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Synergy of Digital Literacy and E-Commerce in Boosting SME Performance

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Abstract: Synergy of Digital Literacy and E-Commerce in Boosting SME Performance

The digital economy (e-commerce) is an important tool to enhance SMEs, with various limitations, including digital literacy and SMEs owner characteristics. The novelty of this study is to provide a deeper understanding and new evidence of the linkage between digital literacy and e-commerce for SMEs. The future expected impact of this study is the government should facilitate and improve the level of digital literacy and e-commerce for SMEs. In particular, this study sets a question, namely: Does technology literacy lead the digital economy (e-commerce) for SMEs? Therefore, this study investigates the determinant factors of e-commerce by moderating variable of digital literacy among SMEs in the Malang region (Malang City, Malang Regency, and Batu City). The sample size is 43 respondents actively involved in business training and mentoring by SME associations, business incubators, and local governments. The respondents have social media and e-commerce to stimulate their sales. The sampling method was purposive sampling. The sample was collected through a survey during March - April 2024. Path analysis was applied to elaborate the study objectives. The findings reveal that the indicators constructing digital literacy and e-commerce are valid and reliable. The digital literacy was influenced by the age of SME owner and economic media. Besides, the digital literacy has a positive and significant impact on e-commerce at the 1% level. E-commerce is also

determined by firm establishment. This condition means that an increase in the quality of digital literacy can lead to a rise in e-commerce utilisation. The implications of this study suggest that SME associations, business incubators and local governments facilitate the improvement of SMEs' digital literacy and their ability to utilise e-commerce appropriately to grow their businesses in the long term. In addition, SMEs should improve their digital business skills through various training and business mentoring conducted by local governments and business incubators.

Keywords: Digital literacy; E-commerce; SMEs

INTRODUCTION

The development of digital technology in business activities has been met with a gradual and well-considered response from business actors. In particular, the utilisation of digital technology in SMEs can facilitate the scaling-up process (Erlanitasari et al., 2019). Nevertheless, the utilisation of digital technology is constrained by the capacity and competency of SMEs' human resources. Consequently, the findings of Erlanitasari et al. (2019) indicated that only approximately 18% of SMEs are able to access and utilise social media, while 9% of SMEs can utilise e-commerce.

The phenomena has been posited by literature that digital literacy can be employed by small and medium-sized enterprises (SMEs) to enhance innovation, facilitate e-commerce integration, expand market reach, and enhance business performance (Fransiska et al., 2024). Consequently, it is recommended that SMEs actors and policy makers prioritise enhancing the quality of digital literacy. In a study by (Islami et al., 2021), it was found that 67% of MSMEs lacked the necessary digital literacy resources, such as computers or laptops. However, 73% of MSMEs had been able to utilise these resources for business activities. This indicates that the majority of MSMEs have engaged with computers and social media in order to facilitate business growth and advancement. In contrast, (Juliyanti & Wibowo, 2021) indicated that as many as 65 SMEs exhibited relatively low levels of digital literacy. This condition serves as a reminder to small business owners and the government to prioritize enhancing digital literacy skills.

Two weaknesses of SME business actors related to digital literacy can be identified. Firstly, there is an insufficient understanding of digital technology. Secondly, there is a relatively low level of digital adoption skills (Ollerenshaw et al., 2021). Consequently, Zahoor et al. (2023) posit that the capacity of managers to attain digital literacy in SMEs can serve as a pivotal factor in the digital transformation of 158 SMEs. The Indonesian Government has implemented strategic steps to realise business digitalisation through the Making Indonesia 4.0 programme

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(Budiyanti et al., 2021). The programme is implemented in SMEs through the development and use of e-commerce in SME business transactions. Consequently, the integration of business digitalisation with e-commerce represents a strategy for the empowerment of SMEs.

Panjaitan et al (2023) demonstrated that when 532 small and medium-sized enterprise (SME) owners possess a higher level of digital literacy, they are more likely to be aware of the necessity to transform their business in order to become more competitive. Furthermore, an increase in digital literacy levels has the potential to facilitate the business innovation process. This condition is consistent with the empirical findings of (Puro et al., 2022), which indicate that digital literacy is positively and significantly correlated with economic strategies in 120 small and medium-sized enterprises (SMEs). Furthermore, Rakib et al. (2024) observed that digital literacy and innovation exerted a considerable influence on competitive advantage in 202 small and medium-sized enterprises (SMEs).

The enhancement of digital literacy among SME business actors offers a vast potential for the adoption of e-commerce. Boachie (2016) posits that e-commerce provides a platform for development and adaptive behaviour for SME owners, thereby ensuring business continuity in the face of intensifying market competition. In particular, Ramdansyah & Taufik (2017) identified that the e-commerce adoption model can be determined by economic activities in general, achieve penetration internationally, and conduct business-to-business (B2B) transactions (efficiency, coordination and expansion of trade).

