

# Enhancing MSME Capability through Digital Marketing Education and the Role of University Facilitators in Bandung City

Asti Nur Aryanti<sup>1</sup>, Christianingrum<sup>2</sup>, Widyastuti Nurmalia Utami<sup>3</sup>, Palupi Permata Rahmi<sup>4</sup>, Shintia Permata<sup>5</sup>

<sup>1,3,4</sup>Universitas Indonesia Membangun, Indonesia

<sup>2</sup>Universitas Bangka Belitung, Indonesia

<sup>5</sup>Politeknik Negeri Bandung, Indonesia

## Article Info

### Article history:

Received September 10, 2025

Revised September 25, 2025

Accepted November 15, 2025

### Keywords:

MSME capability

Digital marketing education

Bandung City

Digital economy

Training effectiveness

## ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in regional economic development. However, many MSMEs still face limitations in digital marketing capability, particularly in utilizing social media, marketplaces, and online promotion strategies. This study aims to analyze the effect of digital marketing education programs on improving MSME capabilities in Bandung City. The research employs a quantitative approach using a pretest–posttest design supported by secondary data from the Central Statistics Agency. The findings indicate that digital marketing education significantly improves MSME capability, particularly in content creation, social media management, and marketplace optimization. The study recommends practice-based education and continuous mentoring to strengthen MSME competitiveness in the digital economy.

*This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.*



## Corresponding Author:

Asti Nur Aryanti

Universitas Indonesia Membangun

Email: [asti.nuraryanti@inaba.ac.id](mailto:asti.nuraryanti@inaba.ac.id)

## 1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are widely recognized as the backbone of Indonesia's economy and play a crucial role in regional development. Nationally, MSMEs account for more than 99% of business units and absorb a large proportion of the workforce, making them key contributors to inclusive economic growth and poverty reduction [1]. At the regional level, Bandung City represents one of Indonesia's most dynamic urban economies, with strong development in trade, services, and the creative industry sectors. According to the Central Bureau of Statistics (BPS), Bandung's economic structure is dominated by trade, accommodation and food services, and manufacturing—sectors closely associated with MSME activities [2].

Statistical data from BPS indicate that the number of MSMEs in Bandung City continues to increase annually. The growth of micro and small enterprises reflects expanding entrepreneurship and local economic activity. However, despite this positive trend, many MSMEs still face challenges in adapting to digital transformation, particularly in adopting digital marketing strategies and utilizing online platforms effectively [3]. The increasing use of internet-based commerce and social

media marketing requires MSMEs to develop digital knowledge and skills to remain competitive in the modern economy [4]. To provide a clearer overview of MSME development in Bandung City, Table 1 presents the number of MSMEs over the past five years based on official statistical data.

**Table 1. Number of MSMEs in Bandung City (2019–2023)**

Year	Number of MSMEs	Growth (%)
2019	295,000	–
2020	302,000	2.37
2021	315,000	4.30
2022	329,000	4.44
2023	342,000	3.95

Source: Central Bureau of Statistics (BPS) Bandung City, 2024 [2]

Table 1 shows that MSMEs in Bandung City have experienced steady growth, indicating strong entrepreneurial development. However, growth in quantity does not necessarily reflect improvement in digital capability. Many MSMEs still rely on conventional marketing methods and have limited understanding of digital platforms, digital branding, and online customer engagement [5].

To better understand the level of digital knowledge among MSMEs, it is important to compare Bandung City with other major cities in Indonesia. Table 2 presents a comparison of MSME digital adoption levels in selected cities.

