

PRODUCT INNOVATION OF SMEs IN VUCA ERA

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Abstract

This paper examines SMEs product innovation in the VUCA (Volatility, Uncertainty, Complexity, Ambiguity) era. One of the common problems for SMEs in Indonesia is challenges related to product innovation. These challenges are limited human resources and lack of access to technology and knowledge. Thus, product innovation will continue to develop not only with a touch of technology orientation, but also requires optimal inter-functional coordination. This study used quantitative methods on 205 SMEs as respondents. There are three variables that are the object of study, they are Product Innovation as the dependent variable, Technology Orientation as the independent variable and Inter-Functional Coordination as the mediating variable. The results of this study state that the Inter-Functional Coordination variable mediates the relationship between the Technology Orientation variable and the Product Innovation variable. Thus, Technology Orientation will not be optimal in developing SMES Product Innovation, unless SMESs strengthen Inter-Functional Coordination. Inter-functional coordination is a process where various functions or departments in an organization work together and collaborate to achieve common goals.

Keywords: Product Innovation, Technology Orientation, Inter-Functional Coordination, VUCA Era, SMESs

INTRODUCTION

The problems faced by Small and Medium Enterprises (SMEs) in Indonesia can vary, but one thing that is often in the spotlight is product innovation. The ability to innovate in products allows SMESs to compete better in an increasingly tight market. However, it should be noted that SMEs problems are not limited to product innovation alone. Several other challenges often faced by SMESs in Indonesia include (Darwanto et al., 2018; Priyo Nugroho, 2023): (1) Limited Access to Capital: SMEs often experience difficulties in gaining access to adequate sources of funds to develop their businesses; (2) Constraints in Market Access: Many SMEs experience difficulties in finding and maintaining a large enough market share, especially due to obstacles in product distribution and marketing; (3) Lack of Managerial Skills: Many SMEs entrepreneurs have limitations in the managerial skills necessary to manage their businesses effectively, such as financial, operational, and human resource management; (4) Complicated Regulations and Bureaucracy: Licensing and regulatory processes are often time-consuming and complicated, which can be an obstacle for SMEs, especially those just starting out; (5) Limitations in Technology and Infrastructure: Limited access to technology and infrastructure can also be an obstacle for SMESs in improving their operational efficiency and competitiveness. Therefore, although product innovation is important, it should not be ignored that there are still other challenges that also have an impact on the development of SMESs in Indonesia. Comprehensive solutions, such as skills training, financial support, regulatory simplification, and infrastructure development, may be needed to help SMESs grow and develop sustainably.

Product innovation is a key element in business success (Castillo-Vergara & García-Pérez-de-Lema, 2021; Curatman et al., 2016; Mulyadi et al., 2021; Reguia, 2014), especially Micro, Small and Medium Enterprises (SME). However, SMEs in Indonesia are faced with a number of challenges related to product innovation. These challenges include: (1) Limited Resources: Most SMEs face constraints in terms of human, financial and time resources, which makes it difficult for them to carry out research and development of new products; (2) Limited Access to Technology and Knowledge: Many SMEs do not have access to the latest technology or knowledge of the latest market trends, making it difficult for them to create products that are innovative and meet consumer needs; (3) Market Uncertainty: Markets in Indonesia are often changeable and difficult to predict, forcing SMEs to adapt quickly to changing trends and consumer preferences in order to remain competitive; (4) Quality and Standards: Some SMEs may face difficulties in meeting the quality standards required to compete in an increasingly tough market; (5) Risk and Failure: Innovation always carries risks, so many SMEs are reluctant to take risks for fear of failure or losing their investment. To overcome these challenges, governments, non-governmental organizations, and the private sector can provide various forms of support to SMEs, such as training on innovation, access to technological resources, financial assistance for research and development, and the establishment of networks to share knowledge and experience among SMEs. With appropriate support, SMEs in Indonesia can improve their product innovation capabilities and provide greater added value to the economy.

