International Journal on Advanced Science Engineering Information Technology

Vol.15 (2025) No. 2
ISSN: 2088-5334

The Readiness of Local Food MSMEs Actors in the Use of Digital Technology 4.0

Sitti Khadijah Yahya Hiola [a,b], Sitti Bulkis [c,*], Salengke [d], Letty Fudjaja [c]

[a] *Agriculture Science Program, Graduate School, Hasanuddin University, Makassar, Indonesia*
[b] *Agribusiness Study Program, Faculty of Agriculture, Muhammadiyah Makassar University, Makassar, Indonesia*
[c] *Department of Socio-Economics of Agriculture, Faculty of Agriculture, Hasanuddin University, Makassar, Indonesia*
[d] *Department of Agricultural Engineering, Faculty of Agriculture, Hasanuddin University, Makassar, Indonesia*
*Correspondence authors: *bulkis.agriuh@gmail.com*

***Abstract*—Digital technology 4.0 is developing automated technology into smart technology. This technology is usually inserted into almost every technological device or application used in everyday life, such as laptops, computers, cellphones, WhatsApp, Facebook, YouTube, Google, TikTok, Instagram, and e-commerce, which are included in the cloud computing category. This system is beneficial for MSME players in running a business and developing local food MSMEs, but what is still an obstacle is that if interaction with digital technology 4.0 has not been carried out thoroughly, the results will be less than optimal. This can be seen through the readiness of MSME players to use digital technology 4.0, such as service features, which are not all utilized in running a business. The results revealed that innovation as a driving factor of readiness for local food MSME players has a more significant positive influence than optimism in controlling local food MSMEs while interacting with digital technology 4.0. Furthermore, the inhibiting factors considerably influence the insecurity felt by local food MSME players in running a business because the sense of trust in the use of digital technology 4.0 is still lacking. Still, the perceived discomfort has been better in using digital technology 4.0. These results will benefit local food MSME players, government institutions, and banking institutions for the development and sustainability of local food.**

***Keywords*—Technology Readiness Index (TRI); MSMEs; digital technology 4.0; local food.**

Manuscript received 5 Jan. 2024; revised 24 Sep. 2024; accepted 12 Jan. 2025. Date of publication 30 Apr. 2025.

I. INTRODUCTION

Psychologically, acceptance or rejection as a form of one's behavior can reflect a readiness for a certain level of maturity. Other researchers define the level of readiness through a person's appearance in a situation that requires always being ready to respond to something[1]. An educational expert, Thorndike, reveals a fact about readiness: it is a reason to continue at the next level, which is necessary for one's development socially, physically, emotionally, and mentally. It simply means that readiness is the situation and condition of a person before receiving something [1].

Technology user readiness measures how ready a person is to use technology, which describes the tendency to accept and utilize technology as a convenience in everyday life [2]. This initial assessment of technology readiness provides feelings of intelligence, success, ignorance, and incompetence. Everyone has different tendencies to use technology, both positive and negative [1], [3]. The current condition is still the low use of technology due to the benefits and functions of technology, so it requires user readiness, and user acceptance of technology is continuing [4], [5].

The German government began using digital technology 4.0 as the next stage of industrial development, using intelligent systems. The changes in this industrial revolution started with steam engines, electric power, automation technology, and today's smart technology [6]. The industrial sector has made changes without directly involving humans, using computers to connect and communicate to arrive at a final decision [4], [6], [7]. Since entering the era of digital technology 4.0, society has experienced a transition in the use of technology, ranging from digitization and digitalization to digital transformation. At the time of the development of digital technology 4.0, society experienced a transition in the use of technology ranging from manual, digitization, digitization to digital transformation, which had positive and negative impacts on the use of digital technology 4.0, so the development of digital technology 4.0 in the future is supported by the application of technology that is comprehensive and equitable in society [4], [8]. The majority

of digital 4.0 technologies used in the business world include artificial intelligence, big data, and cloud computing, which can be used as support based on volume, variety, speed performance, and strategy for doing sales business [9], [10], [11], [12], [13], [14].

The interaction relationship between technology and humans led to the emergence of the basic concept of technology user readiness in the TRI method [1], [15]. Measuring technology user readiness consists of four constructs, including (1) *Optimism*, which sees a positive picture of a technology that can be more flexible in interacting, efficient in terms of use, and can control technology. (2) *Innovative*, which tends to pioneer the technology used. (3) *Discomfort* is felt due to insecurity when interacting with technology. (4) *Insecurity* in the form of questioning everything uncertain in technology. With thirty-six scales of measurement items, each of ten measures *optimism*, seven measures *innovation*, ten measures *discomfort*, and nine measures *insecurity*, on a point scale of 1 to 5 [1], [15]. Previous research has used TRI to address the readiness of online-based learning and mobile payment applications [2], [16], [17].