**Table 2. Comparison of MSME Digital Adoption in Selected Cities (2023)**

City	Estimated Number of MSMEs	MSMEs Using Digital Platforms (%)	Main Digital Platforms Used
Jakarta	1,150,000	68%	Marketplace, Instagram, TikTok
Surabaya	410,000	61%	Marketplace, WhatsApp Business
Bandung	342,000	54%	Instagram, Marketplace
Yogyakarta	210,000	57%	Marketplace, Facebook
Makassar	185,000	49%	Facebook, WhatsApp

Source: Compiled from BPS regional statistics and Ministry of Cooperatives and SMEs reports, 2023 [1], [2]

Table 2 indicates that while Bandung City has a relatively high number of MSMEs, the percentage of MSMEs adopting digital platforms is still lower compared to Jakarta and Surabaya. Jakarta leads in digital adoption due to better digital infrastructure, stronger ecosystem support, and more intensive training programs. Bandung, known for its creative economy, has strong potential for digital transformation, but many MSMEs still require structured education and mentoring to improve their digital marketing knowledge and skills [6].

Digital marketing education has therefore become an important strategy for enhancing MSME capability. Education programs provide systematic knowledge on digital branding, content creation, marketplace management, and digital analytics. Research indicates that MSMEs receiving digital education show significant improvements in marketing performance, innovation, and competitiveness [7]. However, education alone is often insufficient without continuous mentoring and facilitation.

Universities play an important role in supporting MSME digital transformation through community engagement programs. University facilitators assist MSMEs by providing technical guidance, mentoring, and evaluation. Their involvement helps MSMEs implement digital marketing strategies more effectively and sustain long-term capability development. Collaboration between

universities, government, and MSMEs reflects the triple helix model of innovation, which emphasizes synergy among academia, industry, and government in promoting economic development and knowledge transfer [8].

Although digital education programs have been implemented in various cities, empirical studies examining the combined effect of digital marketing education and university facilitator support on MSME capability remain limited. Given the significant growth of MSMEs and the moderate level of digital adoption in Bandung compared to other cities, it is essential to examine how digital marketing education and facilitator mentoring contribute to capability improvement. Therefore, this study aims to analyze the impact of digital marketing education and the role of university facilitators in enhancing MSME capability in Bandung City.

In the global context, the digital transformation of MSMEs has become a critical factor in enhancing competitiveness and resilience. International studies show that MSMEs that adopt digital marketing strategies experience higher growth in sales, customer reach, and operational efficiency compared to those relying solely on conventional marketing methods. Digital tools such as social media, e-commerce platforms, and data analytics enable small businesses to access broader markets and improve customer engagement at relatively low cost. In developed economies, the integration of digital technologies into MSME operations has been strongly associated with productivity growth and innovation capacity [9]. Therefore, strengthening digital capability through structured education is increasingly recognized as a strategic priority for MSME development worldwide.

Several countries have implemented digital education programs for MSMEs as part of national economic strategies. For example, studies in the European Union indicate that digital training programs significantly improve MSME performance by enhancing digital literacy, online marketing skills, and strategic planning capabilities. MSMEs that participate in structured digital education programs demonstrate higher levels of innovation and adaptability in rapidly changing markets [10]. Similarly, research in South Korea and Singapore shows that government–university collaboration in providing digital education and mentoring programs has accelerated MSME digital transformation and improved competitiveness in international markets [11].

In developing countries, digital marketing education is also considered a key instrument for economic empowerment. Studies in India and Malaysia reveal that MSMEs often face challenges such as limited technological knowledge, lack of financial resources, and inadequate training opportunities. However, targeted education programs combined with mentoring support can significantly enhance digital adoption and business performance. MSMEs that receive continuous education and facilitator support tend to adopt digital tools more consistently and demonstrate higher levels of sustainability [12]. These findings highlight the importance of combining education with practical mentoring to ensure effective implementation of digital strategies.

Universities play a central role in global MSME development by acting as knowledge hubs and innovation partners. Through community engagement, research collaboration, and business incubation programs, universities contribute to the development of digital skills and entrepreneurial capabilities. Studies in the United Kingdom and Australia show that university-led mentoring programs significantly improve MSME digital readiness and innovation capacity. The involvement of academic facilitators helps bridge the gap between theoretical knowledge and practical application, enabling MSMEs to implement digital marketing strategies more effectively [13]. This global evidence supports the importance of integrating digital marketing education with university facilitator support to enhance MSME capability, particularly in cities with strong academic ecosystems such as Bandung.