The previous empirical findings indicated that the level of e-commerce adoption among SMEs in Indonesia is relatively low. Furthermore, market share and the number of SMEs adopting e-commerce are positively correlated, while the number of residents with wide access to the internet is not correlated with the level of SMEs' e-commerce (Busnetty & Tambunan, 2020). Furthermore, Riyanto et al.(2021) posit that e-commerce can facilitate SME business development. Nevertheless, SMEs lack the flexibility and dynamism to adopt e-commerce.

The e-commerce adoption process can be influenced by a number of internal and external factors specific to the business in question (Wijaya et al., 2021). The internal factors of SMEs e-commerce adoption encompass a number of key areas, including organisational structure, business behaviour, financial resources, information technology sources, operational processes, the size of the firm, the product and service range, the type of business, the perceived benefits, the technical knowledge base, the implementation process, the time frame, individual perceptions, and the value placed on the initiative. In contrast, external factors influencing e-commerce adoption include regulation, technical, cultural, infrastructural, information security,

environmental, integration and business openness, government transparency, information communication and technology expertise, similarity to industrial activity, safety, competition, market, information technology support, social culture, country context, and sources. Empirical evidence by Sedighi & Sirang (2018) indicated that e-commerce has a significant impact on the business performance of SMEs, including financial performance, internal business processes, consumer engagement, and business learning processes. Conversely, Mali & Rachmawati (2022) posit that the utilisation of e-commerce for SMEs also has a positive impact on the advancement of smart villages.

It is noteworthy that a considerable number of SMEs, amounting to 344, are interested in adopting e-commerce (Harsasi et al., 2023). Nevertheless, they continue to confront a multitude of challenges, including those related to work culture, e-commerce regulations, consumer readiness, trust, infrastructure, technology, human resources, and financial availability. Arif et al.(2024) posited that the sustainability of e-commerce can be determined by the following factors: perceived usefulness, perceived ease of use, perceived risk, cost, and awareness. Moreover, the novelty of this study is elaborating the relationship between digital literacy and ecommerce for SMEs in Malang area. Interestingly, Malang area is the center for SMEs development, education and tourism destination. Several reasons and benefits of digital literacy and ecommerce have been described by Sasmito & Prestianto (2021).

There is a main problem faced by SMEs during the observation process conducted by researchers on March – April 2024. The problem shows that SMEs in Malang region faced challenges and difficulties to adopt e-commerce in selling products. The local government and business incubator of SMEs have tried to support the adoption process of e-commerce. In particular, the SMEs owners are still improving digital literacy knowledge and practice. Therefore, this study sets a question is follows: "Does digital literacy determine digital economy (e-commerce) knowledge and practice for SMEs in Malang region?" The objective of this study is to investigate the determinant factors of e-commerce by moderating variable of digital literacy for small and medium-sized enterprises (SMEs) in the Malang region. Furthermore, the study's contribution can be explained in several ways. Firstly, the study on digital literacy and e-commerce identified a sample of small and medium-sized enterprise (SME) owners who had received training or participated in online economy and business development training activities provided by local governments, SME associations and SME incubators. Second, the policy makers should contribute more to the encouragement and facilitation of increased digital literacy and e-commerce among SME owners.

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LITERATURE REVIEW

The impact of technology on the economy and industry can be elucidated through Paul Romer's endogenous growth theory. Zhao (2019) has further elaborated Paul Romer's endogenous growth theory by considering technology. This theory explicitly incorporates the technology parameter A(t) into the economic growth model. This parameter, designated A(t), can be constructed through the research and development (R&D) model. The enhancement of the quality of R&D through the utilisation of technology can facilitate the optimisation of production efficiency and increase company profits. The enhancement of company efficiency and profits lead the higher level of economic output (growth).

Furthermore, Braunerhjelm & Henrekson (2024) posited that economic growth theories in the 1980s and 1990s continued to emphasise R&D. These theories refer to the economic concepts of Robert Lucas, Paul Romer, Philippe Aghion, and Peter Howitt. Consequently, they argued that entrepreneurship and innovation by incorporating technology will determine economic growth and development. This condition implies that entrepreneurship, innovation and technology are main factors for firm and the economy to ensure robust and enduring economic growth. In essence, these three factors have transformed the business from a technology-free approach to a technology-enabled business at both the production and marketing levels. It is imperative that business actors (investors) enhance their digital business literacy and inclusion to ensure the maintenance of profits, market share and business competitiveness.

Lankshear & Knobel (2016) identified three main features in digital literacy: first, digital literacy is related to information; second, digital literacy involves interaction with information, where there is a value of truth or validity, credibility, and reliability; third, most definitions construct digital literacy as a capacity or ability, a skill, or as a competency. Competencies in digital literacy consist of five competency areas, namely (1) information and data literacy, (2) communication and collaboration, (3) digital content creation, (4) security, and (5) problem-solving.

Information and data literacy is the ability to explore, search and filter data, information and digital content, evaluate data, information and digital content, and manage data, information and digital content. Communication and collaboration are the abilities to interact through digital technology, share through digital technology, engage as a netizen, collaborate through digital technology, and manage digital identity. Content creation is the skill to develop digital content,

integrate and re-elaborate digital content, ensure copyright protection, and develop programs. Security competencies are efforts to protect devices, personal data and privacy, health and well-being, and the environment. Finally, problem-solving skills are the ability to solve technical problems, identify technology needs and responses, use digital technology creatively, and identify digital competency gaps (Lankshear & Knobel, 2016).