The application of technology is used by large companies/organizations in their business processes and has also begun to be used for micro, small, and medium enterprises (MSMEs) [18]. Technology 4.0 is a hot topic in the field of information technology. Studies on MSMEs that have used technology on a micro and small scale still lack knowledge and understanding of digital technology 4.0, but those who have used it state that cloud services greatly help it in running their business [19], [20], [21]. A study revealed that to penetrate the global market, digital technology must be adopted as the main alternative, and good management must be employed to overcome technological barriers to its use [22]. Likewise, many obstacles remain in food MSMEs when applying mastery of technology, knowledge, and information as a business development process in the era 4.0; developed countries have also conducted research for the 2005-2018 period, which shows that the impact depends on the technology applied [22], [23], [24], [25], [26]. MSME actors in South Sulawesi are multiplying, as seen from the data for Makassar City, 211,496 MSMEs, according to data from the South Sulawesi Cooperative and SME Office in 2021. Although various studies have been conducted related to MSMEs in general in multiple countries, experts found that there are still many MSMEs reluctant to apply new technologies [27]. So, there is a need for research on the readiness of MSME players to use digital technology [27], [28], [29].

II. Material and Method

A. Study Area

The research site is located in South Sulawesi Province, covering an area of 45,764,533 km². It is bordered to the north by West Sulawesi and Central Sulawesi, east by Southeast Sulawesi and the Gulf of Bone, south by the Flores Sea, and west by the Makassar Strait. The geographical coordinates range from 0°12' to 8° South latitude and 116°48' to 122°36' East longitude. Data collection occurred across six districts/cities: Makassar, Gowa, Jeneponto, Maros, Bone, and North Luwu, between September 2023 and February 2024. The chosen research locations were based on areas of local food production.

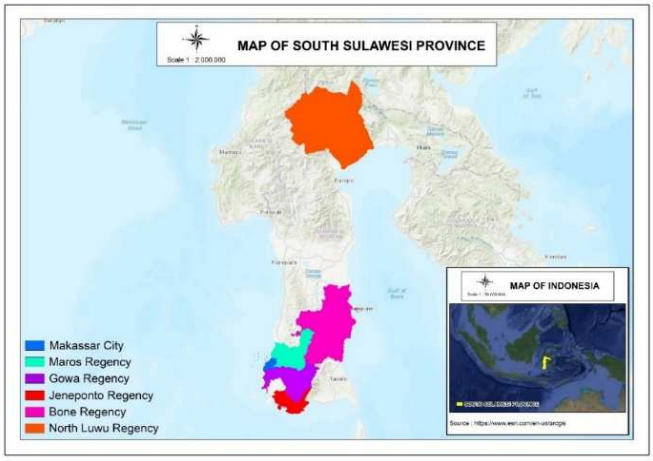

Fig. 1 Research location map

B. Methods

This research was conducted by starting data collection by purposive sampling to achieve the research objectives. Data were obtained through a research questionnaire organized based on 21 items in the TRI construction, which was distributed to 150 research participants in South Sulawesi in 6 locations of local food production centers: Makassar, Gowa, Maros, Jeneponto, Bone, and North Luwu.

C. Research Instruments and Measurements

This research questionnaire employs a Likert scale featuring four options: 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree) by eliminating neutral items in the answer choices to reduce bias that often occurs and as to reduce uncertainty of respondents [30]. Validity testing aims to test each questionnaire instrument so that the accuracy that should be measured can be determined. Testing can be highly valid if the measurement results are precise and accurate according to the test rules (Equations 1 and 2). The instrument is valid if the r count exceeds the table value, indicating a strong correlation with the total score.

$$rxy = \frac{n(\Sigma xy)-(\Sigma x)(\Sigma y)}{\sqrt{(n\,\Sigma x^2-(\Sigma)^2.(n\Sigma y^2-(\Sigma y)^2)}} \quad (1)$$

Description:
rxy: Correlation coefficient
∑x: Sum of item scores
∑y: Total score of all items
n: Number of respondents

Reliability testing helps measure the level of reliability of question items in the instrument using the alpha coefficient or Cronbach's alpha (α). The requirements for research instruments can be said to be reliable using Cronbach's alpha if the reliability coefficient > 0.6 (equation 2):

$$\alpha = \left(\frac{k}{k-1}\right)\left(1-\frac{\Sigma{\sigma_b}^2}{{\sigma_t}^2}\right) \quad (2)$$

Description:
α: Reliability coefficient
$\sum\sigma_b$: Sum of item variance
σ_t: Total variance
k: Total question items

D. Data Analysis

This study uses the Technology Readiness Index (TRI) to examine data analysis. This helps us understand users' readiness for digital technology 4.0, particularly within our local food micro, small, and medium enterprises (MSMEs). The TRI measurement scale includes four main variables: two driving factors, optimism and innovation, and two inhibiting factors, inconvenience and insecurity (Figure 2), which are composed of 36 items [1], [15]. However, this study was adjusted to the needs of research data to be more targeted in analyzing the readiness of local food MSME actors using 21 items.

