

## Cloud-based expertise: Evaluating proficiency in SAP C/4HANA for predicting entrepreneurial readiness in startup businesses

S. Martono<sup>1\*</sup>, Arief Yulianto<sup>1</sup>, Angga Pandu Wijaya<sup>1</sup>, Boonrat Plangsorn<sup>2</sup>

<sup>1</sup>Department of Management, Faculty of Economics and Business, Universitas Negeri Semarang, Semarang 50229, Indonesia; martono@mail.unnes.ac.id (S.M.) apwijaya@mail.unnes.ac.id (A.P.W.).

<sup>2</sup>Department of Educational Technology, Faculty of Education, Kasetsart University, Bangkok 10900, Thailand.

**Abstract:** This study aims to examine the impact of digital competency on entrepreneurial alertness and entrepreneurial readiness. Digital competency, such as the use of SAP C/4HANA, plays a crucial role in business and entrepreneurship. The utilization of SAP C/4HANA for customer insights and sales automation is particularly important for startup companies. This research employs a quantitative approach, involving 193 respondents who are startup business owners. Data were collected from startup business owners in Indonesia. The data were analyzed descriptively using a digital competency map matrix to understand the skills in utilizing SAP C/4HANA. Additionally, inferential analysis was conducted to test the relationships between variables. The findings indicate that the finance and e-commerce sectors have widely adopted SAP C/4HANA. In the finance sector, leveraging data and cloud technologies is essential, while for e-commerce, data analytics and cybersecurity are paramount. The inferential analysis results show that digital competency has a positive direct effect on entrepreneurial alertness but not on entrepreneurial readiness. Entrepreneurial alertness fully mediates the effect of digital competency on entrepreneurial readiness. The implication of this research is to strengthen the adoption of digital technologies in business, highlighting the uneven utilization of SAP C/4HANA across different business sectors.

**Keywords:** Digital competency, Entrepreneurial readiness, Startup businesses, SAP C/4HANA.

### 1. Introduction

In today's rapidly evolving business landscape, digital competency has become a crucial factor influencing entrepreneurial success. Digital competency refers to the ability to effectively use digital tools and technologies to achieve business goals [1]. Companies that leverage advanced digital competencies are more likely to achieve revenue growth than their competitors. Digital competency encompasses a range of skills and knowledge areas that enable individuals to navigate the digital landscape effectively. Information and data literacy is foundational to digital competency, as it involves the ability to locate, evaluate, and use digital information effectively. In the context of entrepreneurship, this skill allows individuals to analyze market trends, customer preferences, and competitive landscapes. Digital competence encompasses a range of skills that allow individuals to use digital technology effectively. This includes not only technical skills but also critical thinking, problem-solving, and the ability to communicate and collaborate in digital environments. This is particularly evident in sectors such as information technology, marketing, and finance, where digital proficiency is a prerequisite. There is a growing demand for individuals who are not only familiar with basic digital tools but also possess advanced skills in platforms like SAP C/4HANA, which is increasingly used for customer relationship management. One specific area of focus is proficiency in integrated systems such as SAP C/4HANA, which provides businesses with a comprehensive suite of tools for customer relationship management (CRM), commerce, and marketing [2]. SAP C/4HANA enhances business agility by helping businesses manage customer relationships effectively. The ability to leverage such technology not only streamlines operations but also provides startups with the agility needed to respond to market

changes. By utilizing SAP C/4HANA, startups can gain insights into customer behavior and preferences, allowing them to tailor their offerings accordingly.

Cloud-based expertise, particularly in enterprise software systems like SAP C/4HANA, is critical for businesses seeking to leverage cloud computing for enhanced customer relationship management. SAP C/4HANA is an integrated suite of applications designed to facilitate seamless customer experiences by providing tools for marketing, commerce, sales, service, and customer data management [3]. Evaluating proficiency in SAP C/4HANA requires a deep understanding of its components, such as SAP Marketing Cloud, SAP Commerce Cloud, SAP Sales Cloud, SAP Service Cloud, and SAP Customer Data Cloud. Each of these components integrates to form a holistic CRM solution that helps organizations engage customers more effectively and optimize their sales and service processes. Proficiency in SAP C/4HANA is often measured through certification programs, hands-on project experience, and familiarity with the platform's latest updates and best practices. Certifications, such as those offered by SAP, validate an individual's knowledge and skills in implementing and managing SAP C/4HANA solutions. These certifications ensure that professionals have a comprehensive understanding of the system's architecture, functionalities, and the ability to customize solutions to meet specific business needs. Additionally, real-world project experience provides practical insights and problem-solving skills that are crucial for effective system deployment and management. Evaluating proficiency involves assessing an individual's ability to integrate SAP C/4HANA with other SAP systems and third-party applications. This integration capability is essential for creating a unified IT environment that supports seamless data flow and enhanced operational efficiency. Experts in SAP C/4HANA must also stay updated with the latest technological advancements and updates released by SAP to ensure they can leverage new features and maintain system security and performance.

