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RESEARCH ARTICLE

Determinants of ICT Adoption in Business for Emerging SME Entrepreneurs in Indonesia

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ABSTRACT

This study investigates the factors of ICT adoption by early-level small and medium-sized enterprises (SMEs) in Indonesia after the pandemic. The study was conducted among 237 new SME entrepreneurs from Indonesia's sixth-highest economic growth regions, with a confirmatory analysis of ICT adoption constructs in a structural equation model (SEM) analysis. This study showed that the benefits and integration with consumers are SMEs' main determinants when adopting ICT when starting their business. This condition is a rational response from SMEs when they begin their business in Indonesia's post-pandemic economic recovery conditions, which need to immediately emerge to capture the market with the efficiency and effectiveness of business processes. The study's results empirically provide a valid and reliable description of the determinants of ICT adoption for strengthening post-pandemic SME business practices and theoretically offer empirical evidence of factors for improving and strengthening digital transformation in business through usefulness and integration with consumers.

Keywords: Customer integration, digital transformation, ICT adoption, SME entrepreneur.

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1. Introduction

Small and Medium Enterprises (SMEs) are essential business entities that generate sustainable economic growth and contribute to the nation's economy. Business sustainability is not possible without digital transformation (Kergroach & Bianchini, 2021), which is one of the strategies that can be implemented to enhance business growth. Sustainable business development can be facilitated through the extensive integration of information and communication technologies (ICT) in enabled business models, making them more accessible and participatory (Bai *et al*., 2021).

The COVID-19 pandemic caused global disruptions that have slowed economic progress and undermined the sustainability of SMEs (Kala'lembang, 2020), specifically mobility, leading to displacement with disrupted supply chains (Bai *et al*., 2021). The SME's limitation can be resolved by increasing ICT adoption and business digitalization, leading to competitiveness and successful growth for competitive advantage (Kamišalić *et al*., 2020). During and after the COVID-19 pandemic, ICT has become essential to SMEs as a technology solution that facilitates specific operational activities. All business functions and operations are conducted online because of restrictions, lockdowns, work-from-home requirements, and other COVID-19-specific conditions and regulations (Denicolai *et al*., 2021). These conditions ensure that SMEs can survive as the economic foundation of the country even in a pandemic situation (Chandra, 2022). According to Bala and Feng (2019) the authors, the success of SMEs is critical for developing countries' growth and stability as they generate employment, reduce poverty, generate new investments, and create wealth (Adeniran & Johnston, 2016).

The digital revolution challenges SMEs to grow, keep up with technological advances and remain competitive in fulfilling environmental sustainability objectives (Conz *et al*., 2017). The multidimensional relationship between ICT adoption in SMEs and sustainability is an interesting research issue. Management attention is directed at identifying the impact of existing digitization practices and the degree to which they support the competitiveness of SMEs in a complicated social, environmental, and technological environment (Kamišalić *et al*., 2020). Developing and strengthening the role of SMEs in the market is one of

the most powerful instruments for reducing poverty and inequality in developing countries (Imanipour *et al*., 2012). As a result, governments worldwide are actively promoting public policies to support SMEs (Awa *et al*., 2016).

Research that investigates ICT adoption in SMEs is fundamental in developing countries. Emerging research that focuses on ICT adoption in the context of SMEs examines the adoption of specific technologies or applications, such as data analytics (Jacobi *et al*., 2012), business intelligence (Olexová, 2014), digital marketing channels (Taiminen & Karjaluoto, 2015), electronic accounting (Johari *et al*., 2018), and websites (Arslan *et al*., 2019). In this context, research focusing on ICT adoption and digital transformation in general and assessing the maturity of end-to-end applications in SMEs is needed and interesting to investigate. This research aims to provide empirical evidence on the determinants of ICT adoption by SMEs in Central Java. This research is important in two aspects: to empirically contribute to a valid and reliable ICT adoption scale in the context of SMEs after the pandemic, to provide a practical reference on the level of ICT adoption of SMEs in Central Java with the formulation of improving and strengthening digital transformation in business.

The diffusion of information and communication technology (ICT) is closely related to the theory of the informatization process, which includes the concept of information internalization in business and industry (Kotelnikov, 2007). Zwicker *et al*. (2010) proposed that an organization's level of informatization (IT) can be assessed based on the following IT dimensions: organizational usage, infrastructure, application characteristics, governance, and impact (De Souza *et al*., 2017). The use of ICT by SMEs is assessed through internal integration, external integration, decision-making, and the use of ICT for knowledge and innovation creation. According to Kotelnikov (2007), ICT adoption in SMEs is divided into four categories: essential communication, basic information technology, advanced communication, and advanced information technology.