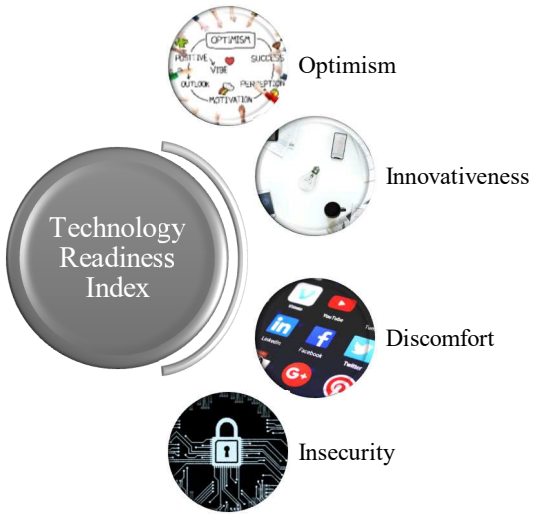

Fig. 2 Data Analysis

TABLE II
OPERATIONAL DEFINITION OF TRI-DETERMINANT VARIABLE

Determinant Variable	Code	Indicator	Operational Definition	Ref
Optimism	OPT 1	Digital technology 4.0 gives freedom of creativity	Believe that digital technology 4.0 is very diverse	[2], [15], [17]
	OPT 2	Accessing local food information through digital technology 4.0	Believe that digital technology 4.0 provides a lot of local food information	
	OPT 3	Digital technology 4.0 can meet the needs of local food businesses	The capabilities of digital technology 4.0 will meet the needs of local food businesses	
	OPT 4	Digital technology 4.0 makes my local food business more efficient	Believe that using digital technology 4.0 will be more efficient in running local food businesses	
	OPT 5	Digital Technology 4.0 will follow the instructions I give	Digital technology 4.0 will adapt to user instructions	
Innovativeness	INN 1	Many people learn digital technology 4.0 from me	The tendency to provide digital technology 4.0 information to others	[1], [29] [1], [15], [28]
	INN 2	Be the first compared to other people around you to know about digital technology 4.0	The desire to be the first to know about digital technology 4.0 compared to people around you	
	INN 3	Find out about the latest digital technology 4.0 services that can be used for local food businesses.	tendency to try the latest services that suit local food businesses	
	INN 4	Enjoy the challenge of finding the latest features of digital technology 4.0	The tendency to like the latest features of digital technology 4.0	
	INN 5	Not having many problems with the use of digital technology 4.0	The tendency to prefer the use of digital technology 4.0	
Discomfort	DIS 1	The application provider does not explain the features available.	Difficulties with features in digital technology services 4.0	[1], [15], [16], [28]
	DIS 2	Digital technology 4.0 does not seem to be designed for local food businesses	Difficulty in adapting digital technology 4.0 in running local food businesses	
	DIS 3	There is no guidance in digital technology services 4.0	Difficulty finding digital technology 4.0 guides	
	DIS 4	The basic model of digital technology 4.0 services is better than those with additional features.	Difficulty with additional features in digital technology 4.0	
	DIS 5	It would be embarrassing if other people knew that I don't understand digital technology 4.0.	You won't be confident if you don't understand digital technology 4.0	
	DIS 6	Digital technology 4.0 has health risks	Concerns about health risks that may arise with the use of digital technology 4.0	
	DIS 7	Digital technology 4.0 makes it too easy for the government to find out someone's activities	Concerns that arise if our activities can be accessed/viewed by the government	
Insecurity	INS 1	Feeling insecure if private data is seen by others	Suspicion about the security of data that can be accessed by others	[1], [15], [29]
	INS 2	Feeling insecure if private data can be lost or deleted	Suspicion about data stored in digital technology 4.0	
	INS 3	Feeling worried that data on digital technology 4.0 cannot be accessed at certain times	Suspicion that data access can be hampered	
	INS 4	Feeling worried if information or messages are not delivered	Suspicion about delays in information obtained	

