56	0.56	0.07	7.91	0.00
H5	Innovation -> MSMEs performance	0.03	0.06	0.12	0.24	0.81
H7	Creativity -> MSMEs performance	0.45	0.40	0.16	2.71	0.01

The original path coefficient of 0.76 shows that the production management model has a very strong positive influence on innovation. A very high T-value (25.33) and a p-value of 0.00 indicate that this relationship is statistically significant. This is in accordance with the opinion of Chin (1998), who states that the T-statistical value above 2.58 shows a very significant relationship. The findings of this study indicate that the production management model has a meaningful influence on increasing innovation, especially for every F&B service business actor in Makassar City. Thus, the research hypothesis (H_1) is acceptable.

The original path coefficient of 0.32 shows that the production management model has a positive influence on creativity. A statistical T-value of 3.66 and a p-value of 0.00 indicate that this relationship is statistically significant. T-values above 1.96 and p-values below 0.05 indicate a significant relationship. The findings of this study indicate that the production management model provides a meaningful and significant influence in increasing creativity, especially for every F&B service business actor in Makassar City. Thus, the research hypothesis (H_2) is acceptable.

The original path coefficient of 0.41 shows that the production management model has a positive influence on MSME performance. A statistical T-value of 4.06 and a p-value of 0.00 indicate that this relationship is statistically significant. T-values above 1.96 and p-values below 0.05 indicate a significant relationship. The findings of this study indicate that the production management model has a meaningful and significant influence in improving MSME performance in the F&B service sector in Makassar City. Thus, the research hypothesis (H_3) is acceptable.

The original path coefficient of 0.56 shows that innovation has a strong positive influence on creativity. A very high T-value (7.91) and a p-value of 0.00 indicate that this relationship is statistically significant. A T-statistic value above 2.58 indicates a very significant relationship. The findings of this study indicate that innovation has a meaningful and significant influence on increasing creativity. Thus, the research hypothesis (H_4) is acceptable.

The original path coefficient of 0.03 shows that innovation has a very small influence on MSME performance. A low T-value (0.24) and a high p-value (0.81) indicate that this relationship is not statistically significant. A p-value above 0.05 indicates the absence of a significant relationship. The findings of this study indicate that innovation has a lesser and insignificant influence on improving MSME performance in the F&B service sector in Makassar City. Thus, the research hypothesis (H_5) can be rejected.

The value of the original path coefficient (O) of 0.45 shows that creativity has a positive influence on MSMEs' performance. A statistical T-value of 2.71 (greater than 1.96) and a p-value of 0.01 (less than 0.05) indicate that this relationship is statistically significant. T-values above 1.96 and p-values below 0.05 indicate a significant relationship. The findings of this study indicate that creativity has a meaningful and significant influence in improving MSMEs' performance in the F&B service sector in Makassar City. Thus, the research hypothesis (H_7) is acceptable.

After the results of the research hypothesis testing that has been carried out, an analysis of the indirect *effect* of *work engagement* and *person-job fit* on employee performance will be presented using employee commitment as a mediating variable. From the results of data processing using SmartPLS 4.1.0, the results of the indirect influence test will be presented as shown in Table 12.

Table 12. The magnitude of the indirect influence path testing with smartPLS 4.1.0.

Relationship between variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Production management model -> Innovation -> MSMEs performance	0.02	0.04	0.09	0.24	0.81
Production management model -> Creativity -> MSMEs performance	0.14	0.12	0.05	2.79	0.01

A very small path coefficient (0.02) shows that the production management model does not make a significant contribution to MSMEs' performance through innovation. This indicates that innovation is not a strong mediator in the relationship between production management and MSMEs' performance (Ngo, 2023). This can be caused by

several factors, such as the lack of effective production management implementation or the low level of innovation among MSMEs. A low T-statistical value (0.24) and a high P-value (0.81) indicate that the relationship between the production management model and MSMEs' performance through innovation is not statistically significant. A T-value below 1.96 (at a significance level of 5%) and a P-value above 0.05 indicate that the null hypothesis (no correlation) cannot be rejected. This indicates that the relationship between the production management model and MSMEs' performance through innovation is not statistically significant. According to Henseler, Hubona, and Ray (2020), a P-value above 0.05 indicates that the null hypothesis (no relationship) cannot be rejected.

