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The impact of changes in online marketing information systems for business products

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ABSTRACT

This study examines the rapid evolution of information technology and digital transformation, particularly the challenges faced by small and medium enterprises (SMEs) in adapting to these dynamic technological changes which are critical to modern business operations. The study highlights the problem of limited utilization of digital media technology by SME managers as a promotional tool for market expansion. A quantitative analysis was conducted using structural equation modeling (SEM) based on Partial Least Squares (PLS) version 4.0. The study employed a simple random sampling technique with 421 participants. The findings indicate that business managers and technology play a significant role in change management. However, digital entrepreneurship and OMISBP do not have a direct impact. Additionally, OMISBP is not as a mediating variable, whereas technology serves as a partial mediator. From a theoretical perspective, the study identifies technology and OMISBP as crucial for SMEs. However, additional factors must address rapid technological changes and adaptation theories. In terms of practical implications, enhancing digital entrepreneurship transformation through online product marketing information system applications can help SMEs expand their market reach while improving marketing and operational efficiency.

Contribution/Originality: This study contributes to the advancement of digital entrepreneurial transformation technology by utilizing online product marketing information system applications to expand market reach. The originality of this study lies in the development of a web-based online marketing information system for business products (OMISBP) for SMEs with technology serving as a partial mediating variable.

1. INTRODUCTION

Rapid advancements in information technology systems and the increasing adoption of digital technologies present significant challenges for small and medium-sized enterprise (SME) managers who rely on computers and smartphones. According to Burnes (2020), change involves transitioning from an old system to a new one while Rismansyah (2024) highlights the profound transformation required for marketing information systems to achieve new operational conditions. Addressing the challenges SMEs face in online marketing requires recognizing technology as a key enabler in overcoming barriers imposed by social distancing measures. Information systems facilitate product advertising and enhance customer engagement by providing detailed and accessible information on products and prices (Konopik, Jahn, Schuster, Hoßbach, & Pflaum, 2022). Moreover, digital skills training programs are essential, as many SMEs still rely on traditional promotional methods that limit market reach

(Agnew, 2023). SMEs can optimize operations and adapt to the demands of the evolving digital market by integrating innovative marketing strategies with effective inventory management practices (Yunita, Rosa, & Karim, 2023). Digital transformation has become a strategic necessity for improving SME competitiveness, yet its adoption is often hindered by complex challenges (Lokuge & Duan, 2023). Additionally, Gonzalez-Varona, López-Paredes, Poza, and Acebes (2024) identify weak financial resources for technology investment, a lack of digitally skilled workers, and resistance to change particularly among middle managers as key barriers to digital transformation. These factors impact the adaptability required for organizations undergoing digital transition.

Adaptability enhances customer engagement, fosters innovation, and establishes a strong foundation for long-term success (Rismansyah, Adam, Hanafi, & Yuliani, 2022). The integration of customer relationship management systems further strengthens online marketing strategies, requiring SMEs to not only respond to change but also anticipate it. This approach fosters a mindset that values experimentation and learning from failure. As SMEs embrace digital transformation, integrating e-commerce platforms becomes crucial for expanding market reach and enhancing customer experience (Bartels & Schmitt, 2022). SMEs that adopt digital technologies experience increased operational efficiency and market expansion, particularly through digital marketing (Melo et al., 2023). Leveraging social media marketing with a strong online presence enables these SMEs to build community engagement, strengthen brand loyalty, and gather valuable consumer insights through targeted advertising (Verhoef et al., 2021).

This strategic correlation between technology adoption and consumer behavior analytics empowers SMEs to effectively navigate the complexities of the modern marketplace, allowing the enterprises to remain competitive and sustain growth (Grooss, Presser, & Tambo, 2022). Therefore, SMEs should adopt new technologies for e-commerce solutions while considering the importance of security measures to protect sensitive customer information which is critical for maintaining trust and credibility in the online marketplace, continue to evolve, prioritizing cybersecurity becomes essential for ensuring long-term business sustainability and safeguarding enterprises and consumers in this rapidly changing environment. Based on previous studies, Dangol (2024) found that extensive research has been conducted on digital technology adoption in developed countries. However, studies focusing on developing countries, particularly in the SME sector remain limited. Therefore, this study focuses on SMEs in developing countries that face unique challenges in adopting digital technologies. A web-based online marketing information system (OMIS) for SME products plays a crucial role in fostering community engagement and encouraging repeat business by delivering personalized experiences tailored to individual preferences. Implementing technology-driven solutions enhances business performance, particularly in marketing and operational efficiency for MSMEs.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