Redoli *et al*. (2008) conceptualized this analysis for the case of ICT adoption in SMEs based on the study by Rao *et al*. (2003). Özşahin *et al*. (2022), based on the study of Redoli *et al*. (2008) considered aspects of telecommunications and information systems and proposed a conceptual framework consisting of essential communication, primary ICT use, internal integration, external integration, inter-organizational integration, and strategic integration. According to Redoli *et al*. (2008), the adoption of ICT in SMEs can be divided into six stages: office automation, office automation, information and communication, internal interaction, external interaction, cooperation and doing business together.

Shiels *et al*. (2003) proposed technical integration, operational integration, inter-organizational integration, and strategic integration for ICT sophistication in SMEs based on the study of Waring and Wainwright (2000). Technical integration refers to the organization's existing ICT infrastructure, such as internet and e-mail access for employees, networks, and networks, and relevant application programs. The operational integration dimension is assessed in terms of ICT-enabled internal business processes, the degree of integration into business processes, the presence of web-based sites, and the effectiveness of their performance (Slim *et al*., 2021). Inter-organizational integration is related to the integration of ICT in the supply chain and the supply chain's sophistication.

The study of ICT adoption is initially characterized by using information systems in specific business functions, followed by business communication (Alma *et al*., 2018; Kotelnikov, 2007; Venkatraman & Fahd, 2016). In recent years, SMEs have turned directly to business integration solutions rather than using different information systems for different business functions. This research shows the integration of five dimensions of ICT adoption to develop a multidimensional construct:

1. First, communication is a dimension of organisational automation from Redoli *et al*. (2008) technical dimensions, and essential communication is integrated into communication. According to Alma *et al*. (2018), communication can be defined as the first level of ICT adoption in SMEs. Early ICT adoption starts with the introduction of communication tools and the Internet for businesses.
2. Second, internal integration is a dimension of internal integration that comes mainly from Alma *et al*. (2018), and operational integration from Kotelnikov (2007) integrated advanced communication. From this perspective, SMEs at this level have achieved the following objectives: providing internal communication and information flow through the intranet, automating internal processes through ERP implementation, and providing all employees with access to PCs equipped with ERP, network hardware/software solutions, and security services.
3. Third, consumer integration Mohamad *et al*. (2010) and Shiels *et al*. (2003) is when ICT-enabled internal business processes evaluate the operational integration dimension, the extent of ICT integration into business processes, websites, and their effectiveness. Based on these definitions, there is some conceptual overlap between internal and external integration, and operational integration includes both.
4. Fourth, inter-organisational integration, which explains the inter-organizational dimension, comes from Alma *et al*. (2018); Huang and Benyoucef (2013) and Redoli *et al*. (2008) those who defines this level as a small step after external integration. Organizational information systems are open to suppliers, distributors, and other trading partners. Electronic communication and information exchange takes place throughout the supply chain. Customer relationship management software is available for operational purposes (AlQershi *et al*., 2020). Based on previous literature, this level of value chain integration enables all entrepreneurs to collaborate and communicate.
5. Fifth, strategic integration is the last dimension, which mainly consists of Hossain and Zhou (2018) and Redoli *et al*. (2008) strategic dimensions, Venkatraman and Fahd (2016) redefinition of business scope, and Redoli *et al*. (2008) making

business together. The assessment of the level of ICT adoption by SMEs refers to five dimensions: communication, internal integration, consumer integration, inter-organizational integration, and strategic integration. SME innovation includes behavioral, product, process, market, and strategic innovation.

2. Materials and Method

The population in this study is small and medium-sized enterprises (SMEs) that are *e-marketplace* partners in Central Java, which was recorded in the first quarter of 2022 as 213,233 units. Following the study of Ardiansah *et al.* (2021a), SMEs that successfully use the *e-marketplace* are only 0.3%, so the sample selected is estimated at 639 data. SMEs will be given questionnaires online.

The researcher identified variables of innovation and ICT adoption that were rated on a five-point scale: strongly agree (5); agree (4); neither agree nor disagree (3) disagree (2); strongly disagree (1). This study developed a structural equation model analysis through stages: (1) Measurement model to test the validity of the relationship between constructs and indicators, (2) Construction model to test the direction of the relationship of constructs in causality, and (3) Hypothesis testing. SEM testing is carried out with WrapPLS because it can identify linear or nonlinear relationships between latent variables and estimate small samples (estimation of 250 data will be more precise according to the characteristics of this study).

3. Result and Finding

The questionnaires were distributed in April–July 2023, and 257 answers were obtained, but only 237 data were complete and could be processed. The distribution of instrument answer areas is presented in Table I.