These findings indicate that creativity plays an important role in connecting the production management model with MSME performance. Creativity is a key factor in driving innovation and business performance, especially in MSMEs (Telukdarie, Dube, Munsamy, Murulane, & Mongwe, 2024). Production management that encourages creativity can help MSMEs optimize business processes and increase competitiveness. Based on statistical analysis, it can be concluded that Hypothesis H₈ is accepted because there is a significant relationship between the production management model and MSME performance through creativity. Creativity plays an effective role as a mediator in improving MSME performance through the implementation of the production management model. This finding emphasizes the importance of encouraging creativity in the production management process to improve competitiveness and MSME performance.

In relation to the description mentioned above, the results of testing the research hypothesis will be presented, which can be shown in Table 13.

Table 13. Recapitulation of the results of the research hypothesis test.

Hypothesis	Variable relationship	Direct influence	Indirect influence	Total influence	T statistics (O/STDEV)	P values	Conclusion
H1	Production management model -> Innovation	0.76	0.00	0.76	23.13	0.00	Accepted
H2	Production management model -> Creativity	0.32	0.00	0.32	3.66	0.00	Accepted
H3	Production management model -> MSMEs performance	0.41	0.00	0.41	4.06	0.00	Accepted
H4	Innovation -> Creativity	0.56	0.00	0.56	7.91	0.00	Accepted
H5	Innovation -> MSMEs performance	0.03	0.00	0.03	0.24	0.81	Rejected
H6	Production management model -> Innovation -> MSMEs performance	0.02	0.04	0.06	0.24	0.81	Rejected
H7	Creativity -> MSMEs performance	0.45	0.00	0.45	2.71	0.01	Accepted
H8	Production management model -> Creativity -> MSMEs performance	0.14	0.12	0.26	2.79	0.01	Accepted

5. DISCUSSION

5.1. Production Management Model and Innovation

The results of the analysis show that the production management model has a positive and significant influence on innovation. Effective production management practices, such as the implementation of lean manufacturing,

automation, and integration of digital technology in the production process, not only serve to improve operational efficiency but also play a strategic role in driving organizational innovation. Well-managed production management can create a work environment that is adaptive and responsive to change and encourages the creation of organizational learning processes. In the context of F&B MSMEs, this includes the ability to simplify work processes, reduce waste, and create flexibility in the supply chain and product development. An efficient production system provides space and resources for the exploration of new ideas, including testing new recipes, packaging innovation, utilizing local ingredients, or adopting digital technologies such as online ordering systems and integration with food delivery platforms. Thus, effective production management is not only related to cost efficiency but also contributes directly to increasing the innovative capacity of the organization, which ultimately impacts the competitiveness and performance of MSMEs as a whole (Srisathan, Ketkaew, & Naruetharadhol, 2023).

An adaptive production environment that is managed effectively and supported by a structured management system allows teams within the organization to be more flexible in responding to market dynamics and developing innovative solutions. A production management system integrated with digital technologies such as the Internet of Things (IoT) and Artificial Intelligence (AI) significantly contributes to increasing the company's innovative capacity. The use of this technology enables companies to collect and analyze data in real time, such as consumer demand data, production efficiency, and raw material trends. Data obtained quickly and accurately will accelerate strategic decision-making while providing sharper insights into market needs. With this capability, companies are not only able to respond to market challenges more effectively but are also better prepared to design new, innovative products and services by evolving customer preferences. For F&B MSMEs, this integration is an important asset in creating a sustainable competitive advantage in the digital era (Papa, Santoro, Tirabeni, & Monge, 2018).