Some stages in calculating the TRI score [1], [28]. (1) In the questionnaire, each statement is multiplied by the value of each weight. (2) A weighted value of 25 percent for each variable. (3) Calculate the statement's weight by dividing 25 percent by the total variable statement (equation 3). (4) Calculate the statement value by dividing the number of answers multiplied by the answer score by the number of respondents and multiplying by the statement weight (equation 4). (5) The total statement value equals the variable value (equation 5). (6) Calculate the TRI value by summing the overall statement score of the four main variables (equation 6). Parasuraman developed the method of TRI [1], [15] in three-level values: (1) Low-level TRI with a value <2.89. (2) Medium level TRI with a value between 2.90 and 3.51. (3) High-level TRI with a value of >3.51.

$$Statement\ Weight = \frac{25\ \%}{\Sigma\ variable\ statement} \qquad (3)$$

$$Statement\ Value = \frac{\Sigma\ (number\ of\ answers\ x\ answer\ score)}{\Sigma\ correspondent}\ x\ Weight\ of\ statement \quad (4)$$

$$Variable\ value = \Sigma\ Statement\ value \quad (5)$$

$$TRI\ value = \Sigma\ Statement\ score \quad (6)$$

III. Results and Discussion

A. Demographics

Respondents in this study were local food MSMEs in South Sulawesi Province. The selection of respondents was intentional by screening food MSMEs. The total population of food MSMEs is 38.570 MSMEs; using the Slovin formula, the number of respondents needed is 150 local food MSMEs. As a province, South Sulawesi has many local commodities spread across its various regions. Therefore, only the most dominant local foods, including Banana, Corn, Cassava, Breadfruit, and Sago, were chosen. Another reason is that digital technology is used in running a business. Based on the characteristics of the respondents, it is assumed that they can be relevant to the variables analyzed in this study. The distribution of respondents (Figure 3) is mainly in Makassar city, 74 percent, because many food MSMEs are located in Makassar city.

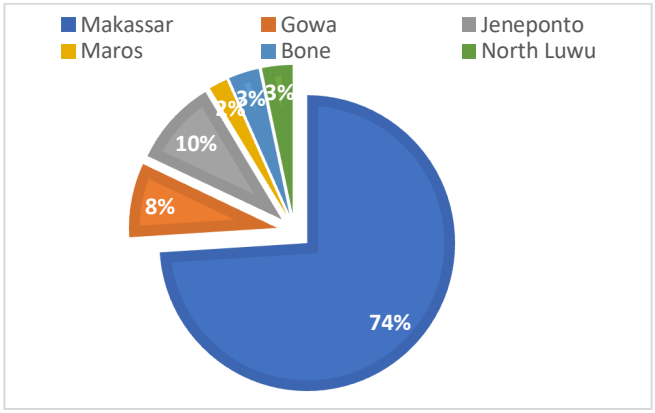

Fig. 3 Distribution of Respondents

TABLE III
RESPONDENT CHARACTERISTICS

Category	Subcategory	Frequency	Percentage
Age (years)	20-30	42	28
	31-40	46	30.6
	41-50	38	25.3
	> 50	24	16
Gender	Male	24	16
	Female	126	84
Education	Elementary School	4	2.6
	Junior High School	4	2.6
	Senior High School	59	39.3
	S1	75	50
	S2	8	5.3
Length of Business (Years)	0-5	105	70
	5-10	37	24.6
	>10	8	5.3
Labor (People)	1-5	132	88
	5-10	11	7.3
	> 20	1	0.6
	>100	2	1.3
	No labor	4	2.6

The characteristics of respondents in this study include age, gender, education, length of business, and labor, which have influenced the demographic factors of MSMEs [31]. The age of local food MSME players is productive, and the majority are women, which is supported by the role of women as breadwinners [32], [33], [34]. Furthermore, local food MSME players are educated at the university level, which can be a significant asset in developing business skills [31]. Meanwhile, the workforce of local food MSMEs shows that the most significant number of laborers is between 1 and 5 people. Consequently, according to World Bank regulations, labor serves as a benchmark in business scale and government regulations.

B. Validity and Reliability

The validity test is one part of this study, which tests the items in the questionnaire using SPSS software. The validity assessment is based on a total of 150 individual respondents. Consequently, the relevant threshold for significance at 5 percent is represented by an r-value of 0.159. This indicates that the measurement may be valid if the computed r-value exceeds 0.159. Conversely, if the calculated r-value is less than 0.159, it is deemed invalid. According to Table 4, it is evident that 21 statement items within the questionnaire are classified as valid.