Table II showed that SME entrepreneurs who are respondents have characteristics dominated by women (83.3%), with most ages less than 20 years as much as 50.1%. The types of businesses that are in great demand by SMEs are culinary (53.3%), fashion (23.3%), and creative products (10.0%). Most SMEs use e-commerce in business for less than one year with a proportion of 48.3%, with the popular type of e-commerce being Shopee (73.3%), with an average monthly e-commerce turnover between Rp1,000,000.00–Rp3,000,000.00. Based on this profile, most SMEs are young and relatively new to using *e-commerce*, with moderate average sales.

TABLE I: Distribution Sample

Area	Sample	Percentage
Banyumas	15	6.37
Kedu	12	5.06
Surakarta	42	17.72
Pati	31	13.08
Semarang	98	41.35
Pekalongan	39	16.45
Total	237	100.00

Sources: Primary processed data, 2022.

TABLE II: Respondent Description

Characteristics	Amount	Percentage
Sex		
Female	197	83.30
Male	40	16.70
Age		
<20 years	119	50.10
21–24 years	16	6.80
25–28 years	10	4.20
29–30 years	13	5.60
>30 years	79	33.34
Business types		
Culinary	127	53.33
Fashion	55	23.34
Creative product	24	10.00
Automotive product	12	5.21
Others	19	8.12
Duration of e-commerce usage		
<1 year	114	48.30
1–2 years	49	20.70
2–3 years	33	13.80
3–4 years	30	12.70
>5 years	11	4.50
Monthly revenue of e-commerce sales (IDR)		
<1,000,000	79	33.30
1,001,000–3,000,000	117	49.20
>3,001,000	41	17.50
E-commerce brand's types		
Shopee	173	73.30
Tokopedia	35	14.67
Lazada	13	5.17
Blibli	7	3.12
Others	9	3.74

Sources: Primary processed data, 2022.

The mean value of the communication variable is 2.67; internal integration 3.57; consumer integration 3.82; organizational integration 3.94; strategic integration 3.68; ICT benefits 4.23; ICT costs 3.31 and ICT benefits 4.27. The data shows that SMEs who agree less tend to doubt the form of communication in ICT adoption, hesitate with internal business integration, and decide on the need for integration with consumers, organizational integration, and strategic integration. On the other hand, SMEs tend to agree with the benefits of ICT, although they are hesitant about its costs.

SEM analysis begins with a measurement model through convergent and discriminant reliability tests (Table III, part A), showing that each question indicator's loading factor value is above 0.5. This is still acceptable because the nature of the measurement model is still confirmative. This condition reinforces that no AVE value is less than 0.5, and the root AVE value is also above 0.7, so the construct is valid. Furthermore, reliability evaluation with composite and Cronbach alpha values (Table III, part B) shows the value of each construct is above 0.7, so each construct is declared reliable. Table III, part C, shows the overall model fit with R^2 (0.737) and adjusted R^2 (0.645) values, classified as high-level models. The SRMR value of 0.900 also supports this; the saturated and estimated models are the same, so it can be concluded that the model can be used for hypothesis testing analysis.

TABLE III: Outer and Inner Model Testing

Indicator	Loading factor							
	COMM	INTN	INCN	INOR	INST	BENF	COST	ADPT
A. Convergent dan discriminant model testing								
x1	0.766	0.735	0.751	0.810	0.905	0.553	0.583	0.567
x2	0.805	0.751	0.816	0.810	0.731	0.869	0.878	0.642
x3	0.748	0.845	0.874	0.645	0.897	0.713	0.932	0.848
x4				0.972		0.922	0.819	0.840
x5				0.632		0.896		0.570
x6						0.872		0.804
x7						0.854		0.604
x8								0.874
x9								0.721
x10								0.813
x11								0.746
x12								0.802
x13								0.873
x14								0.526
AVE	0.598	0.606	0.554	0.551	0.719	0.674	0.663	0.538
Square AVE	0.773	0.778	0.744	0.742	0.847	0.820	0.814	0.733
B. Uji reliability								
Composite reliability	0.817	0.821	0.826	0.858	0.884	0.934	0.884	0.941
Cronbach alpha	0.763	0.773	0.714	0.792	0.800	0.915	0.820	0.931
C. Goodness of fit model								
R^2/Adjusted R^2 on adoption								0.737/0.654
SRMR: Saturated model								0.900
Estimated model								0.900

Table IV shows that ICT adoption is significantly determined by the influence of consumer integration (0.299; p = 0.034) and usefulness (0.534, p = 0.000). While the factors of communication (0.117, p = 0.251), internal integration (0.064, p = 0.359), organizational integration (0.079, p = 0.328), strategic integration (0.209, p = 0.107), and cost (−0.032, p = 0.430) have no significant effect on ICT adoption by SMEs. The ICT adoption model in this study provides a determination value of 0.737, which is classified as high. The variation of integration factors with consumers and ICT usefulness is believed to determine 73.7% of ICT adoption decisions in business. These findings are presented in Fig. 1.