Small and Medium Enterprises (SMEs) in the VUCA (Volatile, Uncertain, Complex, Ambiguous) era face quite big challenges. In the VUCA context, market conditions become more unstable, uncertain, complex and ambiguous (Simpson & Mulhaney, 2024). This impacts SMEs in several ways: (1) Presence of Volatility: Rapid changes in markets, technology, and regulations can cause significant fluctuations in demand, prices, and operational conditions. SMEs must be able to adapt to these changes quickly; (2) Uncertainty: Uncertainty about market conditions, government policies, and technological changes can make long-term planning difficult for SMEs. They need to have the ability to adapt to uncertain situations with flexibility and creativity; (3) Complexity: An increasingly complex business environment requires SMEs to understand the various factors that influence their business, including global markets, complex supply chains, and evolving technologies; (4) Ambiguity: Limited information or clarity in decision making can create ambiguous situations. Therefore, SMEs must be able to manage risks and make decisions using limited information.

To overcome these challenges, Small and Medium Enterprises (SMEs) need to develop a number of strategies: (1) Adaptability and Skills: SMEs must have the ability to adapt to market and technological changes quickly. This includes developing skills to innovate, respond to market changes, and take advantage of emerging opportunities; (2) Partnerships and Networking: Collaborating with other parties in the business ecosystem, such as business partners, SME support institutions, and educational institutions, can help SMEs to obtain additional resources, knowledge, and support needed; (3) Technology Adoption and Digitalization: Utilization of technology and digitalization can help SMEs

improve operational efficiency, reach wider markets, and adapt to ongoing technological changes; (4) Capacity Strengthening: Training and education regarding risk management, strategic planning and other business skills can help SMEs become stronger in facing VUCA conditions. By implementing appropriate strategies, SMEs can turn the challenges faced in VUCA conditions into opportunities for long-term growth and success.

Product innovation requires integration with technology (Fayomi et al., 2019; Foucart & Li, 2021; Lee et al., 2016; Lingyan et al., 2021; Shi et al., 2018). The integration of technology orientation has great significance in the product innovation process for Micro, Small and Medium Enterprises (SMEs) in the current digital era. Technology is the key to producing products that are superior, efficient, and able to compete in an increasingly tight market (Lestari & Warmika, 2019; Widiarta et al., 2020). The application of technology can increase production efficiency, reduce production costs, and speed up the product manufacturing process. By utilizing the right technology, SMEs are able to create products with better quality in a shorter time. Through technology, SMEs can improve the quality of their products in aspects of design, materials and function. Utilizing advanced technology can help SMEs create products that are more innovative and attractive to consumers. Technology can be a source of inspiration for new product development. By utilizing the latest technology, SMEs can create products that have never existed before or improve existing products to make them better. Through technology, SMEs can easily expand their product portfolio. They can adapt their products quickly to changing consumer needs and preferences. Technology, especially the internet, allows SMEs to market and sell their products globally. By utilizing e-commerce platforms and social media, SMEs can reach a wider market without being constrained by geographical boundaries. Technology can be used to improve customer experience with products. From implementing augmented reality in the sales process to using sensors in products to improve their functionality, technology can help SMBs create more satisfying experiences for their customers. Therefore, SMEs need to adopt a technological orientation in their product innovation strategy in order to continue to compete and develop in a market that is constantly changing and developing.