The results of the study indicate that production management has a very strong influence on innovation, with a significant path coefficient value ($\beta = 0.76$). This finding strengthens the view that efficient and structured production management practices can be a major catalyst in encouraging the development of new ideas in organizations, especially in the F&B MSME sector. The application of approaches such as lean manufacturing, total quality management (TQM), and digital technology integration has been shown to have a positive impact on creating a work environment that is conducive to innovation. In this context, companies that adopt technology-based production management systems—such as the use of the Internet of Things (IoT) and Artificial Intelligence (AI)—have better capabilities in collecting and analyzing data in real time. These capabilities enable companies to (1) identify innovation opportunities more quickly, (2) respond to market changes more effectively, and (3) increase flexibility in developing new products or services. In addition, effective production management also strengthens cross-departmental coordination and collaboration, which is a key factor in the innovation process. A collaborative work environment supports the exchange of ideas between teams, accelerates the innovation cycle, and encourages the emergence of creative solutions to various operational and strategic challenges. Thus, it can be concluded that strengthening production management practices, especially those integrated with digital technology, is a potential strategy to increase the innovative capacity of MSMEs while strengthening long-term competitiveness (Loo, Ramachandran, & Raja Yusof, 2023).

Companies that implement collaborative production management practices tend to have higher levels of innovation. This is due to the increased exchange of ideas, knowledge, and skills between teams, which creates synergy in responding to problems and creating new solutions. The integration of digital technology into the production management system not only impacts operational efficiency but also directly opens up new opportunities for innovation. Technologies such as Artificial Intelligence (AI) and machine learning provide deeper analytical capabilities, enabling companies to (1) identify customer consumption patterns, (2) predict market demand, and (3) detect previously undetected production inefficiencies. Through more accurate and predictive data analysis, companies can make more appropriate strategic decisions and ultimately develop more relevant and innovative

products or services. Thus, technology is not only an operational tool but also a significant enabler of innovation in the MSME ecosystem, especially in the F&B sector (Purnomo, Purwandari, & Kumar, 2024).

Integration between production management and supply chain management in creating a sustainable innovation ecosystem. Strong integration between these two functions has been proven to improve the flow of information and materials more efficiently and responsively, allowing companies to be more adaptive in facing market dynamics. One key aspect of this integration is close collaboration with suppliers and business partners, which not only streamlines operational processes but also opens up space for co-creation and joint innovation development. This practice allows companies to share insights, technology, and market feedback more quickly and effectively. Thus, an effective production management model is no longer limited to achieving operational efficiency alone, but also becomes a strategic foundation in building a culture of innovation and creativity within the organization. This is especially important for MSMEs in the F&B sector, which are required to continuously adapt to market tastes, new technologies, and supply chain challenges. Overall, integrated and collaborative production management creates an environment conducive to innovation and creativity, making it an important element in increasing the competitiveness of MSMEs in the digital era (Gui, Condrobimo, & Sriwardiningsih, 2024).

This study makes a significant contribution to the development of literature in the field of production management and innovation by confirming that a structured and adaptive production management model can be a major driver of organizational innovation, especially in the F&B MSME sector. Through the implementation of practices such as lean manufacturing, digital technology integration, Total Quality Management (TQM), and sustainability principles, companies can increase their innovative capacity and maintain competitiveness in a dynamic market. These findings emphasize the importance of cross-functional and external collaboration, such as with suppliers and business partners, in forming a more inclusive and responsive innovation ecosystem for change. The integration of digital technologies such as AI, IoT, and machine learning not only strengthens operational efficiency but also accelerates data-based decision-making processes that support sustainable innovation. This study also emphasizes the need for an innovative organizational culture and visionary leadership to maximize the positive potential of production management towards creating new value. Organizations that can build a work environment that is open to change, collaborative, and technology-based will be better prepared to respond to market challenges and create creative and value-added solutions.