TABLE IV: Hypothesis Testing

Hypothesis	Direct/Total effect	
	Coefficient	p
COMM → ADPT	0.117	0.251
INTN → ADPT	0.064	0.359
INCN → ADPT	0.299	0.034*
INOR → ADPT	0.079	0.328
BENF → ADPT	0.534	0.000*
INST → ADPT	0.209	0.107
COST → ADPT	−0.032	0.430

4. Discussion

The study results show empirically that consumer integration and usefulness are the primary considerations determining SMEs' ICT adoption decisions. This finding conforms with the demographic characteristics of SMEs, most of whom have been using e-commerce for less than one year after the COVID-19 pandemic. Thus, attention to consumer recognition is essential for market exploration. SMEs' adoption of ICT in business processes is oriented toward supporting the integration of consumer needs with SME business processes.

It maps consumer characteristics, product variations, consumption, and transaction patterns that have changed after the COVID-19 pandemic, which can be achieved through ICT in SME business processes (Si, 2021). Consumer demographic profiles, such as gender, age, economic capacity, e-commerce and e-payment preferences, product types, intensity, and capability of transactions, can be determined using ICT related to e-commerce. ICT support includes Internet networks, smartphones, electronic payment devices, transaction data storage, and financial reporting (Hasanah *et al.*, 2022). The integration of ICT in the internal business processes of SMEs affects the efficiency and effectiveness of business processes that connect consumers and suppliers as an entity of business processes (Alma *et al.*, 2018). This is also supported by the fact that SMEs do not use only one e-commerce application and depend on the e-commerce preferences of consumers (Ardiansah *et al.*, 2021b).

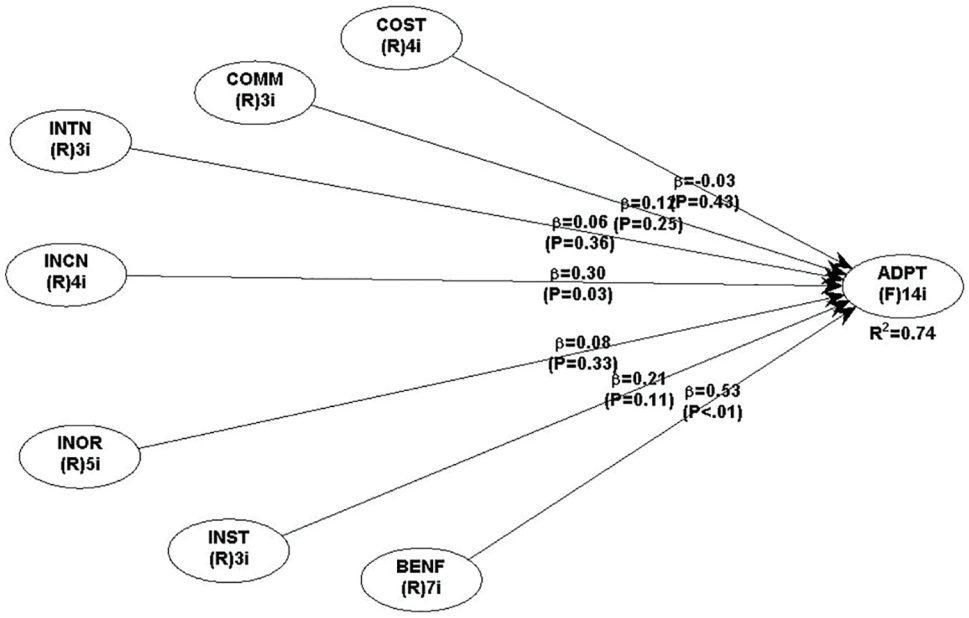

Fig. 1. The hypothesis testing model.

Usefulness is the most important consideration for SMEs when adopting ICT in business processes, and various researchers support these findings (Ardiansah *et al*., 2021a; Dhewanto *et al*., 2020; Hadi Putra & Santoso, 2020; Kusuma *et al*., 2020). ICT-based business functions have been empirically shown to provide economic benefits in both the transaction process's efficiency and the outcomes' effectiveness: market reach, transaction capacity, intensity, and a significant increase in sales turnover (Hasanah *et al*., 2022). SMEs are also early adopters of ICT, strongly driven by the benefits that can be experienced immediately in business. This condition is influenced by the post-pandemic economic recovery, where SMEs determine their existence in business appropriately (Latifah *et al*., 2022) and do not follow business patterns that rely on mere physical working capital determined by consumers and the benefits of quickly choosing e-commerce (Ardiansah *et al*., 2021a; Wang *et al*., 2022).