Digital competency fosters entrepreneurial alertness, which is the ability to identify and exploit new opportunities in the market. Previous research highlights that entrepreneurs with higher digital skills are more likely to recognize emerging trends and adapt their business models accordingly [4]. This agility is essential for startups, as they operate in environments characterized by uncertainty and rapid change. Therefore, enhancing digital competency can serve as a predictor of entrepreneurial alertness, enabling startups to navigate challenges more effectively. Digital competency is increasingly being recognized as a predictor of entrepreneurial alertness, which is essential for identifying and capitalizing on new opportunities. Entrepreneurs with strong digital skills are better equipped to monitor market trends and consumer behavior, allowing them to adjust their strategies proactively [5]. Entrepreneurial alertness is characterized by the ability to perceive opportunities that are not immediately obvious, and this skill is significantly enhanced by digital competencies [6]. The integration of digital tools such as social media analytics and online market research platforms allows entrepreneurs to gather real-time data about consumer preferences. A case study of a fashion startup that utilized social media analytics to gauge customer sentiment able to increase in their ability to adapt product lines in response to consumer feedback [7].

Digital competency plays a significant role in shaping this readiness, as it equips entrepreneurs with the necessary skills to navigate the complexities of starting a business in the digital era. One of the primary ways digital competency influences entrepreneurial readiness is through the ability to develop and implement effective business strategies [8]. Entrepreneurs proficient in digital tools can conduct thorough market research, analyze competition, and identify target demographics, which are critical steps in formulating a viable business plan. Despite the growing recognition of digital competency as a crucial factor influencing entrepreneurial success, there remains a significant research gap in understanding its impact on entrepreneurial alertness and entrepreneurial readiness in Indonesia. While various studies have explored the relationship between digital skills and entrepreneurship in global contexts such as [9]–[11], the specific dynamics within Indonesia's unique socio-economic environment are underexplored. Further investigation is needed to analyze how digital competency affects Indonesian entrepreneurs' ability to identify and seize market opportunities (entrepreneurial alertness) and their preparedness to launch and sustain business (entrepreneurial readiness).

## 2. Method

This study employs a quantitative approach, specifically utilizing a causal research design to investigate the relationships between digital competency, entrepreneurial alertness, and entrepreneurial readiness. The sample consists of 193 startup owners from various sectors in Indonesia, all of whom are utilizing digitalization through SAP C/4HANA. These sectors include finance, e-commerce, technology, and other emerging industries. Participants were selected using a purposive sampling technique to ensure that all respondents have experience with SAP C/4HANA, thereby guaranteeing the relevance of the data to the study's objectives. Data were collected using a structured questionnaire distributed online. The questionnaire was designed to measure digital competency, entrepreneurial alertness, and entrepreneurial readiness, along with demographic information and business characteristics. Items were adapted from existing validated scales and tailored to the context of SAP C/4HANA usage in startups. Data analysis was conducted in two main phases: descriptive analysis and inferential analysis. Descriptive statistics were used to summarize the demographic characteristics of the respondents and to map the digital competencies using a digital competency map matrix. This analysis provided insights into the general trends and patterns of SAP C/4HANA utilization among the sample population. Inferential analysis was performed using Structural Equation Modeling (SEM) with Partial Least Squares (PLS) approach [12].