To achieve optimal results, innovation requires coordination between functions. Cross-functional coordination is critical in ensuring the success and excellence of product innovation within organizations (Jovanov Apasieva, 2018; Knott & Thnarudee, 2022; Tomaskova, 2018; Yadet et al., 2023), including SMEs. The following are several reasons why cross-functional coordination is necessary in product innovation: (1) Knowledge Diversity: Each function in the organization has diverse knowledge and expertise. By coordinating between various functions such as research and development, production, marketing and management, SMEs can combine this diverse knowledge to generate innovative ideas and ensure that the resulting products meet consumer needs and high quality standards; (2) Process Integration: Coordination between various functions allows SMEs to integrate the processes involved in product innovation, from market research and product development to production and marketing. By carrying out this integration, SMEs can ensure that each stage in product development runs smoothly and efficiently; (3) Effective Communication: Cross-functional coordination enables various functions in an organization

to communicate effectively with each other. It allows stakeholders to exchange information, solve problems together, and make informed decisions to overcome challenges that arise during the product innovation process; (4) Risk Management: By coordinating between various functions, SMEs can identify and manage risks associated with product innovation more effectively. This allows them to plan risk mitigation strategies and anticipate changes that may occur during the innovation process; (5) Employee Involvement: Cross-functional coordination also enables the involvement of employees from various backgrounds and levels in the product innovation process. This can increase employee motivation and engagement and enable them to make valuable contributions to product development. Therefore, cross-functional coordination is a key element in ensuring the success and excellence of product innovation in SMEs. Through good coordination between various functions, SMEs can increase the efficiency, effectiveness and success of the products produced.

LITERATURE REVIEW

Product Innovation

Product innovation refers to the process of developing and implementing new ideas or important changes to existing products to meet consumer wants or needs, or to create added value in the market. It involves creative and strategic processes to create products that are superior, more effective, or more attractive than before.

Product innovation has dimensions in the form of: (1) Quality Improvement: Increasing product standards by using better materials, more advanced technology, or more efficient production processes (Lone & Bhat, 2022); (2) New Feature Development: Adding new features to an existing product to increase its value or appeal to consumers (Chae et al., 2020); (3) New Design: Changing or updating the product design to make it more visually or ergonomically appealing; (4) Product Diversification: Creating new products that are different or variations of existing ones to reach wider market segments or meet different needs (Arte & Larimo, 2022; Ding et al., 2023; Judijanto et al., 2023); (5) Technological Innovation: Adopting or developing new technology to improve product performance or functionality (Radicic & Petković, 2023); (6) Process Improvement: Improving production or distribution processes to reduce costs or production time, or to improve product quality and reliability (Klimecka-Tatar & Ingaldi, 2022).

Product innovation is vital in the business world because it helps companies to remain competitive in changing and developing markets. By creating products that are innovative and relevant to consumer needs, companies can gain competitive advantage, expand market share, and provide added value for customers and shareholders.

Technology Orientation

Technology orientation reflects an organization's attitude or strategy towards the use and application of technology in their operational and business activities. It involves how organizations identify, evaluate, adopt, and integrate new technologies in their activities to improve performance, efficiency, and competitive advantage.

Technology orientation includes several aspects: (1) Technology Recognition: An organization's ability to recognize new technological developments and understand their impact on their business (de Mattos et al., 2023); (2) Technology Evaluation: The process of assessing and analyzing new technology to understand its implications and benefits and costs (Willets & Atkins, 2024); (3) Technology Adoption: The steps organizations take to adopt and implement new technology in their operations and business processes (Zamani, 2022); (4) Technology Integration: Integration of new technologies in organizational systems, processes and culture to obtain maximum benefits (Al-Sharafi et al., 2023); (5) Technology Development: Organizational efforts to develop their own technology or collaborate with others to create new and innovative technology solutions (Kim et al., 2019).

A strong technology orientation is characterized by a focus on innovation, adaptation, and utilization of technology as a tool to achieve larger business goals. Organizations with a solid technology orientation tend to be more flexible in dealing with market changes, increasing operational efficiency, and providing added value to customers.

The importance of technology orientation is increasing in the current digital era, where technology is one of the main drivers of innovation and business growth. Organizations that successfully develop and maintain a strong technology orientation have a better chance of remaining competitive and thriving in an ever-changing and evolving marketplace.