Business processes still initially performed by SMEs have not yet been developed through business communication with stakeholders to determine a higher business value chain (Trawnih *et al*., 2021). Communication with suppliers of raw materials, supplies, and equipment is still limited to introductions; hence, less attention is paid to alternative suppliers, markets, and potential consumers (Pu *et al*., 2021). This can be seen from the monthly turnover, which is still limited to between one and three million, which is classified as medium (Pollák & Markovič, 2021). The relatively small effect of the level of Internet adoption on SME performance is explained by the stage of adoption of electronic business by small enterprises, which is still in the initial use stage and not yet in the phase of internalization in their business processes (Ghobakhloo & Benitez-Amado, 2011; Hadi Putra & Santoso, 2020). Electronic business is only used as a communication medium and information, primarily for communicating with users (Widjaja & Matitaputty, 2018).

A study Hermana (2013) found that the level of Internet adoption and market orientation affects the intensity of communication but has no effect on organizational innovation and business performance. The same effect is shown by the level of adoption in the business sector and age (Candra & Ashari, 2014). Internet adoption level and business location affect small businesses' performance and communication intensity. The interaction of the level of adoption with market orientation, business location, business sector, and business age does not affect communication intensity, organizational innovation, and small business performance. The current level of Internet adoption (as measured by web statistics), communication intensity and organisational innovation jointly affect firm performance. Other results show that the actual level of internet adoption does not affect small business performance through communication intensity and organizational innovation (Muñoz-Pascual *et al*., 2021).

Post-pandemic economic recovery has implications for business process decisions integrated with changes in information and communication technology advances. SME business process options that utilize e-commerce, social media, and financial technology have consequences for changes in business governance that are responsive to and follow the demands of economic disruption (Latifah *et al*., 2022). One change priority is the integration of business patterns from upstream to downstream that are internally more efficient, effective, and economical (Yang *et al*., 2016). Based on the findings of this study, internal business integration is not a consideration when adopting ICT in business.

This can be understood as SMEs still in the beginning and have not prepared an overview of business processes. It also shows that SMEs still use conventional business patterns in preparing and presenting products to consumers. This condition is not a problem in the short term, but in the long term, in line with business competition and changing consumer preferences, it will pose a risk of business failure (Lu *et al*., 2021). Internal business integration is needed to meet the demands for higher business quality in both processes and products, which has implications for higher

business value chains for all parties, especially suppliers and consumers (Shiels *et al*., 2003). Internal integration is not a determining factor for adopting ICT in enterprises, followed by the lack of organizational integration and long-term strategy. Traditional business patterns regarding the division of responsibilities, work distribution, work control, and optimal time allocation remain unclear. The workforce involved does not separate tasks, duties, and work distribution systematically and sustainably (Özşahin *et al*., 2022).

The main orientation of completing production to meet product targets is the reason for the duplication reported by SMEs. This impacts medium-and long-term strategic goals that are less aligned with business capacity. Business development that succeeds in rapidly growing is more likely to be the fortune of product differentiation and consumer targeting, which tends to end quickly. The viral marketing effect is the main trigger for business entrepreneurs in product development and consumer targeting. Still, this condition is temporary, and strategic anticipation is needed in the medium and long term. Understanding sustainable business has received less attention from SMEs, such as the findings presented by Ardiansah *et al*. (2021b). SMEs develop businesses that are short-term and rarely sustainable. SMEs face various internal and external barriers but do not adopt business continuity solutions that lead to sustainable business strategies (Pu *et al*., 2021).

ICT adoption is accepted because of current business decisions; it is common for business patterns to change with the use of ICT, which impacts the cost of ICT. The identified ICT cost component includes an investment in smartphones and operational support: Internet quota electronic payment facilities. The business cost component is aimed at increasingly efficient and effective business processes, resulting in sustainable business improvement in the long term (Pu *et al*., 2021). This is less supported by the mindset of SMEs, which still see ICT costs, especially investment costs, as a logical consequence of recent business changes rather than aimed at optimizing business resources (Aleqab *et al*., 2015). The mindset change is due to SMEs' lack of experience and understanding of sustainable business (Alma *et al*., 2018).

5. Conclusion

This study found that an SME considers utility and customer integration factors to be the main determinants when integrating ICT into its business processes. This situation is a consequence of the characteristics of small and medium-sized enterprises, which start their operations with the potential for economic development. Most SMEs have used e-commerce for less than a year since the COVID-19 pandemic. Therefore, it is essential to consider consumer acceptance when mapping the market. This is consistent with its implementation of ICT in SME business processes, which focuses on supporting the integration of consumer needs into SME business processes.

The results of this study can contribute empirically to more valid and reliable ICT adoption drivers that reflect the characteristics of SMEs in the post-pandemic situation and theoretically to ICT adoption drivers. An essential aspect of business is practicality and integration with consumers. This survey is only conducted for SMEs in Central Java that are still starting their business after the COVID-19 pandemic. Further research could include testing different determinants of ICT adoption in firms, considering the unique characteristics of SMEs, such as location, industry, firm size, and product type.