5.2. Production Management Model and Creativity

The production management model has also been shown to have a positive effect on creativity, although with a lower coefficient compared to innovation. A flexible management structure that supports collaboration between individuals or teams can facilitate the emergence of creativity in the workplace. The implementation of effective production management models such as lean manufacturing and the integration of digital technology can create a work environment that is conducive to experimentation and exploration of new ideas, thereby encouraging increased employee creative capacity (Yuen & Baskaran, 2023). Lower levels of influence indicate that creativity is more likely to be influenced by other factors, such as organizational culture or transformational leadership. In this context, employee creativity becomes an important element that can improve a company's ability to adapt to market dynamics and create added value for customers (Falihat, Cheah, Jayabalan, Lee, & Kai, 2022). A work environment that supports creative expression, such as providing space for experimentation, valuing new ideas, and reducing the fear of failure, can strengthen the positive impact of the production management model on creativity. Therefore, the synergy between an effective production management model and a work culture that supports creativity is key to creating a sustainable competitive advantage.

The role of organizational culture is a key factor in strengthening the relationship between production management models and creativity. Research shows that companies with organizational cultures that support innovation and creativity tend to be better able to utilize production management models optimally to encourage

employee creativity. A culture that emphasizes openness, collaboration, and tolerance for failure allows the production management system to not only focus on efficiency but also become a place for exploring new ideas (Topleva & Prokopov, 2020). The importance of creating an inclusive and experiment-supportive organizational culture is crucial to maximizing the positive impact of the production management model on creativity. A culture that allows for failure, values new ideas, and encourages cross-functional collaboration can strengthen the role of the production management model as a trigger for innovation and creativity in the workplace. In addition, transformational leadership also plays an important role in strengthening this relationship. Leaders who have a creative vision, provide moral support and the necessary resources, and can empower employees are more capable of creating creative and high-performing teams. Thus, transformational leadership can be a catalyst that accelerates and deepens the influence of the production management model on increasing creativity in the organization.

Digital technology has been shown to enhance the impact of production management models on creativity. Companies that leverage digital tools such as online collaboration platforms, design software, and cloud-based project management systems tend to be more successful in implementing creative ideas efficiently and measurably. Digital technology not only accelerates the flow of communication and collaboration but also opens up new spaces for exploring ideas through virtual simulations, visualizations, and concept testing. Thus, digital technology acts as an effective tool in supporting the creative process while helping companies achieve better performance (Utama, Yusfiarto, Pertiwi, & Khoirunnisa, 2024). Team diversity plays a significant role in enhancing the impact of production management models on creativity. Teams that consist of individuals with different backgrounds, experiences, and perspectives tend to produce more creative and innovative solutions. This diversity creates a richer dynamic of idea exchange and broadens the perspective on problems, which ultimately strengthens the company's innovative power. Therefore, companies need to actively build diverse and inclusive teams to maximize their creative potential. Creativity that grows in an organization not only impacts internal innovation but also strengthens relationships with customers. Companies that creatively respond to customer feedback demonstrate high adaptability, which in turn helps increase customer satisfaction and maintain customer loyalty. In this context, creativity becomes a strategic asset that connects internal productivity with external added value (Renton, Daellenbach, Davenport, & Richard, 2015).

By creating a work environment that supports creative expression, adopting digital technologies, building an inclusive organizational culture, and involving customers in the creative process, companies can significantly increase their capacity to adapt to market dynamics. This approach not only encourages the emergence of innovative ideas but also strengthens customer involvement in value creation. Companies can achieve better performance while building a sustainable competitive advantage (Sudjatmoko, Ichsan, Astriani, Mariani, & Clairine, 2023). In addition, supportive leadership, team diversity, creativity training, and risk management also play a crucial role in strengthening the positive impact of the production management model on creativity. This study makes a significant contribution to the literature in the field of production management and creativity by demonstrating that an effective production management model can serve as a key driver in fostering organizational creativity. The findings underscore the importance of creating a work environment that supports creativity, as well as the need to integrate digital technologies, inspiring leadership, team diversity, and creativity training programs into business processes to maximize innovative potential and improve overall organizational performance.