Wheeler (2012) noted eight components or elements in digital literacy that contribute to building the online culture of today's society, namely: (1) social networking transliteracy, (2) maintaining privacy, (3) managing identity, (4) creating content, (5) organising and sharing content, (6) reusing/repurposing content, (7) filtering and selecting content, and (8) self-broadcasting. Social Networking is the presence of social networking sites that facilitate online social life and increase efficiency in communication.

This study notes that digital literacy delivers a significant contribution to the business development of SMEs, especially to improve the e-commerce usage. There are several indicators that determine digital literacy level for SMEs cover knowledge or understanding on the type of social media, social media usage, readiness level of social media, e-money or digital payment usage, and knowledge on the content of social media. These indicators will be set to assess the perception level of digital literacy for SMEs in Malang region.

The rapid growth of internet users positively impacts the development of e-commerce in Indonesia. In 2014, it was recorded that Indonesia had become the largest e-commerce market in Southeast Asia, with the number of e-commerce transactions reaching IDR 25.1 Trillion. This number continues to increase yearly, resulting in e-commerce transactions in Indonesia reaching IDR 77.766 trillion throughout 2018 (Sasmito & Prestianto, 2021).

E-commerce Platforms, both on a national and local scale, continue to emerge and are increasingly in demand by consumers. The number of consumers who turn to online stores further encourages sellers to transform their transaction activities towards digitalisation (Orinaldi, 2020). E-commerce is a business that uses information technology to increase sales and business efficiency and provide the basis for new products and services. It is also defined as commercial activities through electronic means. The electronic processing and transmission of information (text, video, audio) reflect the e-commerce. E-commerce involves many activities, such as buying and selling goods and services, and electronic or digital delivery (Išoraitė & Miniotienė, 2018). Along with the development of e-commerce, it can also be defined as electronic transactions around the sale or purchase of goods or services between households, individuals, governments, and other public or private organisations through computer networks (Pradana, 2015).

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E-commerce has several advantages for economic actors. It can act as a tool to promote new forms and dimensions of business, and remove barriers associated with time and space limitations in obtaining goods or services. The users have electronic space and the ability to compare offers from different merchants regarding price, quality aspects, and assessment of seller credibility (Išoraitė & Miniotienė, 2018). E-commerce can also be a means of buying and selling that can minimise cost and time expenditure, as well as an alternative method to improve the sales performance of business products. It can help businesses expand their network so that product sales can reach a broader market segmentation.

This study reports that ecommerce still difficult to be employed for SMEs. The condition is restricted by the understanding and experience of SMEs owner on ecommerce. The owner also faces the insufficient skills to use ecommerce actively. Therefore, this study constructs several indicators that determine ecommerce usage for SMEs in Malang region include a reputable ecommerce, the number of marketplace usage, an active user, an active communication, and a direct impact of the marketplace.

Furthermore, digital literacy and digital economy delivered beneficial impacts both for national economy and industry (SMEs) (Irfan et al., 2022; Afolabi, 2023; Reddy et al., 2023; Wardana et al.,2023; Rehman & Nunziante, 2023; Cai et al., 2024; Chunfang et al., 2024; Ha & Kim, 2024 ; Ma & Gu, 2024; and Tam, et al. 2024). For example, Irfan et al (2022) reported that digital literacy and digital media stimulate the higher level of economic transaction and digital sales in Pakistan. Besides, the higher digital infrastructure leads the higher digital economy practices for 37 African countries during 2009-2022 (Afolabi, 2023). Currently, digital economy enhances sustainable business for a creative economy (Wardana et al., 2023), business digitalisation and innovation (Cai et al., 2024), sustainable agriculture (Chunfang et al., 2024), Ecommerce (Ma & Gu, 2024) and digitalisation of construction industries (Tam et al., 2024).

The current literature reveal that digital literacy has a significant contribution on e-commerce (economic media) such as (Su et al., 2021; Amornkitvikai, et al (2022), Zhang & Zhang (2024), Tanapaisankit, et al (2024), and Jula, et al (2024). The study's objective is to investigate determinant factors of e-commerce by moderating variable of digital literacy for SMEs. Therefore, the hypothesis can be proposed as follows:

H1 : the age of SMEs owner has a positive impact on digital literacy for SMEs in Malang region.

H2 : the period of business operational (firm establishment) has a positive impact on digital literacy for SMEs in Malang region.

H3 : the sex of SMEs owner determines has a positive impact on digital literacy for SMEs in

Malang region.

H4 : the economic media has a positive impact on digital literacy for SMEs in Malang region.

H5 : the digital literacy has a positive impact on e-commerce for SMEs in Malang region.

H6 : the age of SMEs owner has a positive impact on e-commerce though digital literacy for SMEs in Malang region.

H7 : the period of business operational (firm establishment) has a positive impact on e-commerce through digital literacy for SMEs in Malang region.