TABLE IV
VALIDITY TEST RESULTS

Statement Code	r count	r table 5 % (150)	Result
OPT1	0.730	0.159	Valid
OPT2	0.845	0.159	Valid
OPT3	0.781	0.159	Valid
OPT4	0.801	0.159	Valid
OPT5	0.674	0.159	Valid
INN1	0.612	0.159	Valid
INN2	0.819	0.159	Valid
INN3	0.776	0.159	Valid
INN4	0.685	0.159	Valid
INN5	0.743	0.159	Valid
DIS1	0.760	0.159	Valid
DIS2	0.804	0.159	Valid
DIS3	0.786	0.159	Valid
DIS5	0.753	0.159	Valid
DIS6	0.708	0.159	Valid
DIS7	0.699	0.159	Valid
INS1	0.824	0.159	Valid
INS2	0.832	0.159	Valid
INS3	0.705	0.159	Valid
INS4	0.698	0.159	Valid

In this study, we measure data consistency using a reliability test. Cronbach's alpha value> 0.6 indicates reliable results. Based on the recap shown in Table 5, the results meet the reliability.

TABLE V
RELIABILITY TEST RESULTS

Variable	Cronbach Alpha	Result
Optimism	0.827	Reliable
Innovativeness	0.754	Reliable
Discomfort	0.862	Reliable
Insecurity	0.758	Reliable

C. Analysis of MSMEs Readiness Level

This research took place for approximately six months in 150 local food MSMEs. The findings of the TRI analysis are presented in Table 6, indicating a TRI score of 2.666. This

score categorizes it within the Low Technology Readiness Index, as it is positioned below the threshold of 2.89 [1], [15]. The results show that the overall readiness of local food MSME players is still low, but that does not mean they do not use digital technology 4.0; this looks interesting to observe. The perceived readiness of local food MSMEs has a not too big influence on the use of digital technology 4.0 due to the current development of digital technology 4.0, which requires them to interact with digital technology so that local food MSMEs have no other choice but to use digital technology 4.0 even though it is not yet massive. Previous studies have discussed that the readiness of technology users does not always mean adopting the technology [28], [35], [36]. Digital technology is identical for a simple reason: some people use it just because they want to look smarter or because they enjoy it [28], [37], [38].

TABLE VI
READINESS LEVEL MEASUREMENT RESULTS

Main Variable of TRI	Statement Code	Total Score
Optimism	OPT 1	0.117
	OPT 2	0.124
	OPT 3	0.124
	OPT 4	0.140
	OPT 5	0.152
Innovativeness	INN1	0.128
	INN2	0.148
	INN3	0.142
	INN4	0.154
	INN5	0.103
Discomfort	DIS1	0.075
	DIS2	0.076
	DIS3	0.114
	DIS4	0.113
	DIS5	0.090
	DIS6	0.092
	DIS7	0.093
Insecurity	INS1	0.169
	INS2	0.178
	INS3	0.164
	INS4	0.170
Total Score of TRI		**2.666**

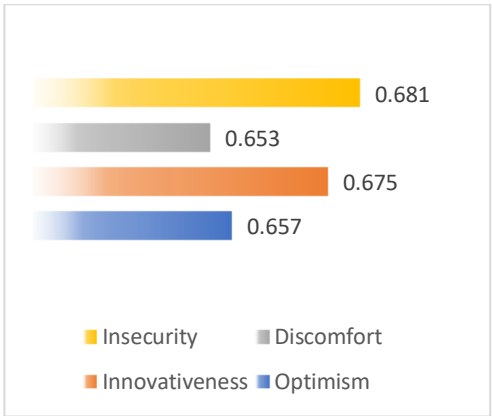

Fig. 4 Readiness of MSMEs for Local Food Products in South Sulawesi

The readiness of MSME actors starts with optimism in using digital technology 4.0 at 0.657 (Figure 4). Optimism requires positive views when interacting with digital technology and a sense of belief that the use of digital technology can facilitate and increase efficiency in running a business and developing sustainable local food products for MSMEs. Innovative variables as a driving factor in the readiness of local food MSME actors need to have a tendency or habit of using digital technology at a score of 0.675 (Figure 4), which means that innovations made by MSME actors emphasize the fact that most digital technology users are currently in the productive age range of 20 to 40 years old (Table 3). Thus, referring to a generation that is considered capable of using technology. Meanwhile, the older generation requires more effort or innovation to follow the development of digital technology 4.0. Even though it does not have to be done alone through a work team, it will also be beneficial in running a local food business. Digital technology 4.0 includes software such as laptops, computers, cellphones, and several social networks to market local food products, such as Facebook, WhatsApp, Instagram, TikTok, Grab/Gojek, Google, Marketplace, etc. It is just that the use of the features that exist in digital technology 4.0 has not been maximized. This is in line with the statement outlined that in strengthening the progress of digital technology 4.0, it is necessary to use digital technology 4.0 thoroughly and evenly [4], [8].