5.3. Production Management Model and MSMEs Performance

The production management model has a significant direct influence on the performance of MSMEs. The implementation of an efficient production management system has been proven to increase productivity, reduce operational costs, and enhance customer satisfaction, which overall has a positive impact on company performance. A well-designed production management system allows MSMEs to optimize the use of limited resources, thereby increasing operational efficiency and competitiveness in the market. The results of the study show that the direct

influence of the production management model on MSME performance has a coefficient of $\beta = 0.41$, which indicates that effective production management practices can significantly increase operational efficiency, reduce waste, and improve product and service quality. MSMEs that adopt modern production management systems, such as lean manufacturing, just-in-time (JIT), or digital technology integration, tend to show better financial and operational performance compared to companies that still apply traditional methods (Telukdarie et al., 2024). MSMEs that implement practices such as structured production planning, quality control, and the use of simple technology have been shown to achieve significant improvements in productivity and profitability. Despite resource constraints, implementing a systematic approach to the production process allows MSMEs to reduce waste, increase efficiency, and produce products of more consistent quality. These simple yet measurable initiatives can be an important foundation for MSMEs' long-term sustainability and growth amidst increasingly competitive markets.

The successful implementation of a production management model in MSMEs is greatly influenced by internal capacity and resource availability. In practice, many MSMEs face significant challenges in adopting complex production management systems, mainly due to financial constraints, lack of skilled labor, and inadequate technological infrastructure. These conditions often hinder the process of innovation and operational efficiency. To overcome these obstacles, a gradual approach and continuous training are effective strategies. Through the adoption of production systems that are tailored to the scale and capacity of MSMEs, as well as relevant technical training support, small and medium enterprises can gradually improve their efficiency, quality, and competitiveness in the market (Maksum, Rahayu, & Kusumawardhani, 2020). Digital technology plays a strategic role in improving the effectiveness of production management in MSMEs. Research shows that the use of simple digital tools such as inventory management software, production tracking applications, or cloud-based record-keeping systems can help MSMEs improve planning accuracy, speed up decision-making, and significantly reduce waste levels. Adopting affordable and easy-to-operate digital technology can be an important first step for MSMEs to improve operational efficiency and overall production performance. By utilizing technology that is tailored to the needs and capacities of small and medium enterprises, the production process can become more structured, transparent, and adaptive to changes in market demand.

Collaboration with suppliers and business partners is an important factor that can strengthen the positive impact of production management on MSMEs' performance. Research shows that MSMEs that establish strategic relationships with suppliers tend to have better access to high-quality raw materials, market information, and even more advanced production technologies (Giordino, Troise, Vanhaverbeke, & Culasso, 2024). Strong partnerships not only improve supply chain stability but also open up opportunities for knowledge transfer and production process innovation. With solid external support, MSMEs can improve operational efficiency, accelerate production processes, and enhance product quality, all of which contribute to improving overall competitiveness and performance. Strategic collaboration with suppliers and business partners can help MSMEs overcome resource constraints while increasing efficiency in the production process. Through mutually beneficial partnerships, MSMEs can gain access to better raw materials, relevant technologies, and best practices in production management. Such collaborations strengthen the company's external capacity and create an ecosystem that supports sustainable growth (Liestyana et al., 2024). On the other hand, human resource development is an internal factor that is no less important in increasing the effectiveness of production management. MSMEs that invest in employee training and competency enhancement tend to have a higher adoption rate of production management practices, as well as show better operational and financial performance. Continuous training helps build a work culture that is adaptive, productive, and oriented toward continuous improvement.

By adopting effective production management practices, MSMEs can improve operational efficiency, reduce production costs, and enhance product quality, which ultimately positively impacts overall business performance. However, the success of implementing a production management model is highly dependent on various supporting factors, such as resource capacity, adoption of digital technology, collaboration with suppliers, human resource

development, and integration of sustainability principles into the production process. This study makes an important contribution to the literature on production management and MSME performance by demonstrating that a properly designed and implemented production management model can be a key driver of increasing the competitiveness of the sector. The findings also emphasize the importance of a flexible and adaptive approach in implementing a production management system, given the unique characteristics and limitations often faced by MSMEs. In addition, this study highlights the urgency of strategic collaboration, continuous training, and the use of appropriate technology to maximize the positive impact of production management on MSME's overall performance.