H8 : the sex of SMEs owner has a positive impact on e-commerce through digital literacy for SMEs in Malang region.

H9 : the economic media has a positive impact on e-commerce through digital literacy for SMEs in Malang region.

METHODS

The population of this study is SMEs that practice economic media (e-commerce) in Malang area. There is no a valid source of the population of SMEs using e-commerce in Malang area in 2024. Therefore, this study select snowball sampling to address the study's objective. The snowball sampling is more appropriate to set a non-probability sampling (Handcock & Gile, 2011). Besides, the sample is collected using several criteria such as the SME owners are the participants of government training program for SMEs, and participants in the training and assessing program of SMEs association and business incubator in Malang area. During March-April 2024, the researchers identify and collect the number of respondents. At that months, total respondents are 43 SMEs owners in Malang region (Malang City, Malang Regency, and Batu City). The data were collected using questionnaire. In particular, Malang region is selected as a study area because it contributes significantly in developing of SMEs in East Java Province. Malang region is also a center of tourism destination and education.

Table 1: Distribution of Respondents

Area	Respondent	Percentage	Industry
Malang City	16	37.21	Foods and beverages, batik, fashion, and ethnic necklace accessories
Malang Regency	12	27.91	Handicraft, foods and beverages, batik, fashion, and ethnic necklace accessories
Batu City	15	34.88	Handicraft, foods and beverages, batik, fashion, and ethnic necklace accessories
Total	43	100	

Source: Primary data output after processing, 2024; (Widiyanti, et al., 2024)

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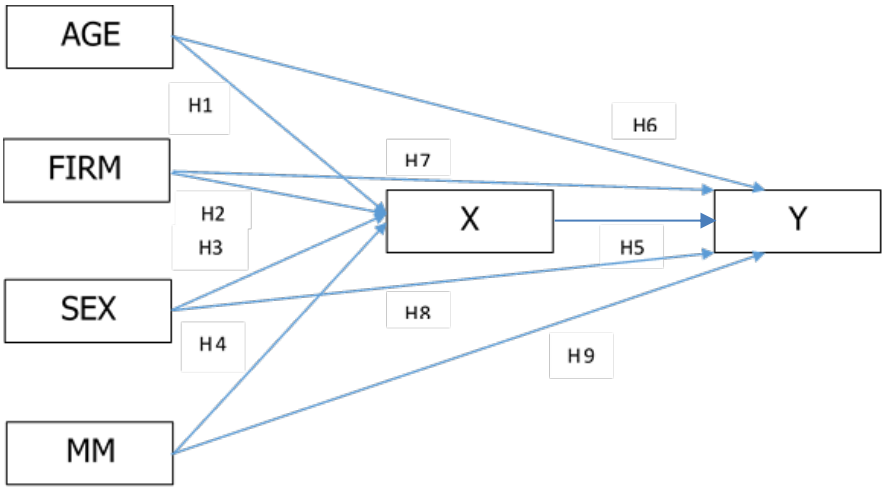
The distribution of respondents can be illustrated by Table 1. The highest number of respondents is collected from Malang City, while the lowest number of respondents is coming from Malang Regency. Besides, the respondents are distributed following several industries cover foods and beverages, batik, fashion, handicraft, and ethnic necklace accessories.

The data can be elaborated in several ways. The first, the data cover characteristics of SMEs owner that connected to digital literacy such as age, sex, period of business operation (firm establishment), and economic media. The data of age and firm establishment (firm) are presented in year. The data of sex is presented in the value of 0 equals woman and 1 equals man. Meanwhile, the data of economic media (mm) is presented in unit (1 = social media, 2 = store, and 3 = ecommerce). Furthermore, the data of digital literacy (x) is constructed by five indicators include knowledge on type of social media (x1), social media usage (x2), readiness of social media (x3), e-money or digital payment usage (x4), and knowledge on content of social media (x5). All data are assessed using likert scale between 1 (strongly disagree) – 5 (strongly agree). The data of ecommerce (y) is formulated by five indicators cover a reputable ecommerce (y1), the number of marketplace usage (y2), an active user of ecommerce (y3), an active communication and relation (y4), and a direct impact of marketplace (y5). All data are also assessed using likert scale between 1 (strongly disagree) – 5 (strongly agree).



Source: Researcher (2024); (Widiyanti, et al., 2024)

Figure 1: The Study Framework

The digital literacy can promote e-commerce usage for SMEs (Umboh & Aryanto, 2023). They proposed that digital literacy can be set as a mediating variable between digital economy

(e-commerce) and SMEs performance for 186 SMEs Batik. Therefore, this study constructs a study framework that can be illustrated by Figure 1. The figure explains that digital literacy (x) becomes a mediating variable between SMEs characteristics (sex, firm, age, and mm) and e-commerce (y). Besides, the figure is constructed following path analysis framework (Sandjojo, 2011).