Inter-Functional Coordination

Inter-functional coordination is a process in which various parts or units in an organization work together to achieve the same goal. It involves collaboration between departments or divisions to coordinate their activities to achieve desired results. Inter-functional coordination is a key element in organizational management because it allows various parts of the organization to work efficiently and effectively together. This helps overcome functional silos and encourages cross-departmental collaboration, ultimately improving the overall performance of the organization.

The dimensions of inter-functional coordination are: (1) Product Development: Collaboration between research and development, production and marketing departments to develop and introduce new products to the market (Iqbal & Suzianti, 2021); (2) Project Management: A project team consisting of members from various departments working together to successfully complete a specific project (Börsch, 2022; Copola Azenha et al., 2021); (3) Strategic Decision Making: Collaboration between senior management from various departments to make strategic decisions that affect the entire organization (Straková & Talíř, 2020); (4) Budget Planning: Collaboration between finance, production and marketing departments to plan an adequate budget to achieve organizational goals (Alhasnawi et al., 2023; Ali et al., 2023; Mulani et al., 2015); (5) Problem Solving: Collaboration between various departments to resolve problems or challenges that arise in the daily operations of the organization (Pereira & Franco, 2022; Tortorella et al., 2023). Inter-functional coordination requires effective communication, coordination and teamwork between different departments. By collaborating cross-functionally, organizations can

improve operational efficiency, respond more quickly to market changes, and better achieve their strategic goals.

METHOD

The research method for this study is a quantitative method. There are three variables that are the object of research, they are Product Innovation as the dependent variable, Technology Orientation as the Independent variable, and Inter-Functional Coordination as the mediating or intervening variable. This research was conducted on 205 SMEs as respondents. This research was conducted in Sukabumi Regency, West Java Province, Indonesia for 3 months, from January to March 2024. This research questionnaire has gone through a validity and reliability testing process, and the results are valid and reliable. All correlation coefficient values for each item have a score of $r > 0.3$, so all instruments are said to be valid. Cronbach's alpha for the Technology Orientation variable is 0.766, Cronbach's alpha for the Inter-Functional Coordinator variable is 0.763 and Cronbach's alpha for the Product Innovation variable is 0.774. So, all variables have a Cronbach's alpha value > 0.6 , so they are reliable. The statistical tool used is path analysis via SPSS.

RESULTS AND DISCUSSION

There are several stages for testing hypotheses using statistical methods in the form of path analysis. In this research, the main hypothesis is that the Inter-Functional Coordination variable mediates the influence of Technology Orientation on Product Innovation. Thus, there are three stages to test this hypothesis. First, calculating the influence of Technology Orientation on Product Innovation. Second, calculate the influence of Technology Orientation on Inter-Functional Coordination. Third, calculate the influence of Technology Orientation and Inter-Functional Coordination on Product Innovation.

The first stage

At this stage, the influence of the Technology Orientation variable on Product Innovation is calculated. The results are as follows:

Table 1. Simple Linear Regression Test Results

		Coefficients^a				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.139	2.688		1.168	.246
	TO	.939	.053	.866	17.601	.000

a. Dependent Variable: PI

Source: SPSS 25 Data Processing Results

Based on the table above, a simple regression equation can be described as follows:
 $Y = \alpha + \beta 1X1 + e$

$$Y = 3.139 + 0.939X_1 + e$$

It makes sense to use the following simple linear regression equation to describe it:

1. The value of the constant (a) is 3.139, which is positive. If the relationship between the independent and dependent variables is unidirectional, it is indicated by a positive sign. As can be seen from above, the PI value is 3.139 if the independent variable TO (X₁), is at zero percent or has not decreased.
2. For the variable TO (X₁), the regression coefficient value is 0.939. An upward relationship between the TO and PI variables is indicated by this number. As a result, the PI variable will grow by 0.939 for every 1% increase in the TO variable. assuming the constant values of other variables. If the relationship between the independent and dependent variables is unidirectional, it is indicated by a positive sign.