5.4. Innovation and Creativity

Innovation in processes and products can trigger the birth of new creative ideas, both at the individual and team levels. The use of new technologies, as well as the implementation of more flexible management approaches, creates a work environment that supports experimentation and exploration of innovative ideas. Studies show that environments that encourage innovation also tend to encourage employees to think outside the box and explore creative solutions. In such a context, individuals feel freer to take risks and try new approaches without fear of failure. This not only increases personal creativity but also strengthens creative collaboration between team members, resulting in a greater synergy of innovative ideas (Chaurasia, Kaul, Yadav, & Shukla, 2020). Innovation in product and service design plays a vital role in driving creativity, as it opens up space for the exploration of new ideas that are fresher and more adaptive to market dynamics. Companies that actively integrate customer feedback into their innovation process are shown to be more capable of producing products that are both creative and relevant to consumer needs and preferences. The study emphasizes that customer involvement in the innovation process not only improves the quality of ideas generated but also ensures that these ideas have a real and applicable impact. This participatory approach strengthens the relationship between companies and customers and creates a more inclusive and market-oriented innovation ecosystem.

Companies that create physical spaces and work cultures that support experimentation and collaboration tend to have higher levels of creativity (Setiawan, Santy, Fitriyani, & Huda, 2023). Digital innovations, such as the use of artificial intelligence (AI) and machine learning, contribute significantly to increasing creativity in the workplace. These technologies provide access to deeper data and analysis, allowing employees to identify hidden patterns and trends that were previously difficult to recognize. This ability is a trigger for the birth of new creative ideas that are more contextual and data-driven. The integration of digital technology in the innovation process not only increases efficiency but is also a key driver of creativity in the digital era. In addition, innovation in business models has also been shown to influence the level of organizational creativity. Companies that adopt innovative business models such as subscription-based platforms, freemium, or the sharing economy encourage employees to think more creatively in creating added value and unique customer experiences (Saputri & Utami, 2023). Business model innovation not only changes the way companies operate but also opens up new opportunities for the exploration of creative ideas.

By creating an environment that supports innovation, facilitates collaboration, adopts new technologies, and encourages team diversity, organizations can increase employee creativity and produce more innovative solutions (Aryani & Tuti, 2023). The synergy between an open work culture, the use of technology, and diverse perspectives creates a strong foundation for the development of new ideas that are relevant, adaptive, and value-added. This approach not only drives the creation of superior products and services but also strengthens the organization's competitiveness in the face of changing market dynamics. Therefore, investing in creativity-enabling factors must be an integral part of a future-oriented organizational strategy. In addition, supportive leadership, an organizational culture that is open to experimentation, and continuous learning programs also play a key role in strengthening the relationship between innovation and creativity. These elements create an ecosystem conducive to the development of new ideas and cross-functional collaboration. This research makes a significant contribution to the innovation and creativity literature by demonstrating that innovation not only serves as a driver of organizational

efficiency and performance but also as a key trigger for the emergence of creative ideas. The findings underscore the importance of creating an environment that supports innovation and creativity by integrating technology, collaboration, diversity, and learning into the innovation process to maximize the positive impact on overall organizational creativity.

5.5. Innovation for MSMEs Performance

The insignificance of innovation to the performance of F&B MSMEs ($\beta = 0.03$; $p = 0.81$) shows that even though innovation is implemented, it does not directly contribute to improved performance. The production management model used has not been effective in reducing production costs without affecting product quality or output. In the F&B industry, high production costs are often a major obstacle to increasing profitability. Innovation in the production process only has a positive impact if it can significantly reduce costs without sacrificing product quality. Limited resources, such as capital, skilled labor, and access to technology, hinder this process. Innovation only has a positive impact on performance if the company has the capacity to implement and commercialize the innovation (Al Hidayat, Suherlan, & Ausat, 2024). In the context of MSMEs in the F&B sector, this limitation may be more pronounced due to high production costs and fierce competition.