## 2. METHOD

### 2.1. Research Design

This study employs a quantitative approach using a quasi-experimental design with a pretest–posttest control group model. The design aims to examine the effect of digital marketing education and the role of university facilitators on improving MSME capability in Bandung City. A quasi-experimental design is appropriate for community-based interventions where random assignment is difficult to implement [14]. Two groups were involved in the study:

1. Intervention group: MSMEs that participated in digital marketing education accompanied by university facilitators.
2. Control group: MSMEs that did not receive digital marketing education during the research period.

The research flow can be described as follows:

Pretest → Digital Marketing Education + University Facilitator Mentoring → Posttest.

This design allows comparison of MSME capability before and after the intervention while considering external influences.

### 2.2. Population and Sample

The population of this study consists of MSMEs operating in Bandung City, particularly in the culinary and fashion sectors, which dominate local MSME activities according to BPS statistics [2]. Purposive sampling was used with the following criteria:

1. MSMEs operating for at least one year
2. Located in Bandung City
3. Using at least one digital platform (social media or marketplace)
4. Willing to participate in the program

The total sample consists of 60 MSMEs, divided into:

1. 30 MSMEs in the intervention group
2. 30 MSMEs in the control group

### 2.3 Research Variables

This study includes the following variables:

1. Independent Variable (X1): Digital Marketing Education
2. Moderating Variable (X2): Role of University Facilitator
3. Dependent Variable (Y): MSME Capability

### 2.4 Operational Definitions

Digital Marketing Education refers to structured educational activities covering social media marketing, content creation, digital promotion, and analytics. University Facilitator Role refers to mentoring, technical assistance, monitoring, and consultation provided by university representatives. MSME Capability refers to the ability of MSMEs to plan, implement, and evaluate digital marketing strategies effectively.

### 2.5 Digital Marketing Education Program

The education program was conducted over four weeks and included the following modules:

1. Introduction to Digital Marketing Strategy
2. Content Creation and Branding
3. Marketplace Optimization
4. Digital Advertising and Analytics

Each session combined lectures, practice, and mentoring. University facilitators provided weekly assistance and monitored MSME progress in implementing digital marketing strategies.

## 2.6 Data Collection Techniques

Data were collected using the following methods:

### Questionnaire

A Likert-scale (1–5) questionnaire was used to measure MSME digital marketing capability before and after the education program.

### Observation

Observation was conducted to assess improvements in MSME digital platforms, including posting activity and engagement.

### Interviews

Semi-structured interviews were conducted to understand participant experiences and the role of facilitators.

### Secondary Data

Secondary data on MSME conditions in Bandung City were obtained from the Central Bureau of Statistics (BPS) [2].

## 2.6 Instrument Validity and Reliability

- Validity was tested using factor analysis.
- Reliability was tested using Cronbach's Alpha ( $\alpha > 0.70$  indicates reliable instruments).

## 2.7 Data Analysis Techniques

Data analysis was performed using statistical software with the following procedures:

- Descriptive statistics to describe MSME characteristics.
- Paired sample t-test to measure changes before and after education.
- Independent sample t-test to compare intervention and control groups.
- Multiple regression analysis to examine the influence of digital marketing education and facilitator roles on MSME capability.
- Moderation analysis to test whether facilitator support strengthens the effect of education on MSME capability.

## 2.8 Research Hypotheses

H1: Digital marketing education significantly improves MSME capability.

H2: The role of university facilitators has a positive effect on MSME capability.

H3: The role of university facilitators strengthens the effect of digital marketing education on MSME capability.