This study focuses on digital marketing systems, particularly the online marketing information system for web-based business platforms (Donaldson, Cuevas, & Lemmens, 2017; Rachmad, 2024). In this context, SME managers leverage digital marketing systems to enhance product marketing, which plays a crucial role in strengthening and sustaining customer relationships.

2.1. Business Managers and Change Management

According to Khan, Ajaz, Khan, Khan, and Fatima (2016), business managers played a key leadership role in change management. Organizations must embrace change to ensure their survival and success, particularly in response to the dynamic and rapidly evolving business environment driven by technological advancements. Therefore, effective leadership is essential in change management. Lies (2021) highlighted the increasing importance of marketing efficiency, viral marketing and social media (Federico, 2020). Furthermore, Rismansyah (2024) described change as a transition from one state to another in the context of digital marketing transformation.

Lautner (2023) found that digital marketing innovation has both direct and indirect impacts on business performance by enhancing marketing capabilities. Business managers were identified as needing to transition the marketing strategies from traditional to online methods based on these results. However, no study previously explored the direct influence of business managers on change management, leading to the following hypothesis.

H_1: Business managers have a direct influence on change management.

2.2. Business Managers and Technology

Managers of SMEs are required to adopt specialized digital marketing technology which includes human resources for online product promotion (Gay, Charlesworth, & Esen, 2007) and communication technology (Gattiker & Stollemmaier, 2012). Furthermore, advancements in Internet technology have become integral to marketing strategies aimed at business expansion (Yunita, Adam, Wahab, Andriana, & Nailis, 2024). Studies on technology by Yadav and Pavlou (2020) and Melović, Jocović, Dabić, Vulić, and Dudic (2020) describe the role of digital continuity and social networks as key components of digital marketing. Additionally, social media technology plays a crucial role in public engagement further reinforcing the necessity for business managers to leverage digital tools for effective communication and business growth. These studies provide the basis for the following hypothesis:

H_2: Business managers have a direct influence on technology.

2.3. Technology and Change Management

Research conducted by Rizal, Kahfi, and Prasetyono (2023) explains that information technology in organizations aims to improve effectiveness and efficiency in daily operations. The use of information technology is categorized into the following three aspects: enhancing efficiency, improving effectiveness, and achieving strategic advancements. Technology adoption is defined as computer-based solutions for business operations (Urbinati, Chiaroni, Chiesa, & Frattini, 2020). This was evident in previous literature on digital technology (Apostolov & Coco, 2021; Nambisan, Lyytinen, Majchrzak, & Song, 2017) and organizational transformation which highlighted the importance of sharing digital resources and capabilities (Warner & Wäger, 2019; Yeow, Soh, & Hansen, 2018). The literature further suggested that changes in business models within a digital context influence startups' transformation processes (Urbinati et al., 2020). Moreover, research has demonstrated that information technology serves as a critical predictor of success in digital entrepreneurship (Abubakre, Zhou, & Zhou, 2022). The integration of technology also plays a crucial role in digital communication strategies, particularly in engaging with potential customers through social media as an effective corporate communication platform. Furthermore, AlZayani, Mohammed, and Shoaib (2024) emphasized the growing demand for technology and its role in sustainability, leading to the following hypothesis:

H_3: Technology has a direct influence on change management.