Sandjojo (2011) explained that path analysis investigated the significant relationship both directly and indirectly among variables. The path analysis can also be called as a causal relationship. Mathematically, the path analysis can be written in the form of multiple regression. The basic models utilized in this study are as follows:

$x = f(sex, firm, age, mm)$ ……(1)

$y = f(sex, firm, age, mm, x)$ ……(2)

The Equation (1) and (2) can be rewritten in the form of path equations are as follows:

$x_i = \alpha_0 + \beta_1 sex_i + \beta_2 firm_i + \beta_3 age_i + \beta_4 mm_i + \varepsilon_{1i}$ ……..(2)

$y_i = \alpha_0 + \beta_1 sex_i + \beta_2 firm_i + \beta_3 age_i + \beta_4 mm_i + \beta_5 x_i + \varepsilon_{2i}$ ……..(3)

The variable of e-commerce is presented by "y", while the variable of digital literacy is illustrated by "x". Besides, the characteristics of SMEs are elaborated by sex, firm, age, and mm. the number of sample (SMEs) can be expressed by "i". The β_{1-5} are parameters of independent variables and it should contribute positively and significantly (> 0) on the dependent variable. The ε denotes the error term of the empirical model.

RESULT AND DISCUSSION

The study respondents were 43 small businesses actively using e-commerce platforms in the Malang region (Malang Regency, Malang City, and Batu City). The respondents also actively participate in training and business mentoring from SME associations, business incubators, and local government. The characteristics of the respondents can be described using several indicators, including gender (male and female), age (years), firm establishment (year), and economic media (shop, social media, and e-commerce).

Table 2 describes the characteristics of the respondents. Gender consists of female (code 0) and male (code 1). There were 38 female respondents (88.37%) and five male respondents (11.63%). Thus, female business owners are dominant and tend to be more active in using social media and e-commerce than male business owners.

The results on the age of the respondents show that they are in the range of 17-58 years old. Six people (13.95%) have the highest frequency level of age, namely 46 years old. Most

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respondents' age were distributed in the minimum to maximum age range, about 1-3 people, respectively. This means business owners in their 40s have a significant interest in interacting with social media and e-commerce to grow their businesses.

Table 2: Respondent Characteristics

Indicator	Mean	Minimum	Maximum	Frequency	Percent
Sex	0.116	0	1	0 = 38 persons and 1 = 5 persons	0 = 88.370 and 1 = 11.630
Age	43.791	17	58	The highest frequency = 46 years = 6 persons	46 years = 13.950
Firm establishment (firm)	6.612	1.5	25	The highest frequency = 2 and 5 years = @10 firms	each 10 firms = 23.260
Economic media (mm)	1.767	1	3	1 = social media (17 firms); 2 = store (19 firms); and 3 = ecommerce (7 firms)	1 = 39.530; 2 = 44.190; and 3 = 16.280

Source: Primary data output after processing, 2024; (Widiyanti, et al., 2024)

The SMEs in the study sample have been established for a minimum of 1.5 years and a maximum of 25 years. Younger businesses (under two years old) tend to rely on social media. Meanwhile, businesses that have been established for more than ten years have been able to rely on stores and e-commerce. During the COVID-19 pandemic, from early 2020 to 2022, many businesses relied on social media or did not concentrate on utilizing stores. The highest frequency occurred in SMEs that have been established for 2 and 5 years, each with ten firms (23.26%). Furthermore, the types of economic media consist of three types: social media (code 1), store (code 2), and e-commerce (code 3). The survey results revealed that 17 firms (39.53%) used social media, 19 firms (44.19%) used stores, and seven firms (16.28%) used e-commerce. This finding conveys that SMEs emphasize social media and stores. Social media is an easy and cheap economic tool to sell products. Meanwhile, stores are mostly preferred due to their strategic business locations in tourist areas and education centers.

Equation (1) and (2) can be estimated using Path Analysis. However, the first step was to test the validity and reliability of the data. The digital literacy data (x) involves five indicators consisting of x1 (Knowledge on the types of social media), x2 (Social media usage), x3 (Readiness of social media), x4 (E-money or digital payment usage), and x5 (Knowledge on the content of social media). Further, e-commerce data also has five indicators which include y1 (reputable e-commerce), y2 (number of marketplace usage), y3 (active user), y4 (active communication), and y5 (direct impact of the marketplace).

Table 3: Direct Effects, Indirect Effects and Total Effects

Variable	Coefficient	z-test	P>|z|	Hypothesis
Direct Effects				
Structural:				
Digital Literacy (x)				
sex	-1.070	-0.76	0.448	Rejected (not significant)
firm	0.955	1.52	0.129	Rejected (not significant)
age	0.614	3.21	0.001	Accepted (significant)
mm	1.183	1.91	0.056	Accepted (significant)
E-commerce (y)				
Digital literacy (x)	0.684	6.77	0.000	Accepted (significant)
sex	-0.386	-0.41	0.681	Rejected (not significant)
firm	0.803	1.88	0.061	Accepted (significant)
age	0.178	1.26	0.208	Rejected (not significant)
mm	0.548	1.28	0.200	Rejected (not significant)
Indirect Effects				
E-commerce (y)				
sex	-0.732	-0.75	0.451	Rejected (not significant)
firm	0.653	1.48	0.139	Rejected (not significant)
age	0.419	2.90	0.004	Accepted (significant)
mm	0.809	1.84	0.066	Accepted (significant)
Total Effects				
Digital Literacy (x)				
sex	-1.070	-0.76	0.448	Rejected (not significant)
firm	0.955	1.52	0.129	Rejected (not significant)
age	0.614	3.21	0.001	Accepted (significant)
mm	1.183	1.91	0.056	Accepted (significant)
E-commerce (y)				
Digital Literacy (x)	0.684	6.77	0.000	Accepted (significant)
sex	-1.118	-0.83	0.405	Rejected (not significant)
firm	1.456	2.43	0.015	Accepted (significant)
age	0.597	3.28	0.001	Accepted (significant)
mm	1.357	2.30	0.022	Accepted (significant)