In addition to the driving factors in the readiness of MSME actors, there are also inhibiting factors, the first of which is inconvenience, with a score of 0.653 (Figure 4), the lowest among other variables, which shows that the perceived inconvenience has been better even though there is still a sense of discomfort, such as the tendency to feel embarrassed if seen unable to master the use of digital technology 4.0. The variable that has the highest score of 0.681 (Figure 4) is insecurity, meaning that MSME players feel insecure in using this digital technology with a lack of confidence that the security of the data obtained will be maintained to secure the database they have, the use of online bookkeeping that will be related to business accounts will be very worrying for them, and this is still widely felt by local food MSME players. This research is supported by previous research, which reveals concerns about privacy issues, so there is a reluctance to use digital technology 4.0, such as online payments [39], [40]. This can be due to the age factor of digital technology 4.0 users occurring among the older generation who still lack confidence and knowledge in operating digital technology 4.0 [28].

This inhibiting factor has a more significant influence exerted by insecurity than discomfort on the readiness of food MSME actors to use digital technology 4.0. Therefore, a more excellent optimism booster factor is needed to reduce business actors' insecurity in running this local food business. In line with other studies, which state that low awareness of the use of technology can affect the perception of user readiness due to unfamiliarity, it is humane for someone to refrain from using something new [28], [40], [41].

IV. CONCLUSION

This study examines the readiness of local food MSMEs to adopt digital technology 4.0 using the Technology Readiness Index (TRI). The findings indicate that the readiness of local food MSMEs can be evaluated through four key TRI variables: optimism at 0.657, innovation at 0.675, inconvenience at 0.653, and insecurity at 0.681. The total TRI score is 2.666, categorized as low since it falls below the threshold of 2.89. This suggests that local food MSMEs are not adequately prepared to utilize digital technology 4.0,

highlighting the need for greater optimism to foster confidence in deploying such technologies effectively, thus reaping the benefits they offer for local food businesses. Perceived insecurity remains a significant obstacle for these businesses. However, a low level of readiness does not mean using digital technology 4.0. The benefits for local food businesses remain limited due to uneven and incomplete utilization. In this study, TRI requires further testing so that the results obtained are more accurate and more specific to show the level of readiness of local food MSME players in South Sulawesi in using digital technology 4.0.

FUNDING

The Education Fund Management Institution (LPDP) No. 04427/BPPT/BPI.06/9/2023 supports this study's research through the Higher Education Financing Center (BPPT).

ACKNOWLEDGMENTS

The authors thank BPPT and LPDP for their financial support and Hasanuddin University for their encouragement.

REFERENCES

[1] A. Parasuraman, "Technology readiness index (TRI): A multiple-item scale to measure readiness to embrace new technologies," *J. Service Res.*, vol. 2, no. 4, pp. 307-320, 2000, doi: 10.1177/109467050024001.

[2] C. H. Lin, H. Y. Shih, and P. J. Sher, "Integrating technology readiness into technology acceptance: The TRAM model," *Psychol. Mark.*, vol. 24, no. 7, pp. 641-657, Jul. 2007, doi: 10.1002/mar.20177.

[3] D. G. Mick and S. Fournier, "Paradoxes of technology: Consumer cognizance, emotions, and coping strategies," *J. Consumer Res.*, vol. 25, no. 2, pp. 123-143, 1998, doi: 10.1086/209531.

[4] A. Tella and G. Olasina, "Predicting users' continuance intention toward e-payment system," *Int. J. Inf. Syst. Social Change*, vol. 5, no. 1, pp. 47-67, Jan. 2014, doi: 10.4018/ijissc.2014010104.

[5] E. T. Straub, "Understanding technology adoption: Theory and future directions for informal learning," *Rev. Educ. Res.*, vol. 79, no. 2, pp. 625-649, 2009, doi: 10.3102/0034654308325896.

[6] M. Skare and D. R. Soriano, "How globalization is changing digital technology adoption: An international perspective," *J. Innov. Knowl.*, vol. 6, no. 4, pp. 222-233, Oct. 2021, doi: 10.1016/j.jik.2021.04.001.

[7] G. M. V. Kawung et al., "Digital technology transformation of SMEs: Indonesian case study," *Amer. J. Multidiscip. Res. Innov.*, vol. 1, no. 6, pp. 56-60, Dec. 2022, doi: 10.54536/ajmri.v1i6.948.

[8] V. Venkatesh and F. D. Davis, "Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies," *Manage. Sci.*, vol. 46, no. 2, pp. 186-204, 2000, doi:10.1287/mnsc.46.2.186.11926.