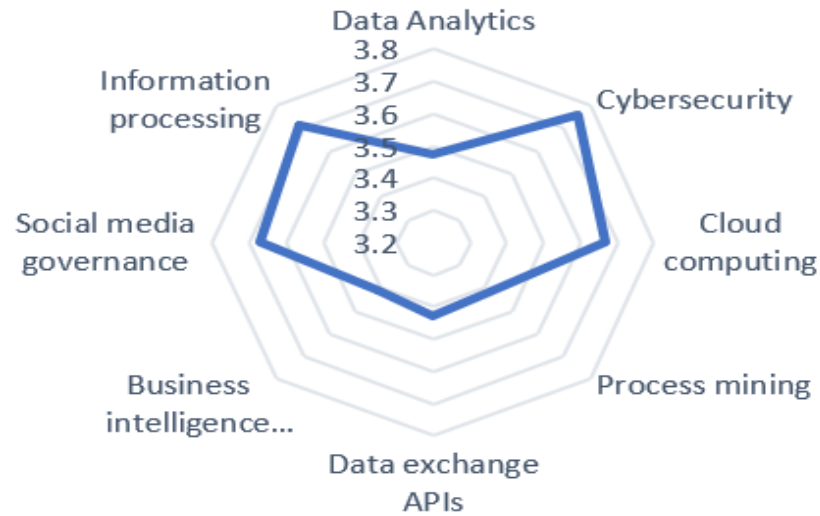
## 3. Result and Discussion

The results of this study present an analysis of digital competence, specifically in the proficiency of using SAP C/4HANA. The analysis was conducted by measuring the level of proficiency and the influence between variables. The testing included descriptive analysis, validity and reliability tests, path coefficient analysis, as well as the examination of direct and indirect effects among variables. This study collected 193 samples that can be classified into several sectors, as shown in Table 1.

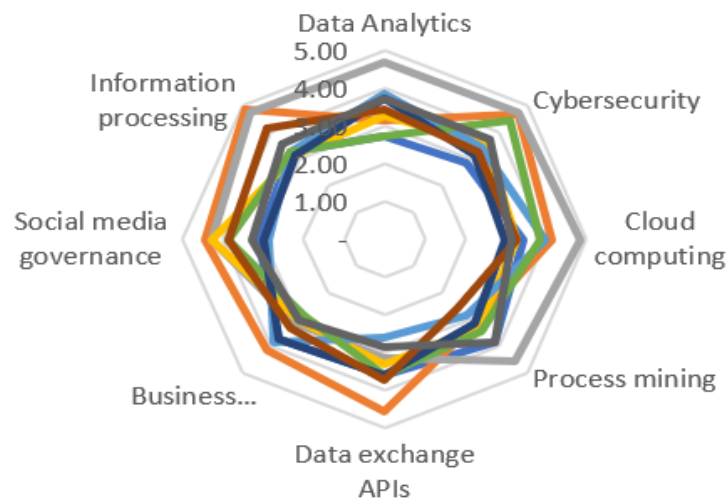
**Table 1.**  
Start up sector.

Startup sector	Number of start up	Percentage
Education	14	7.25%
Finance	36	18.65%
E-commerce	34	17.62%
Entertainment and Media	21	10.88%
Agriculture	12	6.22%
Hospitality and Tourism	14	7.25%
Food and Beverage	31	16.06%
Fashion and Apparel	24	12.44%
Others	7	3.63%
Total	193	100.00%

The proficiency ratings in Figure 1 depict various skills in a startup business, on a scale from 1 to 5. Cybersecurity (3.76) and Information Processing (3.72) have the highest ratings, indicating that startups generally have a strong capability in protecting data and efficiently processing information. Cloud Computing (3.67) and Social Media Governance (3.67) also score well, showing competence in managing cloud services and overseeing social media activities. Data Analytics (3.47), Data Exchange APIs (3.43), Process Mining (3.41), and Business Intelligence Tools (3.41) have slightly above average ratings, suggesting these areas could benefit from additional focus and development.



**Figure 1.**  
Start up digital competency map.



**Figure 2.**  
Startup digital competency by sector.

Based on Figure 2, startups in Finance and E-commerce are at the forefront of technology adoption, particularly in areas that directly impact their core operations. For Finance, leveraging data and cloud technologies is crucial for better financial management and efficiency. For E-commerce, data analytics and cybersecurity are essential for operational success and customer trust. Startups in Education and

Agriculture show more moderate ratings across the listed technologies. This may indicate that these sectors are either at earlier stages of adopting these technologies or have different priorities. For instance, Education may focus more on educational tools and platforms rather than advanced data analytics, while Agriculture may prioritize technologies related to production and logistics.