The production management model used may focus more on short-term operational efficiency than long-term innovation. MSMEs tend to adopt production management practices that focus on reducing costs and increasing productivity but pay less attention to innovations that can create added value (Pusung, Narsa, & Wardhaningrum, 2023). The impact on MSME F&B performance is that the inability of production management models to reduce production costs without affecting product yield (loading factor PPM_6 = 0.58) can be a major obstacle to improving performance. F&B MSMEs often face fluctuations in raw material prices, which makes it difficult to reduce production costs significantly. Many F&B MSMEs still rely on manual labor, which limits their ability to reduce production costs through automation. The adoption of modern production technologies, such as automated food processing machines, can help reduce production costs, but high initial investment is often an obstacle (Antesty, Susilawati, Selan, & Thalib, 2023).

In the F&B industry, product quality is a critical factor that affects customer satisfaction. Efforts to reduce production costs often risk degrading product quality, which can ultimately hurt performance. F&B MSMEs need to balance cost efficiency and product quality to remain competitive (Teoh, Ahmad, Abdul-Halim, & Kan, 2023). These findings indicate that production cost efficiency must be carried out strategically so as not to sacrifice product quality, which is the main key to maintaining the competitiveness of MSMEs in the F&B sector. There are several important implications for MSME F&B players: (1) F&B MSMEs need to consider investing in small to medium-scale production technology that can increase efficiency without reducing quality. The use of affordable modern production aids can help reduce the waste of raw materials and time while maintaining product consistency. (2) Increasing human resource capacity through training in production management, product innovation, and quality control is very important. Skilled employees will be better able to identify efficiency opportunities and maintain quality standards in the production process. (3) MSME F&B also needs to build long-term and mutually beneficial relationships with raw material suppliers. This collaboration can help deal with price fluctuations, ensure continuity of supply, and enable better price negotiations so that production costs can be reduced efficiently.

MSMEs in developing countries often face resource limitations in terms of technology, capital, and human resources. Strategies that integrate efficiency (production management), uniqueness (creativity), and product value renewal (innovation) are important to improve performance sustainably (Smuts et al., 2024). This study aims to integrate the four main constructs of production management, innovation, creativity, and performance of F&B MSMEs into a comprehensive research framework. Although each construct has been widely studied separately in previous studies, the integration of the four elements into one integrated model is still relatively rare, especially in the context of F&B MSMEs in developing countries. Most previous studies have tended to focus on the direct

relationship between production management and performance or innovation and performance without considering the mediating role of creativity. Creativity plays an important role as a bridge between operational practices (such as production efficiency) and strategic outputs (such as product innovation and increased added value). By including creativity as a mediating variable, this study provides a new perspective on understanding how managerial and operational practices indirectly affect MSME performance through internal organizational mechanisms. This is especially relevant for F&B MSMEs in developing countries, which often have to rely on creativity to overcome resource constraints and market instability.

One of the interesting findings of this study is that innovation does not have a significant effect on the performance of F&B MSMEs ($\beta = 0.03$; $p = 0.81$). This finding is contrary to the majority of previous studies that consistently show that innovation is the key to improving organizational performance. However, in the context of F&B MSMEs in developing countries, this result reflects the complexity of the relationship between innovation and performance. The novelty of this finding lies in the identification of contextual factors that can hinder the optimization of results from innovative activities. Among them are: (1) Limited resources (capital, human resources, technology), (2) Lack of capacity to effectively commercialize innovation, and (3) Inability to protect innovation through intellectual property rights. These factors cause innovation carried out by MSMEs not to always result in significant performance improvements because they are not sufficiently supported by an adequate ecosystem for the transformation of innovation into competitive advantage. In contrast, this study found that creativity acts as a significant mediator in the relationship between production management models and F&B MSMEs performance ($\beta = 0.14$; $p = 0.01$). This finding provides a new contribution to the literature, which has so far positioned creativity as an independent or dependent variable but rarely as a mediating variable in the context of managerial-operational relationships. The implication is that good production management practices do not necessarily have a direct impact on performance improvement but can produce a more creative work environment, which in turn encourages value creation and product differentiation, which are important in the competitive and dynamic F&B sector (Inegbedion, Thikan, David, Ajani, & Peter, 2024). Thus, this study makes a significant theoretical contribution by showing that creativity can be a key mechanism in transforming production management practices into better performance outcomes.