[9] P. C. Verhoef and T. H. A. Bijmolt, "Marketing perspectives on digital business models: A framework and overview of the special issue," *Int. J. Res. Mark.*, vol. 36, no. 3, pp. 341-349, Sep. 2019, doi:10.1016/j.ijresmar.2019.08.001.

[10] C. Brewis, S. Dibb, and M. Meadows, "Leveraging big data for strategic marketing: A dynamic capabilities model for incumbent firms," *Technol. Forecast. Social Change*, vol. 190, May 2023, doi:10.1016/j.techfore.2023.122402.

[11] K. D. Martin and P. E. Murphy, "The role of data privacy in marketing," *J. Acad. Mark. Sci.*, vol. 45, no. 2, pp. 135-155, Mar. 2017, doi: 10.1007/s11747-016-0495-4.

[12] S. Shashi et al., "The impact of leanness and innovativeness on environmental and financial performance: Insights from Indian SMEs," *Int. J. Prod. Econ.*, vol. 212, pp. 111-124, 2019, doi:10.1016/j.ijpe.2019.02.011.

[13] S. Fosso Wamba et al., "How 'big data' can make big impact: Findings from a systematic review and a longitudinal case study," *Int. J. Prod. Econ.*, vol. 165, pp. 234-246, Jul. 2015, doi:10.1016/j.ijpe.2014.12.031.

[14] S. Erevelles, N. Fukawa, and L. Swayne, "Big Data consumer analytics and the transformation of marketing," *J. Bus. Res.*, vol. 69, no. 2, pp. 897-904, Feb. 2016, doi: 10.1016/j.jbusres.2015.07.001.

[15] A. Parasuraman and C. L. Colby, "An updated and streamlined technology readiness index: TRI 2.0," *J. Service Res.*, vol. 18, no. 1, pp. 59-74, Feb. 2015, doi: 10.1177/1094670514539730.

[16] W. Rafdinal and W. Senalasari, "Predicting the adoption of mobile payment applications during the COVID-19 pandemic," *Int. J. Bank Mark.*, vol. 39, no. 6, pp. 984-1002, 2021, doi: 10.1108/IJBM-10-2020-0532.

[17] M. Wiese and M. Humbani, "Exploring technology readiness for mobile payment app users," *Int. Rev. Retail, Distrib. Consumer Res.*, vol. 30, no. 2, pp. 123-142, Mar. 2020, doi:10.1080/09593969.2019.1626260.

[18] L. I. Wijaya et al., "Scope of e-commerce use, innovation capability, and performance: Food sector MSMEs in Indonesia," *J. Open Innov.: Technol., Market, Complex.*, vol. 11, no. 1, p. 100459, Mar. 2025, doi:10.1016/j.joitmc.2024.100459.

[19] R. Kr. Singh et al., "Applications of information and communication technology for sustainable growth of SMEs in India food industry," *Resour., Conserv. Recycl.*, vol. 147, pp. 10-18, 2019, doi:10.1016/j.resconrec.2019.04.014.

[20] A. H. Turan and T. Koç, "Health information technology adoption and acceptance of Turkish physicians-A model proposal and empirical assessment," *Health Inform. J.*, vol. 28, no. 2, Apr. 2022, doi:10.1177/14604582221096041.

[21] V. Serafeimidis and S. Smithson, "Information systems evaluation in practice: A case study of organizational change," *J. Inf. Technol.*, vol. 15, no. 2, pp. 93-105, Jun. 2000, doi: 10.1177/026839620001500202.

[22] O. Rodríguez-Espíndola et al., "Analysis of the adoption of emergent technologies for risk management in the era of digital manufacturing," *Technol. Forecast. Soc. Change*, vol. 178, May 2022, doi: 10.1016/j.techfore.2022.121562.

[23] T. Masood and P. Sonntag, "Industry 4.0: Adoption challenges and benefits for SMEs," *Comput. Ind.*, vol. 121, p. 103261, Oct. 2020, doi:10.1016/j.compind.2020.103261.

[24] F. Ullah et al., "Barriers to the digitalisation and innovation of Australian smart real estate: A managerial perspective on the technology non-adoption," *Environ. Technol. Innov.*, vol. 22, May 2021, doi: 10.1016/j.eti.2021.101527.

[25] J. Abbas et al., "Financial innovation and digitalization promote business growth: The interplay of green technology innovation, product market competition and firm performance," *Innov. Green Dev.*, vol. 3, no. 1, p. 100111, Mar. 2024, doi:10.1016/j.igd.2023.100111.