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Disclosure Statement

The authors declare that we have no relevant or material financial interests related to the research or non-financial interests such as personal or professional relationships, affiliations, knowledge, or beliefs with other parties in the subject matter or material discussed in this manuscript.

Conflict of Interest

The authors declare that they do not have any conflict of interest.

References

Adeniran, T. V., & Johnston, K. A. (2016). The impacts of ICT utilisation and dynamic capabilities on the competitive advantage of South African SMEs. *International Journal of Information Technology and Management*, *15*(1), 59–89. https://doi.org/10.1504/IJITM.2016.073915.

Aleqab, M. M. A., Nurunnabi, M., & Adel, D. (2015). Mind the gap: Accounting information systems curricula development in compliance with IFAC standards in a developing country. *Journal of Education for Business*, *90*(7), 349–358. https://doi.org/10.1080/08832323.2015.1068155.

Alma, B., Coşkun, E., & Özşahin, M. (2018). A framework proposal for examining the effect of ICT adoption level on innovativeness in SMEs. *Americas Conference on Information Systems 2018: Digital Disruption, AMCIS 2018*, 1–10.

AlQershi, N., Mokhtar, S. S. M., & Abas, Z. B. (2020). Innovative CRM and performance of SMEs: The moderating role of relational capital. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(4), 1–18. https://doi.org/10.3390/joitmc6040155.

Ardiansah, M. N., Anisykurlillah, I., & Udin, U. (2021a). Investigating the maturity level of computer-based accounting systems in small and medium-sized enterprises: Empirical evidence in indonesia. *Quality-Access to Success*, *22*(181), 12–17.

Ardiansah, M. N., Chariri, A., & Raharja, S. (2021b). Does E-commerce impact on accounting information system and organizations performance? *Proceedings of the 2nd Annual Conference on Blended Learning, Educational Technology and Innovation (ACBLETI 2020)*, *560*(Acbleti 2020), 476–481. https://doi.org/10.2991/assehr.k.210615.090.

Arslan, F., Bagchi, K. K., & Kirs, P. (2019). Factors implicated with firm-level ICT use in developing economies. *Journal of Global Information Technology Management*, *22*(3), 179–207. https://doi.org/10.1080/1097198X.2019.1642022.

Awa, H. O., Ukoha, O., & Emecheta, B. C. (2016). Using TOE theoretical framework to study the adoption of ERP solution. *Cogent Business and Management*, *3*(1), 1–23. https://doi.org/10.1080/23311975.2016.1196571.

Bai, C., Quayson, M., & Sarkis, J. (2021). COVID-19 pandemic digitization lessons for sustainable development of micro-and small-enterprises. *Sustainable Production and Consumption*, *27*, 1989–2001. https://doi.org/10.1016/j.spc.2021.04.035.

Bala, H., & Feng, X. (2019). Success of small and medium enterprises in Myanmar: Role of technological, organizational, and environmental factors. *Journal of Global Information Technology*, *22*(2), 100–119. https://doi.org/10.1080/1097198X.2019.1603511.

Candra, N., & Ashari, R. (2014). Technology readiness and E-commerce adoption. *Gadjah Mada International Journal of Business*, *16*(1), 69–88. http://jurnal.ugm.ac.id/gamaijb/issue/archive%5Cnhttp://search.ebscohost.com/login.aspx?direct=true&db=eoh&AN=1505451&site=ehost-live.

Chandra, M. P. (2022). Strengthening small and medium enterprises (SMEs) through sociopreunership-based communities in technology sustainability. *Jurnal Digital Bisnis, Modal Manusia, Marketing, Entrepreneurship, Finance, & Strategi Bisnis (DImmensi)*, *2*(1), 1. https://doi.org/10.32897/dimmensi.v2i1.1183.

Conz, E., Denicolai, S., & Zucchella, A. (2017). The resilience strategies of SMEs in mature clusters. *Journal of Enterprising Communities: People and Places in the Global Economy*, *11*(1), 186–210. https://doi.org/10.1108/JEC-02-2015-0015.

De Souza, C. A., Siqueira, É.S., & Reinhard, N. (2017). Digital divide of small and medium-sized enterprises: An analysis of influencing factors using the toe theory. *Revista de Administracao Mackenzie*, *18*(2), 15–48. https://doi.org/10.1590/1678-69712017/administracao.v18n2p15-48.

Denicolai, S., Zucchella, A., & Magnani, G. (2021). Internationalization, digitalization, and sustainability: Are SMEs ready? A survey on synergies and substituting effects among growth paths. *Technological Forecasting and Social Change*, *166*(1), 1–15. https://doi.org/10.1016/j.techfore.2021.120650. https://www.sciencedirect.com/science/article/pii/S0040162521000822.