Second Stage

At this stage, the influence of the Technology Orientation variable on Inter-Functional Coordination is calculated. The results are as follows:

Table 2. Simple Linear Regression Test Results
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.325	3.112		3.639	.000
	TO	.799	.062	.787	12.947	.000

a. Dependent Variable: IC

Source: SPSS 25 Data Processing Results

The following is a description of a basic regression equation based on the previous table:

$$Y = \alpha + \beta_1 X_1 + e$$

$$Y = 11.325 + 0.799X_1 + e$$

It makes sense to use the following simple linear regression equation to describe it:

1. The positive value of 11.325 is assigned to the constant value (a). When there is a positive sign, the influence between the independent and dependent variables is one-way. This demonstrates that the IC value is 11.325 if the independent variable, TO (X₁), is at zero percent or has not changed.
2. For the TO (X₁) variable, the regression coefficient value is 0.799. This number demonstrates that the TO and IC variables have a positive relationship. Accordingly, the IC variable will grow by 0.799 if the TO variable increases by 1%. assuming the stability of other factors. When there is a positive sign, the influence between the independent and dependent variables is one-way.

Third Stage

At this stage, the influence of the Technology Orientation and Inter-Functional Coordination variables on Product Innovation is calculated. The results are as follows:

Table 3. Multiple Linear Regression Test Results
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.605	2.771		.218	.828
	TO	.760	.084	.701	9.056	.000
	IC	.224	.083	.210	2.708	.008

a. Dependent Variable: PI

Source: SPSS 25 Data Processing Results

The following is a description of a basic regression equation based on the previous table:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + e$$

$$Y = 0.605 + 0.760X_1 + 0.224X_2 + e$$

It makes sense to use the following simple linear regression equation to describe it:

1. The positive value of 0.605 is assigned to the constant value (a). An indication of a unidirectional influence between the independent and dependent variables is shown by a positive sign. This demonstrates that the PI value is 0.605 if all of the independent variables, such as TO (X1) and IC (X2), have a value of 0% or have not changed.
2. For the TO (X1) variable, the regression coefficient value is 0.760. This number demonstrates that the TO and PI variables have a positive relationship. This indicates that a 1% rise in the TO variable will result in a 0.760 increase in the PI variable. assuming the stability of other factors. When there is a positive sign, the influence between the independent and dependent variables is one-way.
3. For the IC (X2) variable, the regression coefficient value is 0.224. This number indicates that the IC and PI variables have a positive relationship. This indicates that a 1% rise in the IC variable will result in a 0.224 increase in the PI variable. assuming the stability of other factors. When there is a positive sign, the influence between the independent and dependent variables is one-way.

Sobel Test stage

The final stage is the Sobel Test. The Sobel test is a statistical method used to test the significance of mediation effects in path analysis. The mediation effect occurs when the relationship between the independent variable (X) and the dependent variable (Y) is partially explained through the mediator (M). In this case, the dependent variable is Product Invasion, the independent variable is Technology Orientation and the mediating variable is Inter-Functional Coordination. The Sobel Test calculation is as follows:

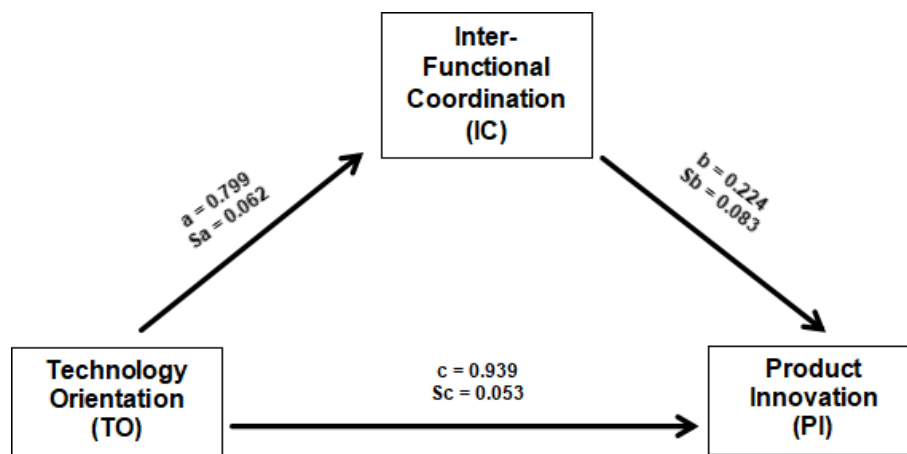


Figure 1. Concept Framework and Sobel Test Data

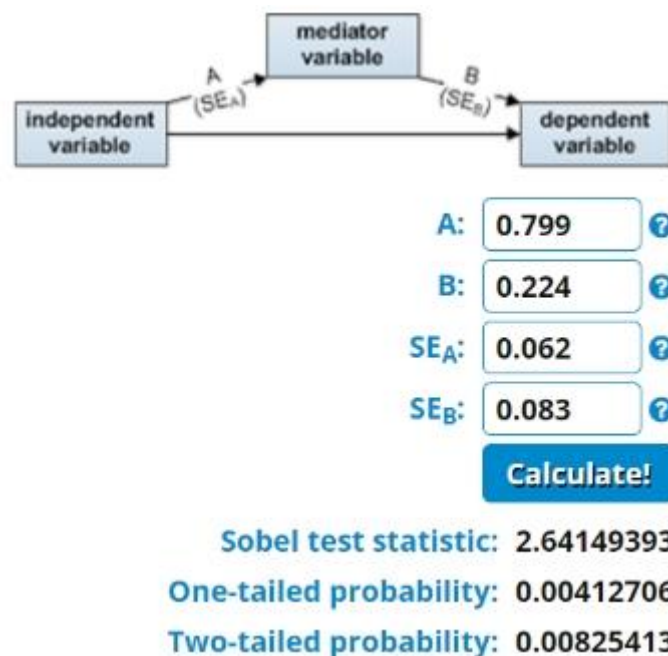


Figure 2. Sobel Test Calculator

Source: <https://www.danielsoper.com/statcalc/calculator.aspx?id=31>

The results of the Sobel Test calculation show that the calculated Z value is 2.64. It is known that the Z value of the table is 1.96. Thus, the calculated Z value is greater than the Z table value. The Sobel Test results also show that the One-Tailed Probability value is 0.004 and the Two-Tailed Probability value is 0.008. The One-Tailed Probability value and the Two-Tailed Probability value are less than 0.05. Thus, this research shows the results that Inter-Functional Coordination mediates the influence of Technology Orientation on Product Innovation.

The importance of focusing on technology for SMEs in developing product innovation is undeniable, because technology has a crucial role in the dynamics of innovation and competition in today's business world. Emphasis on technology is vital in

developing product innovation because: (1) Technology is often the main source of innovative ideas for developing new products or improving existing products. By utilizing the latest technology, SMEs can create new solutions that are more efficient, attractive and provide added value for customers; (2) Technology allows product development to be carried out more quickly and efficiently; (3) The use of advanced technology enables increased product quality by providing better control over the production process and improving product design; (4) Technology enables the development of products with new features that were previously impossible to achieve; (5) Technological innovation allows SMEs to create products that can reach global markets more easily. E-commerce platforms, digital marketing and communication technologies enable SMEs to market their products and sell them to customers in various countries; (6) In a competitive business environment, a focus on technology can be a determining factor in increasing the competitiveness of SMEs.