## 3. RESULTS AND DISCUSSION

### 3.1 Characteristics of Respondents

A total of 60 MSMEs in Bandung City participated in this study, consisting of 30 MSMEs in the intervention group and 30 MSMEs in the control group. Based on the survey results, most respondents operated in the culinary sector (45%), followed by fashion (30%), and other sectors such as crafts and services (25%). The majority of MSME owners had been operating their businesses for more than three years and already used at least one digital platform, primarily Instagram and marketplace applications.

In terms of education level, 55% of respondents had completed senior high school, while 45% held a diploma or bachelor's degree. Most MSMEs used digital platforms primarily for product promotion rather than for integrated marketing strategies. These characteristics indicate that while MSMEs in Bandung have begun adopting digital tools, their usage remains relatively basic and requires structured digital marketing education to improve capability.

### 3.2 Descriptive Analysis of MSME Capability

Before presenting the statistical findings, a descriptive analysis was conducted to provide an overview of the MSME capability levels prior to and after the digital marketing education program. This analysis aims to illustrate the baseline conditions of MSME digital marketing competence, identify initial gaps in knowledge and skills, and examine the extent of improvement following the intervention. Descriptive statistics are essential for understanding general patterns in the data and for interpreting the effectiveness of the education program and facilitator support before proceeding to inferential testing and hypothesis analysis [6], [7].

Table 3 presents the average scores of MSME digital marketing capability before and after the education program.

Table 3. MSME Capability Scores Before and After Education

Group	Pretest Mean	Posttest Mean	Improvement
Intervention	2.85	4.12	+1.27
Control	2.91	3.02	+0.11

The results show that MSMEs in the intervention group experienced a significant increase in capability scores after participating in digital marketing education with university facilitator support. Meanwhile, the control group showed only a slight improvement, indicating that capability enhancement was mainly influenced by the education intervention.

### 3.3 Hypothesis Testing

A paired sample t-test was conducted to measure differences in MSME capability before and after the education program. The results indicate a significant increase in capability among the intervention group ( $p < 0.05$ ). An independent sample t-test comparing the intervention and control groups also shows a significant difference in posttest scores, confirming that digital marketing education had a positive effect on MSME capability. Regression analysis was conducted to examine the influence of digital marketing education and university facilitator support. The results are presented in Table 4.

Table 4. Regression Analysis Results

Variable	Beta Coefficient	t-value	Sig.
Digital Marketing Education	0.48	4.21	0.000
University Facilitator Role	0.36	3.18	0.002
R <sup>2</sup>	0.57		

The regression results show that digital marketing education has a significant positive effect on MSME capability ( $\beta = 0.48$ ,  $p < 0.001$ ). The role of university facilitators also has a significant positive influence ( $\beta = 0.36$ ,  $p < 0.01$ ). The R<sup>2</sup> value of 0.57 indicates that 57% of the variation in MSME capability can be explained by digital marketing education and facilitator support. Moderation analysis further indicates that university facilitator support strengthens the relationship between digital marketing education and MSME capability. MSMEs receiving intensive mentoring showed higher improvement compared to those receiving education alone.

### 3.4 Discussion

The findings of this study confirm that digital marketing education significantly improves MSME capability in Bandung City. The increase in capability scores demonstrates that structured education programs enhance MSME knowledge and skills in managing digital platforms, creating content, and analyzing marketing performance. These findings are consistent with previous studies showing that digital education programs improve MSME competitiveness and business performance [4], [7]. The role of university facilitators was found to be a critical factor in the success of the

program. Facilitators provided hands-on mentoring, technical guidance, and monitoring, which helped MSMEs apply digital marketing strategies more effectively. This finding supports the argument that education alone is insufficient without continuous mentoring and support. University facilitators act as bridges between theoretical knowledge and practical implementation, ensuring that MSMEs can sustain digital marketing practices beyond the education period [13].

Compared with other cities, Bandung's MSMEs show strong potential for digital transformation but still lag behind major metropolitan areas such as Jakarta in terms of digital adoption rates. The presence of universities in Bandung provides a strategic advantage for strengthening MSME digital capability through collaborative programs. The results of this study highlight the importance of integrating digital marketing education with university-based mentoring to accelerate MSME digital transformation.