**Table 2.**  
Validity test result.

Variable	Indicator	Digital competence	Entrepreneurial alertness	Entrepreneurial readiness
Digital competence	DC1	0.945		
	DC2	0.962		
	DC3	0.879		
	DC4	0.959		
	DC5	0.933		
Entrepreneurial alertness	EA1		0.945	
	EA2		0.952	
	EA3		0.955	
	EA4		0.944	
	EA5		0.928	
Entrepreneurial readiness	ER1			0.936
	ER2			0.936
	ER3			0.932
	ER4			0.944

**Table 3.**  
Path coefficient.

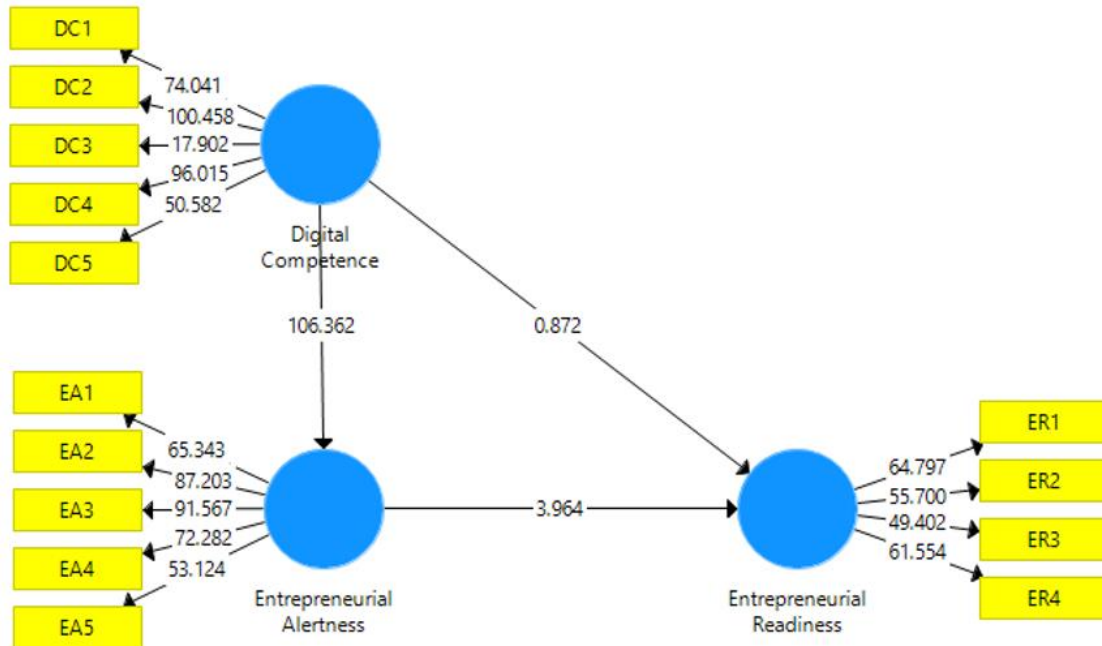
	Entrepreneurial alertness	Entrepreneurial readiness
Digital competence	0.962	0.167
Entrepreneurial alertness	-	0.749

In Table 3, the path coefficient is 0.962. This high value suggests a strong positive relationship between digital competence and entrepreneurial readiness. Individuals with higher digital competence are more likely to be ready for entrepreneurial activities. The path coefficient is 0.167. This lower value suggests a weak positive relationship between digital competence and entrepreneurial alertness. While there is a positive relationship, it is not as strong as the relationship with entrepreneurial readiness. The path coefficient is 0.749. This value indicates a strong positive relationship between entrepreneurial alertness and entrepreneurial readiness. Individuals who are more alert to entrepreneurial opportunities tend to be more ready to engage in entrepreneurial activities.

The validity testing results indicate that all research indicators have met the validity test criteria. This is evident from the loading factors, which are greater than 0.7. The test results are presented in Table 2. The reliability testing results are shown in Table 4. The values of Cronbach's Alpha, rho\_A, and Composite Reliability have met the reliability criteria.