2.4. Business Managers' Influence on Technology-Mediated Change Management

Managers of SMEs using web-based online marketing information systems have been shown to expand market reach and actively utilize Internet technology for marketing (Dermawan, Primawanti, Internasional, & Padjadjaran, 2020). Publications have further examined online marketing information systems for business products and web-based platforms facilitating product introductions, where the online system directly processes inputs and outputs (Paillat et al., 2023). Digital transformation has been identified as a result of integrating digital technology into business operations (Verhoef et al., 2021). Furthermore, Jung and Shegai (2023) found that digital marketing innovation has significant direct and indirect effects on company performance through marketing capabilities. The study addresses challenges by proposing a web-based digital marketing system to increase product demand and attract more visitors. Digital technology plays a crucial role in supporting the entrepreneurial process (Urbinati et

al., 2020). Families and entrepreneurial communities have a positive and significant impact on entrepreneurship, further strengthened by the use of digital technology (Soluk, Kammerlander, & Darwin, 2021). Research by AlZayani et al. (2024) also concludes that smart technology and other sustainability performance factors significantly influence profitability. However, the study found no mediation effect of the "SMEs sustainability strategy". Technology-mediated change management refers to the use of digital technology by organizations to facilitate change implementation. The adoption of digital technology has significantly penetrated change management practices (Kanitz & Gonzalez, 2021). A study by Yunus, Aman, and Keliwon (2019) found that support from business leaders is essential to encourage and motivate IT users to adopt new technology innovations. Additionally, the ability to adapt and integrate new technology is crucial in ensuring change readiness. Challenges such as resistance to change and anxiety about new technologies can be overcome through management involvement, ongoing discussions, education, demonstration of knowledge, and training. Previous studies lacked empirical evidence regarding the consequences of adopting digital technology as a mediating variable despite the adoption. Based on this gap, the following hypothesis was formulated:

H_4: Business managers influence technology-mediated change management.

2.5. Digital Entrepreneurship and Change Management

Product innovation refers to the commercialization of new technologies or the combination of technologies that address user or market needs (Utterback & Abernathy, 1975). Digital entrepreneurship is recognized as a key aspect of marketing transformation, including collaboration with other stakeholders (Musnaini & Irjus Indrawan, 2020). The findings highlight the need to analyze the impact of digital transformation on SME management, given that SMEs account for 99.8% of all European enterprises and contribute to 65% of global employment in the European business economy during 2021–2022 (Gorgels, Priem, Blagoeva, Martinelle, & Milanesi, 2022). Digital marketing is emphasized as a critical factor in fostering a digital mindset among stakeholders (Arbittier, 2023). Marino-Romero, Palos-Sánchez, and Velicia-Martín (2024) outline a structured digital transformation approach aimed at modifying organizational processes in SMEs, enhancing their agility and responsiveness to sudden market changes. Similarly, Jibril, Kesidou, and Roper (2024) find that adopting digital technology strengthens micro-business capabilities and reinforces the link between sustainability goals and innovation. Based on these results, the following hypothesis was formulated:

H_5: Digital entrepreneurship has a direct influence on change management.

2.6. Digital Entrepreneurship and OMISBP

A structured literature review on digital entrepreneurship provides insights into recent developments, including design, action, and collaboration with practitioners, generating practice-driven insights (Zaheer, Breyer, & Dumay, 2019). Digital entrepreneurship is defined as a form of entrepreneurship that leverages digital technology (Setiawan et al., 2023). Studies indicate that digital marketing capabilities contribute positively to performance, with companies exhibiting a higher entrepreneurial orientation utilizing these capabilities more effectively to achieve better results (Wang, 2020). Jibril et al. (2024) highlight the significance of digitalizing operations, modernizing information technology, managing changes associated with digital transformation, and their impact on digital marketing. Based on these findings, the following hypothesis is proposed:

H_6: Digital entrepreneurship directly influences OMISBP.

2.7. OMISBP and Change Management

Dapko, Boyer, and Harris (2021) stated that social media marketing was a highly popular and effective method for interacting with consumers. Digital marketing played an important role in ensuring that medium-credit businesses remained competitive. Study results showed that digital marketing, social media, and multi-channel

marketing were significantly related to the performance of SMEs in cyber entrepreneurship (Hasbolah et al., 2022). Digital marketing capabilities contributed positively to performance while enterprises with a greater entrepreneurial orientation use these capabilities more effectively resulting in improved performance (Sharma, 2023). Web-based online marketing information systems were described as continuous technological advances that had rapidly transformed digital marketing, emphasizing the importance of digital strategies for the future. Technological improvements also enabled more people to access the Internet (Novandari et al., 2023). Based on these results, the following hypothesis was proposed:

H_7: OMISBP direct influences on change management.