[26] H. R. Abbu, D. Fleischmann, and P. Gopalakrishna, "The digital transformation of the grocery business - driven by consumers, powered by technology, and accelerated by the COVID-19 pandemic," in *Digital Transformation in Business and Society*, Cham: Springer, 2021, doi: 10.1007/978-3-030-72660-7_32.

[27] H. Loubna, "Digital marketing practices in Moroccan SMEs (small and medium sized enterprises): A systematic literature review," *Moroccan J. Res. Manage. Mark.*, vol. 14, 2022, doi:10.48376/IMIST.PRSM/remarem-v14i2.39101.

[28] V. Balakrishnan and N. L. M. Shuib, "Drivers and inhibitors for digital payment adoption using the Cashless Society Readiness-Adoption model in Malaysia," *Technol. Soc.*, vol. 65, May 2021, doi:10.1016/j.techsoc.2021.101554.

[29] V. Jafari-Sadeghi et al., "Exploring the impact of digital transformation on technology entrepreneurship and technological market expansion: The role of technology readiness, exploration and exploitation," *J. Bus. Res.*, vol. 124, pp. 100-111, 2021, doi:10.1016/j.jbusres.2020.11.020.

[30] S. Dolnicar, "5/7-point Likert scales aren't always the best option: Their validity is undermined by lack of reliability, response style bias, long completion times and limitations to permissible statistical procedures," *Ann. Tourism Res.*, vol. 91, Nov. 2021, doi:10.1016/j.annals.2021.103297.

[31] D. Zuhroh et al., "The impact of sharing economy platforms, management accounting systems, and demographic factors on financial performance: Exploring the role of formal and informal education in MSMEs," *J. Open Innov.: Technol., Market, Complex.*, vol. 11, no. 1, p. 100447, Mar. 2025, doi:10.1016/j.joitmc.2024.100447.

[32] O. O. Osunmuyiwa and H. Ahlborg, "Stimulating competition, diversification, or re-enforcing entrepreneurial barriers? Exploring small-scale electricity systems and gender-inclusive entrepreneurship," *Energy Res. Soc. Sci.*, vol. 89, p. 102566, Jul. 2022, doi: 10.1016/j.erss.2022.102566.

[33] M. R. Sarker et al., "Systems thinking on the gendered impacts of COVID-19 in Bangladesh: A systematic review," *Heliyon*, vol. 9, no. 2, p. e13773, Feb. 2023, doi: 10.1016/j.heliyon.2023.e13773.

[34] A. Hendratmi et al., "Livelihood strategies of women entrepreneurs in Indonesia," *Heliyon*, vol. 8, no. 9, Sep. 2022, doi:10.1016/j.heliyon.2022.e10520.

[35] Y. Yang et al., "Understanding perceived risks in mobile payment acceptance," *Ind. Manage. Data Syst.*, vol. 115, no. 2, pp. 253-269, Mar. 2015, doi: 10.1108/IMDS-08-2014-0243.

[36] E. Slade et al., "An empirical investigation of remote mobile payment adoption," in *Developments in Marketing Science: Proc. Acad. Mark. Sci.*, Cham: Springer, 2016, pp. 441-442, doi: 10.1007/978-3-319-11815-4_122.

[37] S. Kumar et al., "A behavioural reasoning perspective on the consumption of local food. A study on REKO, a social media-based local food distribution system," *Food Qual. Prefer.*, vol. 93, Oct. 2021, doi: 10.1016/j.foodqual.2021.104264.

[38] S. Fraccastoro, M. Gabrielsson, and E. B. Pullins, "The integrated use of social media, digital, and traditional communication tools in the B2B sales process of international SMEs," *Int. Bus. Rev.*, vol. 30, no. 4, p. 101776, 2021, doi: 10.1016/j.ibusrev.2020.101776.

[39] J. Pirhonen et al., "'These devices have not been made for older people's needs' - Older adults' perceptions of digital technologies in Finland and Ireland," *Technol. Soc.*, vol. 62, p. 101287, Aug. 2020, doi: 10.1016/j.techsoc.2020.101287.

[40] T. Oliveira et al., "Mobile payment: Understanding the determinants of customer adoption and intention to recommend the technology," *Comput. Hum. Behav.*, vol. 61, pp. 404-414, Aug. 2016, doi: 10.1016/j.chb.2016.03.030.

[41] C. Flavián, M. Guinalíu, and R. Gurrea, "The influence of familiarity and usability on loyalty to online journalistic services: The role of user experience," *J. Retail. Consum. Serv.*, vol. 13, no. 5, pp. 363-375, Sep. 2006, doi: 10.1016/j.jretconser.2005.11.003.