This study is conducted in the context of MSMEs in the food and beverage (F&B) sector in developing countries, which often face unique challenges such as limited resources, inadequate infrastructure, and a challenging business ecosystem. In this constrained environment, this study provides new insights into how production management models, innovation, and creativity interact to influence MSME performance. This study specifically highlights how operational strategies such as production management can drive performance improvements, not directly, but through creativity as a mediator. This enriches the understanding of the role of non-material internal processes such as creative ideas in bridging the gap between operational efficiency and achieving optimal performance. From a methodological perspective, this study uses path analysis to test direct and indirect relationships between variables. This approach allows the identification of complex mediation mechanisms, which are often missed in the usual linear regression analysis approach. In the context of MSME F&B research, the use of path analysis is still relatively rare, so this study provides a significant methodological contribution. Thus, this study not only expands the literature on managerial models in MSMEs but also offers a new analytical framework that can be used to examine the internal dynamics of organizations in the informal and semi-formal sectors, especially in developing countries.

6. CONCLUSION

The study not only provides theoretical contributions but also specific practical implications for F&B MSMEs. The recommendations produced include the importance of integrating technology, building a supportive ecosystem, and creating a creative organizational culture. The model developed in this study was designed by considering the resource limitations and operational context typical of F&B MSMEs so that it has a high applicative value. The results

of the study indicate that the production management model has a positive and significant influence on innovation. This finding confirms that, in the context of F&B MSMEs in Makassar City, an effective production management model can be an important catalyst for driving innovation, increasing creativity, and strengthening business performance sustainably. Thus, this model can play a role as a primary strategy to increase the competitiveness and sustainability of MSME businesses amidst dynamic market challenges.

Innovation and creativity show that innovation not only improves the efficiency and performance of the organization but also triggers the emergence of new creative ideas. The production management model encourages innovation; however, innovation does not directly contribute to improving the performance of MSMEs. This can be caused by limited resources, an inability to reduce production costs, and the production management model used may focus more on short-term operational efficiency than long-term innovation. The impact on the performance of MSMEs in the F&B sector includes the inability of production management models to reduce production costs without affecting the resulting product outcomes, high costs of raw materials, dependence on manual labor, and product quality demands. Creativity is the main driver of MSMEs' performance. By creating a work environment that supports creative expression, adopting digital technology, building an inclusive organizational culture, and engaging customers in the creative process, MSMEs can improve their ability to adapt to market changes, create added value for customers, and achieve better performance.

Local governments and MSME support institutions need to encourage the adoption of simple yet impactful technologies, such as inventory management software, online ordering systems, and production tracking applications. Technical training and subsidies for technology adoption can be initial incentives for MSMEs with limited capital and human resources. Policies are needed that encourage collaboration between MSMEs, suppliers, creative industry players, and higher education institutions to create more efficient and innovative value chains. The government can facilitate the formation of area-based F&B MSME clusters and hold integrated business incubation programs. City governments and business support actors need to encourage the formation of a work culture that promotes experimentation, tolerance for failure, and appreciation for new ideas.

Through transformational leadership training programs and creativity training for business owners and employees, the implementation of continuous training that is not only technical but also includes production management, product innovation, digital marketing, and financial management is very important. A training approach based on specific F&B sector needs will be more effective in improving the competence of business actors. F&B MSMEs need to be directed to explore innovative business models such as pre-order systems, healthy food subscriptions, or partnerships with food delivery services. Supporting policies can be in the form of innovation-based funding access and business accelerator programs that emphasize business model innovation. Local governments are advised to formulate long-term policies that support the development of MSMEs based on innovation and sustainability. This includes ease of licensing, tax incentives, and legal protection for MSME creative products.

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Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Data Availability Statement: Upon a reasonable request, the supporting data of this study can be provided by the corresponding author.

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