2.8. Digital Entrepreneurship Influences OMISBP-Mediated Change Management

Previous studies by Al-Mutawa and Al Mubarak (2023) showed that the adoption of computing provided solutions to organizational challenges. The adoption of digital technology by SMEs significantly impacted company sustainability. Furthermore, entrepreneurial innovation and information technology exhibited both negative and positive moderating effects on the relationship between information technology and digital entrepreneurial success (Abubakre et al., 2022). Marketing management was also identified as the strategic interaction between online presence and product innovation performance in SMEs (Rainer, Prince, Sanchez-Rodriguez, Splettstoesser-Hogeterp, & Ebrahimi, 2020). Tolstoy, Nordman, and Vu (2022) showed that online marketing capabilities positively influenced international performance through market orientation mediation. Previous research by Legros, Han, and Park (2024) on online behavioral advertising has a significant influence on consumer privacy, which is mediated by consumer attitudes and has a positive effect on consumer attitudes. AlKoliby, Abdullah, and Suki (2024) found that digital marketing indirectly influenced the sustainable performance of manufacturing SMEs through innovation as full mediation. Several studies have not identified online marketing information systems as mediators for business products. Additionally, empirical evidence for the mediating role of online marketing information systems and digital entrepreneurship remained lacking, prompting the following hypothesis to be formulated:

H_8: Digital entrepreneurship influences OMISBP-mediated change management.

2.9. Internal Factors and External Factors of Change

The theory of social change by Ogburn (1922) and Gerritsen and Stein (1992) state that internal and external causes fostered organizational change. The internal causes included changes in social norms, beliefs, and cultural practices originating in society. External causes included changes in population dynamics, economic activities, and societal technological advancements. However, external causes originated outside of society and included globalization, political change and environmental variables as well as interactions with other cultures or societies.

2.10. Internal Factors and Change Management

Internal factors refer to elements in a community or organization that could drive change where the variables originated from the social system (Ogburn, 1922). Additionally, Rismansyah (2024) emphasized the importance of internal elements in driving societal change. Previous studies have shown the relationship between change management, digital transformation, and the success of information technology projects which improved SMEs performance and resilience (Kala Kamdjoug, 2024). These results suggested that internal factors including the role of change leadership should be entrusted to individuals with genuine networking skills and sincerity. Furthermore, change leaders were recommended to focus on securing and maintaining employee support for organizational change (Ouedraogo, Ouakouak, & Hewapathirana, 2024). Future studies were expected to explore the development of digital transformation and the implications for SMEs-specific economies while designing new tools and methods to measure digital transformation stages (Cheng, Li, & Zhao, 2024). This study outlined implications for enterprises

planning to execute digital transformation and enhance internal management. Based on these insights, the following hypothesis was formulated:

H_9: Internal factors *directly influence change management.*

2.11. External Factors and Change Management

External factors were described as elements outside the community or organization that influenced change including broader environmental, economic, and cultural variables (Danang & Yanuar, 2021; Ogburn, 1922; Rabuana & Yanuar, 2023). These results showed significant transformations positive and negative among internal and external stakeholders through these changes that occurred in distinct ways (Thompson & Parent, 2024). Furthermore, a publication by Guo, Yang, Sun, and Zhang (2024) showed that information technology indirectly addressed supply chain vulnerabilities by enhancing internal factors and addressing external organizational challenges, eventually impacting change. Porfírio, Felício, and Carrilho (2024) also outlined the importance of employee skills and stakeholders' digital experiences in managing human resources and addressing digital transformation in the banking sector. These results found that combinations of internal and external factors significantly influenced the impact of digital transformation on Portuguese banks' performance. Further analysis by Kaskova and Trofimova (2023) showed that internal and external environmental factors could have positive and negative effects on the socio-economic conditions of Eurasian Economic Union countries. Based on this information, the following hypothesis was established:

H_{10}: External factors directly influence change management.