Dhewanto, W., Lestari, Y. D., Herliana, S., & Kania, R. (2020). Information technology adoption model in Indonesian creative industry clusters: Toward strengthening competitive advantages. *International Journal of Technology Transfer and Commercialisation*, *17*(1). 19. https://doi.org/10.1504/ijttc.2020.106564.

Ghobakhloo, M., & Benitez-Amado, J. (2011). Reasons for information technology adoption and sophistication within manufacturing SMEs. *POMS 22nd Annual Conference*. pomsmeetings.org. https://www.pomsmeetings.org/confpapers/020/020-0013.pdf.

Hadi Putra, P. O., & Santoso, H. B. (2020). Contextual factors and performance impact of e-business use in Indonesian small and medium enterprises (SMEs). *Heliyon*, *6*(3), e03568. https://doi.org/10.1016/j.heliyon.2020.e03568.

Hasanah, A. U., Shino, Y., & Kosasi, S. (2022). The role of information technology in improving the competitiveness of small and SME enterprises. *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, *3*(2), 168–174. https://doi.org/10.34306/itsdi.v3i2.561.

Hermana, B. (2013). *E-Bisnis: Model Adopsi Teknologi Dan Dampaknya Terhadap Inovasi Organisasi, Intensitas Komunikasi, Dan Kinerja Usaha Kecil* [Gunadarma Univesity]. https://api.semanticscholar.org/CorpusID:191193806.

Hossain, M. S., & Zhou, X. (2018). Impact of m-payments on purchase intention and customer satisfaction: Perceived flow as mediator. *International Journal of Science and Business*, *2*(3), 503–517. https://doi.org/10.5281/zenodo.1408692.

Huang, Z., & Benyoucef, M. (2013). From e-commerce to social commerce: A close look at design features. *Electronic Commerce Research and Applications*, *12*(4), 246–259. https://doi.org/10.1016/j.elerap.2012.12.003.

Imanipour, N., Talebi, K., & Rezazadeh, S. (2012). Obstacles in business process management (BPM) implementation and adoption in SMEs. Available at SSRN 1990609. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1990609.

Jacobi, C., Völker, U., Trockel, M. T., & Taylor, C. B. (2012). Effects of an Internet-based intervention for subthreshold eating disorders: A randomized controlled trial. *Behaviour Research and Therapy*, *50*(2), 93–99. https://doi.org/10.1016/j.brat.2011.09.013.

Johari, R. J., Rashid, N., Yazid, A. S., & Salleh, F. (2018). An empirical examination of undergraduate accounting students' ethical judgment: Malaysia evidence. *International Journal of Academic Research in Business and Social Sciences*, *8*(12), 669–681. https://doi.org/10.6007/ijarbss/v8-i12/5064.

Kala'lembang, A. (2020). Adopsi E-Commerce Dalam Mendukung Perkembangan Usaha Mikro Kecil Dan Menengah (UMKM) Di Masa Pandemi Covid-19. *Capital: Jurnal Ekonomi Dan Manajemen*, *4*(1), 54. https://doi.org/10.25273/capital.v4i1.7358.

Kamišalić, A., Šestak, M., & Beranič, T. (2020). Supporting the sustainability of natural fiber-based value chains of smes through digitalization. *Sustainability (Switzerland)*, *12*(19). https://doi.org/10.3390/su12198121.

Kergroach, S., & Bianchini, M. M. (2021). *The Digital Transformation of SMEs*. sela.org. http://www.sela.org/media/3222564/the-digital-transformation-of-smes.pdf.

Kotelnikov, V. (2007). Small and medium enterprises and ICT. In *Asia-pacific development information programme*. UNDP.

Kusuma, H., Muafi, M., Aji, H. M., & Pamungkas, S. (2020). Information and communication technology adoption in small-and medium-sized enterprises: Demographic characteristics. *Journal of Asian Finance, Economics and Business*, *7*(10), 969–980. https://doi.org/10.13106/jafeb.2020.vol7.no10.969.

Latifah, L., Susilowati, N., Noor Ardiansah, M., Syukri Abdullah, M., & Alam, S. (2022). Social media networking and knowledge sharing in increasing innovation and MSME's growth: Based on the theory of communication visibility. *Jurnal Ilmiah Bidang Ilmu Ekonomi*, *17*(2), 122–138. http://journal.umpo.ac.id/index.php/ekuilibrium.

Lu, M., Wang, R., & Li, P. (2021). Comparative analysis of online fresh food shopping behavior during normal and COVID-19 crisis periods. *British Food Journal*. https://doi.org/10.1108/BFJ-09-2020-0849.