Source: Primary data output after processing, 2024; (Widiyanti, et al., 2024).

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A validity test represents the accuracy of a research instrument in measurement. In this study, the validity testing method used is a pairwise correlation. The general rule of pairwise correlation is that each indicator is valid when the significance value is <0.05. The study findings describe that almost all digital literacy (x) indicators have a significance value <0.05, which means the indicators are valid. However, some indicators' significance values were still >0.05 or invalid. These indicators were then corrected or deleted. Higher levels of indicator validity imply that the data (variables) are more robust.

Further, investigation into the validity test of e-commerce (y) indicators shows that almost all indicators are valid or have a significance value of <0.05. This suggests that the e-commerce indicators can be used to investigate the relationship between digital literacy and e-commerce of SMEs in Malang. This study also explored the reliability of the digital literacy and e-commerce data for SMEs in Malang. The findings show that the reliability coefficient values for digital literacy (x) and e-commerce (y) data are 0.7866 and 0.7923, respectively. A general data assessment is reliable when the coefficient value is >0.60. Thus, data x and y are reliable. The implication is that both data can be used in path analysis. The findings on the estimation of Equation (1) and (2) can be traced using path analysis, as reflected in Table 3. Some of the findings in this table can be elaborated in several ways following hypothesis development (H1-H9).

1. The Effect of Age of SMEs Owner on Digital Literacy

Table 3 points out that the age of SME business owners have a positive and significant effect on digital literacy at the 1% level. This condition conveys the message that older SME business actors' age support the improvement of digital literacy. The coefficient of relationship between age and digital literacy is about 0.614 (Table 3). The level of coefficient illustrates that the higher the level of coefficient the higher the relationship between age of SMEs owner and digital literacy. Besides, the study's finding provides an accepted of hypothesis.

Wulandari, et al (2023) argued that digital literacy has a significant relationship with business performance and owner characteristics of 60 SMEs. The condition means that business performance and owner characteristics stimulate digital literacy for SMEs. These findings indicate the significance of age-specific factors in fostering the quality of digital literacy among SME owners. Furthermore, Munger et al. (2021) reported that the existence and contribution of social media will result in age groups (young and old) exhibiting different levels of digital literacy. The condition evidents that the capacity of the older generation to enhance their digital literacy is a significant factor in propelling business advancement. Conversely, the younger generation's skills

in digital literacy can be directed towards ensuring business efficiency.

2. The Effect Period of Business Operation (Firm Establishment) on Digital Literacy

The variable of firm does not provide a significant impact on digital literacy (Table 3). Besides, the coefficient of relationship between firm and digital literacy is about 0.955. The condition means that digital literacy does not depend on the time period of firm establishment. Therefore, the finding shows a rejected of hypothesis. Hastuti, et al (2021) found that digital literacy knowledge has a positive and significant impact on the business performance of 95 Batik SMEs. An increase in digital literacy knowledge is associated with an improvement in the quality of business performance. The period of firm establishment becomes a factor in encouraging the company's digital transformation towards a higher level of digital literacy. For companies that have been in operation for an extended period, digital transformation is a necessity to ensure business continuity and competitiveness. The expansion of market access for companies is facilitated by an increase in digital literacy.

3. The Effect of Sex of SMEs Owner on Digital Literacy

The sex of SME owners does not contribute significantly on digital literacy (Table 3). The coefficient of relationship between sex and digital literacy is about -1.070. The findings explain that male and female characteristics of SME owners do not determine the level of digital literacy. Besides, the finding explains a rejected of hypothesis.

The previous study argued that gender can lead the improvement level of digital literacy for SMEs (Wulandari et al., 2023). The condition means that male and female of SMEs owners have a significant concern on digital literacy. The level of internet access by men and women is a significant factor in the increasing digital literacy of businesses. In essence, the reliance on the internet for business activities drives the behaviour of men and women to achieve a higher level of digital literacy in order to guarantee business continuity. Furthermore, (Long et al., 2023) found that men tend to have a higher level of digital literacy than women. The disparity in digital literacy levels between men and women becomes more pronounced with age. This implies that men's accessibility to digital technology is contingent upon their level of education, income, and position within the company. Consequently, the necessity for men to enhance the quality of their digital business literacy is more pronounced and precise than that of women.