2.12. State of the Art

This study synthesized results from previous publications on digital marketing and social media. It further emphasized that wider product marketing increased market reach and customer awareness where digital marketing was considered crucial for business competitiveness. However, no prior studies focused on digital marketing information systems for SMEs, particularly online marketing information systems for web-based platform business products. The novelty of this study lay in introducing a marketing system that applied online marketing information systems for web-based platform business products in SMEs. This theoretical framework was developed based on the presentation of the study concepts and served as the foundation for the thinking model.

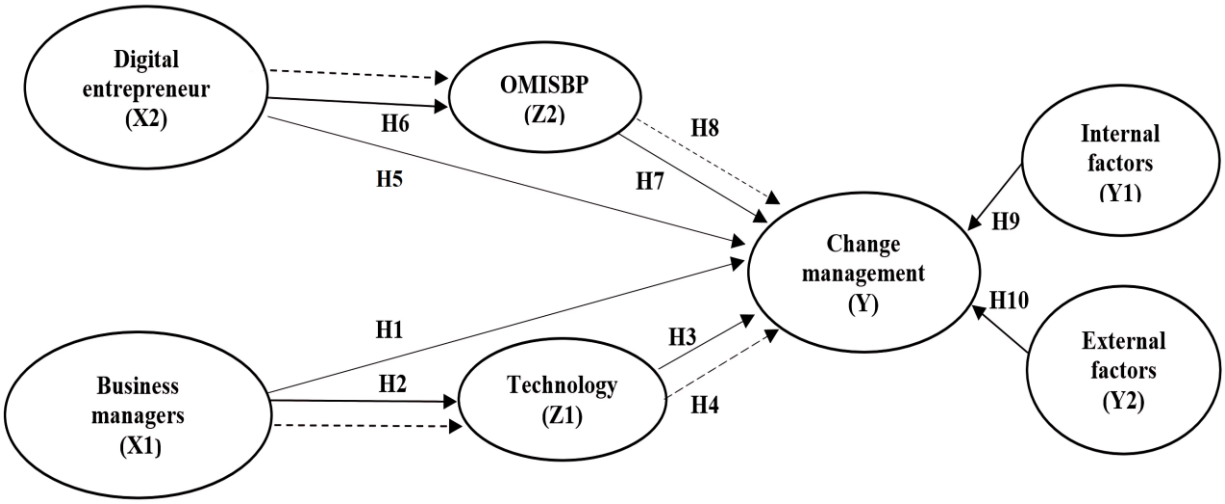

Figure 1. Framework of thought for technology (business manager), OMISBP (digital entrepreneur), and change management (internal and external factors).

Note: X1: Business managers, X2: Digital entrepreneur, Z1: Technology, Z2: OMISBP, Y: Change management,: Y1: Internal factors, Y2: External factors, .

3. METHODOLOGY

3.1. Research Design

The investigation was carried out utilizing a quantitative technique. Conceptual framework data collection on SMEs still relies on traditional promotional methods that limit market reach built on digital marketing theory. The variables involved in this research method are business manager, change management, digital entrepreneur, OMISBP, technology and, SMEs. Data were collected through questionnaire distribution using research instruments. Quantitative methods were used in this study with a quantitative approach using questionnaires that were distributed to respondents and analyzed through a structural equation model (SEM) statistical program. Probability sampling was applied to provide equal opportunities for each member to be included as a sample. Data analysis was conducted using quantitative methods and adopted SEM based on partial least squares (PLS) version 4.0 (Hayes, 2018). According to Yamane (1973), the population of SMEs in several areas of South Sumatra, Indonesia was approximately 536. Technique systematic random sampling approach is a method of sampling that is organized and methodical. This strategy is intended to pick SMEs from a population in an efficient and representative manner. The application of this technique begins by determining each requirement in the target sample. The results of a pilot test including 50 respondents showed that SMEs actors were less proficient in using technology to market products through online marketing information systems. Additionally, 65 SMEs actors lacked essential credentials such as an identity, email, or business permit and did not qualify as respondents. In total, 421 SMEs met the required criteria.

4. RESULTS

The frequency distribution of respondents who filled out the questionnaire based on gender, age, last education, type of business, and length of business was presented in Table 1.