However, focusing on technology orientation for developing product innovation is not enough in this VUCA Era. Because SMEs need stronger Inter-Functional Coordination to optimize the strengthening of the relationship between Technology Orientation and Product Innovation. Strengthening cross-functional coordination has a vital role in connecting the focus on technology with the development of product innovation, because: (1) By establishing close coordination between departments or functions within the organization, it makes it easier to ensure that all parties have a uniform understanding of the organization's strategic goals, including objectives related to the development of product innovation; (2) Cross-functional coordination enables more efficient utilization of organizational resources; (3) Strong integration between functions allows synchronization of processes and activities required in product development; (4) With cross-functional coordination, opportunities open for greater collaboration and exchange of ideas between departments. Collaboration between different departments can produce better innovative solutions than if each department worked separately; (5) In the midst of a business environment that continues to change and develop, a fast response to technological changes becomes very important. Effective coordination between functions allows organizations to identify and adopt new technologies quickly, so they can remain at the forefront of developing product innovation. Thus, strengthening cross-functional coordination can increase the effectiveness of focusing on technology in producing product innovation, by ensuring that all departments work in a coordinated manner to achieve organizational innovation goals.

CLOSING

Conclusion

Collaboration between functions in SMEs mediates and acts as a link between the focus on technology and the development of product innovation, especially in the VUCA Era which is currently still relevant. In this framework, coordination between various units or departments within SMEs enables synergistic collaboration to create innovative new products using technology as the main driver. Cross-functional collaboration has a key role

in organizing the product innovation process by connecting product development steps with existing technology needs. Solid collaboration between research and development, production, marketing and other departments can facilitate the smooth flow of information and knowledge, enabling synergy in developing concepts, prototypes and bringing new products to market. Thus, coordination between functions not only helps in integrating a focus on technology with the development of product innovation, but also ensures that the assets and knowledge possessed by SMEs are used optimally to create products that meet market needs and utilize available technology.

Acknowledgement

We would like to express our gratitude to everyone who has supported our research on SME product innovation in the VUCA era. First of all, we appreciate the time and insights provided by respondents in surveys and interviews, which have provided valuable insights and formed the basis of our research. We would also like to thank H. Yulipri, Head of the Sukabumi Regency Small and Medium Enterprises Cooperatives Service (Dinas Koperasi Usaha Kecil dan Menengah/DKUKM), who has provided data support for this research.

In addition, we would like to acknowledge the valuable contributions of the reviewers and editors who have provided meaningful input and suggestions in the process of reviewing this article, especially Dr. Asep M. Ramdan who is also Deputy Chancellor 1 of the Muhammadiyah University of Sukabumi (UMMI) and Dr. Jujun Ratnasari who is also the chairman of LPPM UMMI. Without their contribution, the quality of this research would not reach the expected standards.

We would also like to express our gratitude to our family and friends for their extraordinary moral support and motivation during this research process, especially to Alhidayatullah, Muhammad Khairul Amal and Muh. Abdul Aziz who is also part of the research team. The enthusiasm they gave has become a source of inspiration and motivation for us to complete this research.

Lastly, we would like to appreciate all parties who have provided contributions and support in various forms during this research process, although we cannot mention them one by one. We are grateful for all the help and support that has been provided, because this contribution is very significant in the success of our research.

Declaration of Conflicting Interests

The authors assert that there are no conflicting interests associated with the publication of this research paper titled 'Product Innovation of SMEs in VUCA Era.' The study was conducted with the primary aim of contributing to the academic understanding and knowledge in the domain of innovation within Small and Medium Enterprises (SMEs) during the VUCA era. Neither financial nor personal connections with other individuals or organizations have influenced the research process, analysis, or interpretation of the results.

We affirm that this manuscript has been exclusively submitted to this International Seminar and is not currently being considered for publication elsewhere. All authors have

thoroughly reviewed the final version of the manuscript and have unanimously agreed to its submission for publication.

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PRODUCT INNOVATION OF SMEs IN VUCA ERA

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DOI: <https://doi.org/10.54443/sibatik.v3i8.2308>