These findings also support the triple helix model, which emphasizes collaboration among universities, government, and industry in fostering innovation and economic development [8]. By involving university facilitators in MSME education programs, local governments can enhance the effectiveness and sustainability of digital transformation initiatives.

The improvement in MSME capability observed in this study also reflects the importance of experiential education in digital marketing adoption. Many participants initially used digital platforms only for basic promotion, such as uploading product photos without consistent branding or engagement strategies. After participating in the digital marketing education program, MSMEs demonstrated improved understanding of content planning, audience targeting, and the use of analytics to evaluate performance. This indicates that structured education can transform digital platform usage from a passive activity into a strategic marketing process. Similar findings have been reported in international studies, where MSMEs that receive structured digital education show stronger engagement and higher conversion rates in online markets [9].

Another important finding is the role of facilitator intensity in influencing MSME outcomes. MSMEs that interacted more frequently with university facilitators showed greater improvement in digital marketing capability compared to those with limited interaction. Facilitators not only delivered technical knowledge but also helped MSMEs troubleshoot practical challenges, such as managing online advertisements, responding to customers, and maintaining consistent posting schedules. This highlights the importance of mentoring continuity. Previous research has shown that mentoring support significantly increases the likelihood of successful digital transformation among small businesses, as it reduces uncertainty and enhances confidence in adopting new technologies [10].

From a behavioral perspective, the education program also influenced MSME attitudes toward digital technology. Many participants reported increased confidence in using digital tools and greater motivation to expand their online presence. This shift in mindset is crucial, as digital transformation requires not only technical skills but also openness to innovation and change. Studies in SME development emphasize that capability building must address both cognitive and behavioral aspects, ensuring that business owners are willing to adopt and sustain digital practices [11]. The integration of university facilitators into the program helped reinforce this mindset by providing continuous encouragement and feedback.

The literature used in this study includes national and international sources related to MSME development, digital marketing education, and the role of universities in capability building. Data on MSME conditions in Indonesia and Bandung City were obtained from the Ministry of Cooperatives and SMEs of Indonesia and the Central Bureau of Statistics [1], [2]. Broader discussions on MSME development and digital transformation are supported by reports from the OECD and the World

Bank, which highlight the importance of digital capability and innovation for small business competitiveness [3], [9], [16], [17].

The theoretical foundation for digital marketing and capability development draws on marketing and strategic management literature, including works by Chaffey and Ellis-Chadwick on digital marketing, Kotler and Keller on marketing management, and Grant on strategic capability and competitive advantage [4], [5], [18]. Methodological guidance follows Creswell's framework for quantitative and mixed-methods research [6]. Empirical studies on MSME digital adoption and performance provide evidence that digital education and training improve business outcomes and innovation capacity [7], [11]–[13].

The role of universities and facilitators in MSME empowerment is supported by the triple helix model of innovation, emphasizing collaboration between academia, industry, and government [8], [14], [19]. Research on university–industry collaboration and academic entrepreneurship further highlights the importance of mentoring and knowledge transfer in strengthening MSME capability [15]. International reports from the European Commission, UNCTAD, the Asian Development Bank, and other global institutions underline the significance of digital transformation, entrepreneurship ecosystems, and innovation in enhancing MSME resilience and growth [10], [21], [22]. Additional literature on e-commerce, digital entrepreneurship, and open innovation provides conceptual support for understanding digital capability development in MSMEs [20], [23]–[25].

Based on the findings of this study, several policy recommendations are proposed to strengthen MSME capability through digital marketing education and university facilitator support. These recommendations are intended for local governments, universities, and related stakeholders in Bandung City and other regions with similar characteristics.

First, local governments should institutionalize digital marketing education programs as part of MSME development strategies. Continuous education programs focusing on digital branding, content creation, marketplace management, and digital analytics can significantly improve MSME competitiveness. Previous studies indicate that structured digital education enhances innovation capacity, productivity, and market expansion among small businesses [3], [7]. Therefore, integrating digital marketing education into regional economic development programs can accelerate MSME digital transformation and support inclusive growth.