Table 1. Data respondents:

No.	Data of respondents	Frequency	Percent
	Gender		
	Male	165	39.2
1	Female	256	60.8
	Age		
	15-18 years	57	13.5
	19- 21 years	61	14.5
	22-25 years	133	31.6
	26-29 years	124	29.5
2.	> 30 years	46	10.9
	Type of business		
	Micro business	148	35.2
	Small business	133	31.6
3.	Medium business	140	33.3
	Length of business		
	1- 3 years	83	19.7
	4- 6 years	94	22.3
	7-9 years	98	23.3
	9-11 year	74	17.6
4.	> 12 years	72	17.1
Sum		421	100%

The data consisted of 421 SMEs with most respondents being female totaling 256 (60.8%) as well as aged 22 - 25 years amounted to 133 (32.6%) based on the results of the distributed questionnaires. Micro businesses formed

the majority of business types with 148 respondents (35.2%), while 98 respondents (23.3%) reported operating their businesses for 7–9 years.

The results of data management were obtained before outer processing, variance inflation factor (VIF), validity, and reliability tests. Average variance extracted (AVE) value exceeded 0.5, and the composite reliability (CR) value was greater than 0.7. These results showed that the questionnaire items were valid and reliable.

Table 2. Measurement model evaluation for VIF, Cronbach's alpha, Rho_a, Rho_c, AVE, outer loadings and, convergent validity.

Variables	Indicators	VIF	Cronbach's alpha	Rho_a	Rho_c	AVE	Outer loadings	Convergent validity
X2	X.2.1 <- X2	3.228	0.928	0.929	0.944	0.736	0.872	Valid***
	X.2.2 <- X2	3.712					0.891	Valid***
	X.2.3 <- X2	3.844					0.899	Valid***
	X.2.4 <- X2	3.877					0.899	Valid***
	X.2.5 <- X2	3.166					0.873	Valid***
	X.2.6 <- X2	2.890					0.860	Valid***
X1	X1.1 <- X1	3.613	0.943	0.944	0.955	0.779	0.863	Valid***
	X1.2 <- X1	3.409					0.852	Valid***
	X1.3 <- X1	3.492					0.880	Valid***
	X1.4 <- X1	3.119					0.845	Valid***
	X1.5 <- X1	2.717					0.843	Valid***
	X1.6 <- X1	2.859					0.864	Valid***
Y2	Y1.10 <- Y2	2.917	0.851	0.856	0.894	0.629	0.866	Valid***
	Y1.11 <- Y2	3.311					0.887	Valid***
	Y1.12 <- Y2	2.883					0.882	Valid***
	Y1.13 <- Y2	1.609					0.705	Valid***
	Y1.14 <- Y2	2.575					0.865	Valid***
Y	Y1.1 <- Y	3.334	0.844	0.854	0.895	0.681	0.846	Valid***
	Y1.2 <- Y	3.335					0.857	Valid***
	Y1.3 <- Y	2.201					0.867	Valid***
	Y1.4 <- Y	2.056					0.752	Valid**
	Y1.5 <- Y	1.770					0.717	Valid**
Y1	Y1.6 <- Y1	1.969	0.897	0.904	0.925	0.712	0.838	Valid***
	Y1.7 <- Y1	2.370					0.861	Valid***
	Y1.8 <- Y1	1.890					0.764	Valid**
	Y1.9 <- Y1	1.972					0.834	Valid***
Z1	Z1.1 <- Z1	2.613	0.929	0.930	0.944	0.739	0.845	Valid***
	Z1.2 <- Z1	2.648					0.834	Valid***
	Z1.3 <- Z1	4.060					0.887	Valid***
	Z1.4 <- Z1	4.244					0.891	Valid***
	Z1.5 <- Z1	3.270					0.882	Valid***
	Z1.6 <- Z1	2.371					0.814	Valid***
Z2	Z2.1 <- Z2	2.733	0.924	0.932	0.941	0.726	0.847	Valid***
	Z2.2 <- Z2	2.017					0.782	Valid***
	Z2.3 <- Z2	3.819					0.897	Valid***
	Z2.4 <- Z2	4.203					0.908	Valid***
	Z2.5 <- Z2	3.443					0.861	Valid***
	Z2.6 <- Z2	2.790					0.811	Valid***

Note: Variance inflation factor (VIF) < 10: Cronbach's alpha > 0.70: Composite reliability (Rho_a) > 0.70: Composite reliability Rho_c > 0.70: average variance extracted (AVE) >0.50: outer loadings p.value; *** p value > 0.70; **p value > 0.70.