4. The Effect of Economic Media on Digital Literacy

The economic media (mm) has a positive and significant impact on digital literacy at the 10% level (Table 3). The increasing economic media usage stimulates an increase in the digital literacy. The coefficient of relationship between economic media and digital literacy is about

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1.183. It denotes that the higher perception level of economic media usage delivers the higher perception level of digital literacy quality for SMEs. The finding illustrates an accepted of hypothesis. Wardoyo et al. (2024) explained that entrepreneurial literacy can serve as a catalyst for digital literacy in 125 SMEs. The economic media delivers a significant contribution to improve the quality of digital literacy. The accessibility of economic media to small and medium-sized enterprise (SME) owners presents an opportunity to enhance digital literacy. The small and medium-sized enterprise (SME) owners can leverage economic media to expand their market reach and enhance their digital technology practices, thereby ensuring business continuity. In particular, (Arafah & Hasyim, 2023) traced the distribution of economic media use, with the results indicating that Facebook users accounted for 38.4% of the total, WhatsApp users are about 20.2%, YouTube users are about 18.4%, Twitter users are about 8.3%, and TikTok users are about 8.3%.

5. The Effect of Digital Literacy on E-Commerce

The digital literacy has a positive and significant impact on e-commerce at 1% level. Besides, the coefficient of relationship between digital literacy and e-commerce is about 0.684. The condition shows that the higher quality and knowledge of digital literacy for SME owners lead the higher quality and practice of e-commerce. Besides, the value of 0.684 represents the higher relationship or impact level of digital literacy on e-commerce. Therefore, the finding provides an accepted of hypothesis.

Previous empirical studies revealed the significant relationship between digital literacy and e-commerce (Poorangi et al., 2013; Jahanshahi et al., 2013; Amin & Hussin, 2014; Astuti & Nasution, 2014; Costa & Castro, 2021; and Wardoyo et al., 2024). For example, Poorangi et al (2013) found that e-commerce adoption can be determined by business digitalization. E-commerce was also influenced by technological, organisational and environmental factors (Amin & Hussin, 2014). Astuti & Nasution (2014) indicated that as many as 190 small and medium-sized enterprise (SME) owners exhibited a relatively low level of digital economic utilisation, with only 36.3% actively engaging with e-commerce. In more detail, Jahanshahi et al. (2013) identified a number of benefits that e-commerce brings to SMEs, including increased market share, increased profit, increased productivity, reduced costs (transactions, selling, advertising), improved customer service, increased accessibility for end users, increased responsiveness from end users, increased efficiency in dealing with suppliers, enhanced company brand and corporate image, increased customer loyalty and retention, and improved business processes flow. Furthermore, Costa & Castro (2021) observed that digital literacy serves as a catalyst for

the continued adoption of e-commerce. Meanwhile, Wardoyo et al. (2024) pointed out that entrepreneurial literacy can serve as a catalyst for digital literacy in 125 SMEs.

6. The Effect of Age of SMEs Owner on E-Commerce through Digital Literacy

The variable of age of SME owners does not contribute significantly on e-commerce. Besides, the coefficient of relationship between age and e-commerce is about 0.178 (Table 3). The findings elaborate that the higher number of age cannot stimulate the higher knowledge and practice of e-commerce for SMEs. The condition means that the finding describes a rejected of hypothesis.

Amin & Hussin (2014) described the e-commerce adoption model by SMEs as an e-commerce model that considers business owner characteristics. Besides, Al-Tit (2020) identifies ten key drivers of e-commerce that SME owners should consider. The characteristics of business owner will lead the improvement of e-commerce quality. These ten key drivers are consumer preferences, e-commerce perception, partner willingness, e-commerce costs, technical expertise, consumer trust, employee knowledge and experience, top management support, convenience utilisation, and organisational culture.

Moreover, business owners will also be confronted with changes and challenges in older consumers accessing e-commerce (Rybaczewska & Sparks, 2021). In the context of e-commerce, older consumers require more comprehensive and intense interaction and communication during business transactions with business actors. Consequently, an increase in the age of SME owners may contribute to the success and sustainability of businesses by facilitating the appropriate utilisation of e-commerce. Enhancing the digital literacy of SMEs owners in business practices through e-commerce will facilitate older consumers' access and utilisation of e-commerce.

7. The Effect of Period of Business Operational (Firm Establishment) on E-Commerce through Digital Literacy

The firm establishment (firm) has a positive and significant impact on e-commerce at 10%. The coefficient of relationship between firm establishment and e-commerce is about 0.803 under direct effects and 1.456 under total effects (Table 3). However, the firm establishment does not contribute significantly on e-commerce under indirect effects. The condition exhibits that the higher knowledge and practice of e-commerce for SME owners will be determined by firm establishment directly. Besides, the higher value of coefficient explains the higher level of relationship between firm establishment and e-commerce. Therefore, the finding describes an accepted of hypothesis.