Mohamad, R., Building, A., & Ismail, N. A. (2010). Customers perception of security indicators in online banking sites in Nigeria. *Journal of Internet Banking and Commerce*, *15*(1), 1–11. https://doi.org/10.1007/978-3-531-92534-9_12.

Muñoz-Pascual, L., Curado, C., & Galende, J. (2021). How does the use of information technologies affect the adoption of environmental practices in SMEs? A mixed-methods approach. *Review of Managerial Science*, *15*(1), 75–102. https://doi.org/10.1007/s11846-019-00371-2.

Olexová, C. (2014). Business intelligence adoption: A case study in the retail chain. *WSEAS Transactions on Business and Economics*, *11*(1), 95–106.

Özşahin, M., Çallı, B. A., & Coşkun, E. (2022). ICT adoption scale development for SMEs. *Sustainability*, *14*(22), 1–28. https://doi.org/10.3390/su142214897.

Pollák, F., & Markovič, P. (2021). Size of business unit as a factor influencing adoption of digital marketing: Empirical analysis of SMEs operating in the central European market. *Administrative Sciences*, *11*(3). https://doi.org/10.3390/admsci11030071.

Pu, G., Qamruzzaman, M., Mehta, A. M., Naqvi, F. N., & Karim, S. (2021). Innovative finance, technological adaptation and SMEs sustainability: The mediating role of government support during COVID-19 pandemic. *Sustainability*. https://www.mdpi.com/1231888.

Rao, S. S., Metts, G., & Mora Monge, C. A. (2003). Electronic commerce development in small and medium sized enterprises: A stage model and its implications. *Business Process Management Journal*, *9*(1), 11–32. https://doi.org/10.1108/14637150310461378.

Redoli, J., Mompó, R., García-Díez, J., & López-Coronado, M. (2008). A model for the assessment and development of Internet-based information and communication services in small and medium enterprises. *Technovation*, *28*(7), 424–435. https://doi.org/10.1016/j.technovation.2008.02.008.

Shiels, H., McIvor, R., & O'Reilly, D. (2003). Understanding the implications of ICT adoption: Insights from SMEs. *Logistics Information Management*, *16*(5), 312–326. https://doi.org/10.1108/09576050310499318.

Si, Y. (2021). Research on the balanced relationship between online consumer behavior and E-commerce service quality based on 5G network. *Mobile Information Systems, 2021*. https://doi.org/10.1155/2021/5562996.

Slim, A., Sarah, O., Kadhim, K., & Ali, B. (2021). The effect of information technology business alignment factors on performance of SMEs. *Management*. http://growingscience.com/beta/msl/4371-the-effect-of-information-technology-business-alignment-factors-on-performance-of-smes.html.

Taiminen, H. M., & Karjaluoto, H. (2015). The usage of digital marketing channels in SMEs. *Journal of Small Business and Enterprise Development*, *22*(4), 633–651. https://doi.org/10.1108/JSBED-05-2013-0073.

Trawnih, A., Yaseen, H., Al-Adwan, A. S., Alsoud, A. R., & Jaber, O. A. (2021). Factors influencing social media adoption among smes during covid-19 crisis. *Journal of Management Information and Decision Sciences*, *24*(6), 1–18.

Venkatraman, S., & Fahd, K. (2016). Challenges and success factors of ERP systems in Australian SMEs. *Systems*, *4*(2), 20. https://doi.org/10.3390/systems4020020.

Wang, S., Cheah, J. H., Lim, X. J., Leong, Y. C., & Choo, W. C. (2022). Thanks COVID-19, I'll reconsider my purchase: Can fear appeal reduce online shopping cart abandonment? *Journal of Retailing*

and Consumer Services, *64*(November 2021), 102843. https://doi.org/10.1016/j.jretconser.2021.102843.

Waring, T., & Wainwright, D. (2000). Interpreting integration with respect to information systems in organizations-image, theory and reality. *Journal of Information Technology*, *15*(2), 131–147. https://doi.org/10.1080/026839600344320.

Widjaja, A., & Matitaputty, S. (2018). Empowerment of small medium enterprises through student participatory action research in implementation of accounting information system. *SHS Web of Conferences*, *59*, 01002. https://doi.org/10.1051/shsconf/20185901002.

Yang, Z., Shi, Y., & Yan, H. (2016). Scale, congestion, efficiency and effectiveness in e-commerce firms. *Electronic Commerce Research and Applications*, *20*, 171–182. https://doi.org/10.1016/j.elerap.2016.07.003.

Zwicker, J., Fettke, P., & Loos, P. (2010). Business process maturity in public administrations. *Handbook on Business Process Management*, *2*, 369–396. https://doi.org/10.1007/978-3-642-01982-1.