**Table 4.**  
Reliability test result.

Variable	Cronbach's alpha	rho_A	Composite reliability
Digital competence	0.964	0.967	0.972
Entrepreneurial alertness	0.97	0.97	0.976
Entrepreneurial readiness	0.954	0.956	0.966



**Figure 3.**  
Research framework.

The results of the direct effect testing are presented in Table 5, while the results of the indirect effect testing are shown in Table 6. Figure 3 provides a summary of both the direct and indirect effects in forming entrepreneurial readiness.

**Table 5.**  
Results of direct effect testing.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	P values
Digital competence → Entrepreneurial alertness	0.962	0.962	0.009	106.362	0.000
Digital competence → Entrepreneurial readiness	0.167	0.159	0.192	0.872	0.384
Entrepreneurial alertness → Entrepreneurial readiness	0.749	0.759	0.189	3.964	0.000

**Table 6.**  
Results of indirect effect testing.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	P values
Digital competence → Entrepreneurial alertness → Entrepreneurial readiness	0.721	0.73	0.182	3.951	0.000

The test results in Table 5 and 6 indicate that digital competence has a direct effect on entrepreneurial alertness but no direct effect on entrepreneurial readiness. The tests demonstrate that entrepreneurial alertness fully mediates the effect of digital competence on entrepreneurial readiness. The findings suggest that digital competence in operating SAP C/4HANA requires entrepreneurial alertness to foster entrepreneurial readiness.

#### 4. Discussion

Digital competency plays a pivotal role in enhancing entrepreneurial alertness by equipping entrepreneurs with the tools necessary to analyze market trends and consumer behavior [13]. In a digital economy, access to data is abundant, but the ability to interpret and utilize this data effectively differentiates successful entrepreneurs from their less successful counterparts [14]. Organizations that leverage data-driven decision-making to acquire customers, retain customers, and be profitable highlight the importance of digital competency in fostering an environment conducive to entrepreneurial alertness [15]. Moreover, digital proficiency in operating SAP C/4HANA provides entrepreneurs with real-time insights into market dynamics, enabling them to swiftly identify shifts in consumer preferences and emerging trends [2]. For instance, SAP C/4HANA allows entrepreneurs to monitor their products or services. By staying attuned to these dynamics, entrepreneurs can pivot their strategies and offerings in response to changing market conditions. In addition to market analysis, digital competency facilitates effective communication and collaboration among entrepreneurial teams [16]. With the rise of remote work and digital collaboration tools, entrepreneurs can engage with their teams and stakeholders more efficiently, fostering a culture of innovation and responsiveness.

The relationship between digital competency and entrepreneurial readiness has been a growing area of interest among researchers. Previous studies have highlighted the importance of digital skills in entrepreneurship [17], [18], yet few have examined the mediating factors that influence this relationship. The results underscore the importance of digital competency, particularly through the utilization of advanced technologies like SAP C/4HANA. The adoption of such technologies in the finance and e-commerce sectors highlights the role of digital tools in enabling data-driven decision-making, enhancing operational efficiency, and securing competitive advantages [19], [20]. In finance, the integration of data and cloud technologies is crucial for managing financial data effectively, while in e-commerce, data analytics and cybersecurity are paramount for protecting consumer information and optimizing sales strategies.

Digital competency was found to have a direct positive impact on entrepreneurial alertness, suggesting that individuals with higher digital skills are better equipped to recognize and seize new opportunities. This aligns with previous research indicating that digital tools can enhance cognitive abilities related to opportunity identification and market analysis [21]. Interestingly, the direct relationship between digital competency and entrepreneurial readiness was not supported. Instead, entrepreneurial alertness fully mediated this relationship. This finding implies that while digital competency provides the necessary tools and skills, the actual readiness to embark on entrepreneurial ventures depends significantly on the individual's alertness to opportunities. Therefore, entrepreneurial readiness is not merely a function of having the right digital tools but also the capability to effectively utilize these tools in identifying and acting upon market opportunities. The concept of entrepreneurial alertness has gained traction in the literature as a critical factor influencing entrepreneurial behavior [15]. Entrepreneurial alertness is linked to opportunity recognition, which is essential for entrepreneurial success. Individuals who possess high levels of alertness are more likely to identify and exploit opportunities, making them better equipped for entrepreneurial challenges [5]. This aligns with findings, which reported that entrepreneurs who actively seek out opportunities are more likely to succeed in their ventures.