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Amin & Hussin (2014) paid more attention on the contribution of firm operasional on e-commerce adoption model by SMEs. As a company gains experience and longevity in its operations, it becomes increasingly likely that it will encounter opportunities to explore and adopt e-commerce practices. E-commerce practices are designed to ensure the sustainability and expansion of the market. Besides, Rahayu & Day (2015) posited that the adoption of e-commerce by 292 SMEs in Indonesia is contingent upon perceived benefits, technology readiness, owners' innovativeness, owners' IT ability, and owners' IT experience. In essence, the duration of business operations is enhanced by the advent of e-commerce. The firm operational can also increase the e-commerce practices for SMEs (Jahanshahi et al., 2013). This condition indicates that long-standing enterprises are driven to enhance their business scale through the utilisation of e-commerce.

8. The Effect of Sex of SMEs Owner on E-Commerce through Digital Literacy

The variable of sex of SME owner does not provide a significant impact on e-commerce (Table 3). The coefficient of relationship between sex and e-commerce is about -0.386 under direct, -0.732 under indirect effects, and -1.118 under total effects. The findings describe that the knowledge and practice level of e-commerce for SMEs do not depend on the sex of SME owners. Therefore, the finding illustrates a rejected of hypothesis.

Amin & Hussin (2014) and Rahayu & Day (2015) noted that the e-commerce adoption model for SMEs has a relationship with business owner characteristics. SME owners of both sexes demonstrate a greater propensity to utilise e-commerce as a means of fostering business growth. This condition represents that gender presents a more favourable and appropriate context for e-commerce practices within SMEs. Moreover, the gender can qualify the quality of e-commerce (Al-Tit, 2020). The motivation of men and women as small business owners to access and practice e-commerce will facilitate the development of more effective business operations. In addition, E-commerce can also be used as a medium for connecting consumers and producers, thus providing an input to improve product quality in the future (Orinaldi, 2020; and Sudaryono et al., 2020).

9. The Effect of Economic Media on E-Commerce though Digital Literacy

The economic media does not contribute significantly on e-commerce for SMEs under direct effects (Table 3). The condition means that the finding provides a rejected of hypothesis. Conversely, those two variables have a positive and significant impact at 5% under indirect and total effects. The coefficients of relationship between economic media and e-commerce under indirect and total effects are 0.809 and 1.357, respectively. It illustrates that the economic

media will stimulate indirectly the quality of knowledge and practice of e-commerce for SME owners.

Rahayu & Day (2015) concerned on the significant relationship between business media and e-commerce. The higher knowledge and practice of business media lead the higher quality of e-commerce. Besides, the e-commerce brought a beneficial impact of business marketing media (Jahanshahi et al., 2013). The increasing prevalence of economic media is driving the growth of e-commerce. In essence, the proliferation of economic media that can be accessed and utilized by small and medium-sized enterprise (SME) owners will facilitate the enhancement of their practices and utilization of e-commerce. However, Savrul et al. (2014) identified obstacles to e-commerce adoption for SMEs, namely that SMEs lack the capacity and capability to adopt e-commerce and compete in the global market. Therefore, small and medium-sized enterprise (SME) owners should direct greater attention to enhancing their abilities to utilise economic media and e-commerce in order to guarantee a market power and a global competitiveness. Haryanti & Subriadi (2020) and Nisar & Prabhakar (2017) noted that e-commerce also increases the availability of information, not only for consumers but also for competitors, where they can identify and improve their respective product innovations.

CONCLUSION

The existence of information technology (business digitalisation) has given SMEs a broader space to utilise e-commerce to increase sales. Besides, the utilisation of e-commerce can be linked to the quality of digital literacy. Therefore, this study investigates the determinant factors of e-commerce by moderating variable of digital literacy among 43 SMEs in Malang. All data were collected through a survey from March to April 2024. Path analysis was applied to address the study's objective. The study findings can be described in several ways. First, the age of SME business owners have a positive and significant effect on digital literacy at the 1% level. Second, the firm does not provide a significant impact on digital literacy. Third, the sex of SME owners does not contribute significantly on digital literacy. Fourth, the economic media (mm) has a positive and significant impact on digital literacy at the 10% level. Fifth, the digital literacy has a positive and significant impact on e-commerce at 1% level. Sixth, the age of SME owners does not contribute significantly on e-commerce. Seventh, the firm establishment (firm) has a positive and significant impact on e-commerce at 10%. Eighth, the sex of SME owner does not provide a significant impact on e-commerce. Ninth, the economic media contributes positively and significantly on e-commerce for SMEs under indirect and total effects.

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The policy implications of the study findings can be formulated in several ways. First, SMEs in the Malang region should improve their digital literacy to encourage increased utilisation of e-commerce. Both are orientated to increase business turnover and revenue. Second, local governments, SME associations, and SME incubators can pay more attention to training and mentoring activities on digital literacy and e-commerce utilisation. Thirdly, social implications can be realised through the active role of business actors towards the surrounding environment and employment when they can improve digital literacy and utilise e-commerce. This study has several limitations. Firstly, the number of samples obtained is relatively small. This condition may be the cause of many variables not having significant implications. Therefore, future research can increase the number of samples. Second, the path analysis method can be substituted with the SEM method or panel data by increasing the number of samples, both individual samples (cross-section) and observation periods (time series). Therefore, the future study can emphasize on the SEM or panel data estimation.

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