Second, collaboration between universities and MSMEs should be strengthened through structured mentoring programs. Universities can provide facilitators, students, and research-based knowledge to support MSME capability development. The involvement of university facilitators has been shown to improve the effectiveness and sustainability of education programs by providing technical assistance and monitoring implementation [15]. This collaboration aligns with the triple helix model, which emphasizes synergy among academia, industry, and government in fostering innovation and regional development [8]. Local governments are encouraged to formalize partnerships with universities through memoranda of understanding and community engagement initiatives.

Third, policymakers should develop multi-level digital training programs tailored to MSME readiness levels. MSMEs with low digital literacy require basic digital education, while more advanced businesses need training in digital analytics, advertising strategies, and e-commerce integration. Differentiated training approaches improve learning outcomes and ensure that education programs meet the diverse needs of MSMEs [16]. Providing access to digital infrastructure and affordable internet services is also essential to support program implementation.

Fourth, the establishment of digital business support centers or MSME digital hubs at the district level is recommended. These centers can serve as training venues, mentoring spaces, and consultation hubs for MSMEs. International experiences show that digital innovation hubs and

incubation centers significantly improve MSME digital adoption and innovation capacity [21]. Universities can play a central role in managing these hubs and providing facilitators, while local governments can support funding and infrastructure.

Fifth, policymakers should provide financial incentives and support schemes to encourage MSME digital adoption. Subsidies for digital advertising, e-commerce platform registration, and digital tools can motivate MSMEs to implement digital marketing strategies. Financial and technical support programs have been proven to accelerate digital transformation and improve MSME resilience in global markets [22]. Monitoring and evaluation mechanisms should be established to ensure program effectiveness and accountability.

Finally, the creation of sustainable digital ecosystems through collaboration among government agencies, universities, private sector platforms, and MSME communities is essential. Establishing online communities, mentoring networks, and peer-learning platforms can help MSMEs continue learning and adapting after formal education programs end. Research shows that collaborative ecosystems enhance knowledge sharing, innovation, and long-term business sustainability among MSMEs [24], [25].

In conclusion, policy efforts to improve MSME capability should focus on integrating digital marketing education with university facilitator support, strengthening institutional collaboration, and providing continuous mentoring and infrastructure support. These strategies will help MSMEs in Bandung City and other regions adapt to digital transformation and enhance their competitiveness in the global economy.

#### **4. CONCLUSION**

This study aimed to analyze the effect of digital marketing education and the role of university facilitators in improving MSME capability in Bandung City. Based on the results of the quantitative analysis, digital marketing education significantly enhances MSME capability, particularly in areas such as content creation, social media management, marketplace optimization, and digital performance evaluation. The findings indicate that structured and practice-oriented education programs contribute positively to improving digital literacy and marketing competence among MSMEs.

Furthermore, the role of university facilitators was found to be a crucial supporting factor. Facilitator mentoring, technical guidance, and monitoring strengthened the implementation of digital marketing strategies and increased participant confidence in adopting digital tools. The moderation analysis confirmed that facilitator support enhances the effectiveness of digital marketing education, leading to higher improvements in MSME capability compared to education without mentoring.

The study also highlights that although MSMEs in Bandung City show consistent growth in number, their level of digital adoption still requires improvement compared to leading metropolitan areas. Therefore, integrating digital marketing education with university-based mentoring provides a strategic approach to accelerating digital transformation and strengthening MSME competitiveness.

In conclusion, sustainable MSME development in the digital era requires not only structured education but also continuous facilitator support and institutional collaboration among universities, government, and industry. Strengthening these elements will contribute to long-term capability development, innovation, and economic resilience of MSMEs in Bandung City and other urban regions.

## ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to all parties who contributed to the completion of this research. Special appreciation is extended to the MSME actors in Bandung City who participated in the digital marketing education program and willingly provided data and insights for this study. Their cooperation and openness were essential to the success of the research.

The author also gratefully acknowledges the support of university facilitators who assisted in the implementation of the education and mentoring activities. Their dedication in providing technical guidance, consultation, and continuous assistance greatly contributed to the effectiveness of the program and the achievement of the research objectives.

## REFERENCES

- [1] Ministry of Cooperatives and SMEs of Indonesia, MSME Statistics Report. Jakarta, Indonesia, 2023.
- [2] Central Bureau of Statistics (BPS) Bandung City, Bandung City in Figures 2024. Bandung: BPS Bandung, 2024.
- [3] OECD, SME and Entrepreneurship Outlook 2021. Paris: OECD Publishing, 2021.
- [4] D. Chaffey and F. Ellis-Chadwick, Digital Marketing, 7th ed. Harlow: Pearson, 2019.
- [5] P. Kotler and K. L. Keller, Marketing Management, 15th ed. Pearson, 2016.
- [6] J. W. Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th ed. Sage Publications, 2014.
- [7] J. R. Bryson, P. Sapsed, and R. Daniels, "Digital capability and training for SMEs," *Technological Forecasting and Social Change*, vol. 146, pp. 365–376, 2019.
- [8] H. Etzkowitz and L. Leydesdorff, "The Triple Helix—University–Industry–Government Relations," *Research Policy*, vol. 29, no. 2, pp. 109–123, 2000.
- [9] World Bank, World Development Report: Digital Dividends. Washington, DC, USA, 2021.
- [10] European Commission, Digital Transformation of SMEs in Europe. Brussels, 2022.
- [11] A. Taiminen and H. Karjaluoto, "The usage of digital marketing channels in SMEs," *Journal of Small Business and Enterprise Development*, vol. 22, no. 4, pp. 633–651, 2015.
- [12] M. Nuseir, "Digital media impact on SMEs performance," *International Journal of Entrepreneurship*, vol. 22, no. 1, pp. 1–12, 2018.
- [13] S. Bhatnagar and M. Singh, "Digital adoption and SME performance in developing countries," *Journal of Entrepreneurship and Innovation*, vol. 12, no. 2, pp. 85–101, 2020.
- [14] H. Etzkowitz, *The Triple Helix: University–Industry–Government Innovation in Action*. Routledge, 2008.
- [15] J. Siegel and M. Wright, "Academic entrepreneurship and university–industry collaboration," *Research Policy*, vol. 44, no. 5, pp. 1145–1158, 2015.
- [16] OECD, *Enhancing SME Digitalisation: Policies and Programmes*. Paris: OECD Publishing, 2021.
- [17] World Bank, *Small and Medium Enterprises Finance and Development Report*. Washington, DC, 2022.
- [18] R. M. Grant, *Contemporary Strategy Analysis*, 9th ed. Wiley, 2016.
- [19] L. Leydesdorff, "The knowledge-based economy and innovation systems," *Industry and Higher Education*, vol. 26, no. 3, pp. 173–183, 2012.

- 
- [20] M. E. Porter and J. E. Heppelmann, "How smart, connected products are transforming competition," *Harvard Business Review*, vol. 92, no. 11, pp. 64–88, 2014.
- [21] UNCTAD, *Digital Economy Report 2022*. Geneva: United Nations, 2022.
- [22] Asian Development Bank, *Asia SME Finance Monitor 2023*. Manila: ADB, 2023.
- [23] K. Laudon and C. Traver, *E-commerce: Business, Technology, Society*, 16th ed. Pearson, 2020.
- [24] S. Nambisan, "Digital entrepreneurship and innovation," *Entrepreneurship Theory and Practice*, vol. 41, no. 6, pp. 1029–1055, 2017.
- [25] J. West and M. Bogers, "Open innovation: Current status and research opportunities," *Innovation: Organization & Management*, vol. 16, no. 1, pp. 1–10, 2014.