In addition to individual attributes, contextual factors also play a significant role in shaping the relationship between digital competency and entrepreneurial readiness. Social networks and support systems on the development of entrepreneurial skills. Entrepreneurs who engage with mentors and peers in their networks are more likely to enhance their digital competencies and entrepreneurial



alertness, ultimately leading to greater readiness. This underscores the importance of considering the broader ecosystem in which aspiring entrepreneurs operate. The rapid pace of technological change necessitates continuous learning and adaptation for entrepreneurs [22]. Digital transformation is reshaping industries and creating new business models. Entrepreneurs must not only possess digital skills but also the alertness to adapt to these changes and seize emerging opportunities. This dynamic environment further emphasizes the need for a comprehensive understanding of how digital competency interacts with other factors to influence entrepreneurial readiness. SAP C/4HANA, as an example of advanced digital technology, illustrates digital competency can enhance various aspects of a business [2]. Its capabilities in customer insights and sales automation empower businesses to make informed decisions, streamline operations, and enhance customer engagement. However, for these competencies to translate into entrepreneurial readiness, entrepreneurs must also develop the ability to creatively apply these tools in innovative ways and manage the inherent risks associated with entrepreneurial ventures.

## 5. Conclusion

This study explores the impact of digital competency on entrepreneurial alertness and entrepreneurial readiness, with a particular focus on the role of SAP C/4HANA in startup businesses. The research findings underscore the significant role those digital competencies play in enhancing entrepreneurial alertness, which in turn influences entrepreneurial readiness. The descriptive analysis reveals that the finance and e-commerce sectors are leading in the adoption of SAP C/4HANA, leveraging its capabilities in data management, cloud technologies, data analytics, and cybersecurity. These sectors demonstrate a clear understanding of the importance of digital tools in achieving competitive advantage and operational efficiency. Inferential analysis further supports the notion that digital competency directly enhances entrepreneurial alertness. However, it does not have a direct impact on entrepreneurial readiness. Instead, entrepreneurial alertness acts as a full mediator in this relationship, indicating that the ability to recognize and act on opportunities is a critical pathway through which digital competency translates into readiness for entrepreneurial ventures. The implications of this study suggest that while digital competency is crucial, its benefits are fully realized only when it enhances an entrepreneur's alertness to opportunities. Therefore, fostering digital skills alone is insufficient; there must also be a focus on developing the ability to identify and leverage these skills in practical, entrepreneurial contexts. Moreover, the uneven adoption of SAP C/4HANA across different sectors suggests the need for broader dissemination and support for digital technology integration in various industries. Policymakers and business leaders should promote initiatives that encourage the adoption of digital tools like SAP C/4HANA, ensuring that startups across all sectors can benefit from enhanced digital capabilities.

## Copyright:

© 2024 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## References

- [1] D. M. Nazarov and D. B. Kovtun, "SAP Analytics Cloud: Intellectual service of digital transformation," *Informatics Educ.*, vol. 37, no. 2, 2022, doi: 10.32517/0234-0453-2022-37-2-24-33.
- [2] M. M. Bernadeth Oliverio, D. T. Earl Panes, T. C. Mae Vinluan, G. Lorraine Intal, and A. Kelly Balan, "Business Process Reengineering and ERP System Implementation Plan for A Manufacturing Company: A Case Study," *J. Namibian Stud.*, 2023.
- [3] G. Hancerliogullari Koksalmis and S. Damar, "An Empirical Evaluation of a Modified Technology Acceptance Model for SAP ERP System," *EMJ - Eng. Manag. J.*, vol. 34, no. 2, 2022, doi: 10.1080/10429247.2020.1860415.
- [4] A. D. Daniel, S. Adeel, and A. Botelho, "Entrepreneurial Alertness Research: Past and Future," *SAGE Open*, vol. 11, no. 3, 2021, doi: 10.1177/21582440211031535.
- [5] H. Heinemann, P. Mussel, and P. Schäpers, "Curious enough to start up? What an epistemic curiosity and entrepreneurial alertness influence entrepreneurship orientation and intention," *Front. Psychol.*, vol. 13, 2022, doi: 10.3389/fpsyg.2022.1003866.
- [6] A. Wibowo, B. S. Narmaditya, A. Saptono, M. S. Effendi, S. Mukhtar, and M. H. Mohd Shafai, "Does Digital



- Entrepreneurship Education Matter for Students' Digital Entrepreneurial Intentions? The Mediating Role of Entrepreneurial Alertness," *Cogent Educ.*, vol. 10, no. 1, 2023, doi: 10.1080/2331186X.2023.2221164.
- [7] M. Matarazzo, L. Penco, G. Profumo, and R. Quaglia, "Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective," *J. Bus. Res.*, vol. 123, 2021, doi: 10.1016/j.jbusres.2020.10.033.
- [8] D. M. Mudalige, "An Analysis of Success Factors of Digital Entrepreneurs in Western Province, Sri Lanka," *Asian J. Manag. Stud.*, vol. 3, no. 1, 2023, doi: 10.4038/ajms.v3i1.60.
- [9] S. Harini, D. Pranitasari, M. Said, and E. Endri, "Determinants of SME performance: Evidence from Indonesia," *Probl. Perspect. Manag.*, vol. 21, no. 1, 2023, doi: 10.21511/ppm.21(1).2023.40.
- [10] I. Stagias, S. Retalis, and M. Sourgiadaki, "Fostering business opportunity identification skills in secondary education via an orchestrated technology enhanced learning script," *Entrep. Educ.*, vol. 4, no. 1, 2021, doi: 10.1007/s41959-021-00045-9.
- [11] M. Uhl-Bien and M. Arena, "Leadership for organizational adaptability: A theoretical synthesis and integrative framework," *Leadersh. Q.*, vol. 29, no. 1, 2018, doi: 10.1016/j.leaqua.2017.12.009.
- [12] O. Götz, K. Liehr-Gobbers, and M. Krafft, "Evaluation of Structural Equation Models Using the Partial Least Squares (PLS) Approach," in *Handbook of Partial Least Squares*, 2010.
- [13] M. J. Ziółkowska, "Digital transformation and marketing activities in small and medium-sized enterprises," *Sustain.*, vol. 13, no. 5, 2021, doi: 10.3390/su13052512.
- [14] L. G. Hrebiniak and W. F. Joyce, "Organizational Adaptation: Strategic Choice and Environmental Determinism," *Adm. Sci. Q.*, 1985, doi: 10.2307/2392666.
- [15] B. Rizvanović, A. Zutshi, A. Grilo, and T. Nodehi, "Linking the potentials of extended digital marketing impact and start-up growth: Developing a macro-dynamic framework of start-up growth drivers supported by digital marketing," *Technol. Forecast. Soc. Change*, vol. 186, 2023, doi: 10.1016/j.techfore.2022.122128.
- [16] J. H. J. Yun, D. K. Won, and K. B. Park, "Entrepreneurial cyclical dynamics of open innovation," *J. Evol. Econ.*, vol. 28, no. 5, pp. 1151–1174, 2018, doi: 10.1007/s00191-018-0596-y.
- [17] D. Harding *et al.*, "Readiness of technology adaptation towards digital-based entrepreneurship," *Int. J. Entrep.*, vol. 24, no. 1, 2020.
- [18] M.-C. Morandini, A. Thum-Thysen, and A. Vandeplas, "Facing the Digital Transformation: Are Digital Skills Enough?" *Eur. Econ. Econ. Br.*, vol. 8030, no. July, 2020.
- [19] M. Yasir, A. Majid, and M. Yasir, "Entrepreneurial knowledge and start-up behavior in a turbulent environment," *J. Manag. Dev.*, vol. 36, no. 9, 2017, doi: 10.1108/jmd-10-2016-0193.
- [20] S. Green, "A digital start-up project - CARM tool as an innovative approach to digital government transformation," *Comput. Syst. Sci. Eng.*, vol. 35, no. 4, 2020, doi: 10.32604/csse.2020.35.257.
- [21] I. Nurhas, S. Geisler, and J. Pawlowski, "An intergenerational competency framework: Competencies for knowledge sustainability and start-up development in the digital age," *Sustain. Dev.*, vol. 30, no. 6, 2022, doi: 10.1002/sd.2338.
- [22] C. Hampel, M. Perkmann, and N. Phillips, "Beyond the lean start-up: experimentation in corporate entrepreneurship and innovation," *Innov. Organ. Manag.*, vol. 22, no. 1, 2020, doi: 10.1080/14479338.2019.1632713.