Source: Hair Jr et al. (2021).

Statistical processing using SEM with the Smart PLS 4.0 program showed that the variance inflation factor (VIF) value was >1. Reliability test results showed that the average variance extracted (AVE) value was >0.5 while Cronbach's alpha and composite reliability (Rho_a) > 0.70 and, composite reliability Rho_c > 0.70. This confirmed the reliability of the questionnaire items. The outer loading values of the measured variables were also >0.7 and the convergent validity results exceeded 0.7, signifying that all study items were valid. Consequently, all study items

met the requirements for further processing. Discriminant validity was examined to determine whether two conceptually distinct ideas showed adequate distinction. Discriminant validity is shown in Table 3.

Table 3. Discriminant validity test (Fornell-Larcker criterion).

Variables	X1	X2	Y	Y1	Y2	Z1	Z2
X1	0.858						
X2	0.862	0.882					
Y	0.768	0.755	0.793				
Y1	0.700	0.703	0.827	0.825			
Y2	0.811	0.811	0.846	0.821	0.844		
Z1	0.834	0.836	0.797	0.765	0.817	0.860	
Z2	0.780	0.786	0.779	0.775	0.789	0.857	0.852

Note: AVE > 0.70.

The Fornell-Larcker criterion values were used to assess the discriminant validity test. The results showed good discriminant validity when the construct's value exceeded those of the other constructs.

The results of data processing showed discriminant validity with cross-loading values >0.70. Therefore, the indicator tests met the requirements and were considered suitable for further testing. The bootstrapping results or total indirect effects obtained using Smart PLS version 4.0 (Hair, Hult, Ringle, & Sarstedt, 2017) are shown in Figure 2.

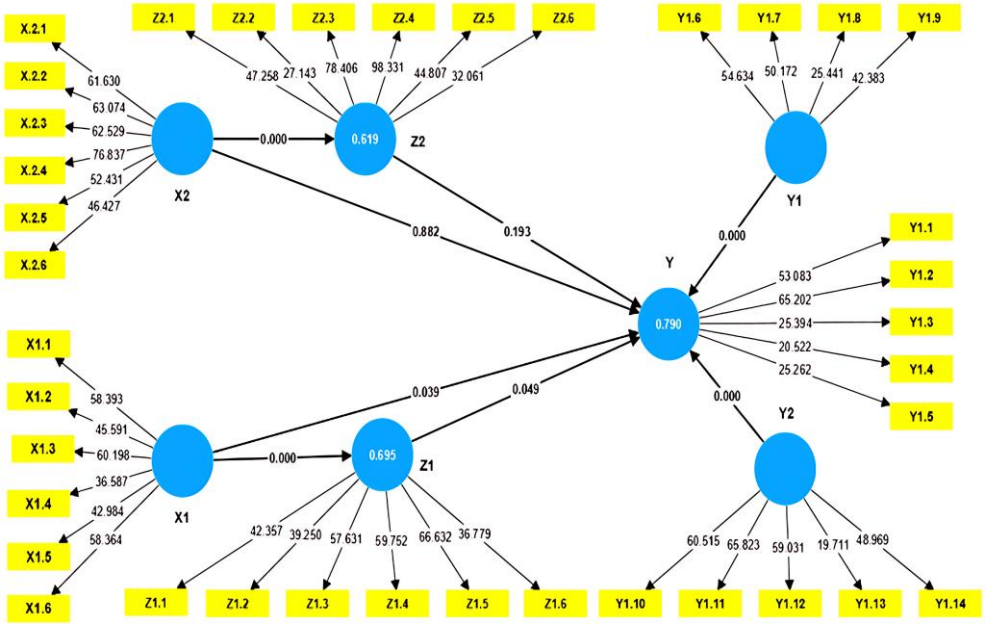

Figure 2. Path co-efficient and P-values for technology=Z1, (business manager =X1), OMISBP=Z2) (digital entrepreneur=X2), and change management=Y (internal factors=Y1 and external factors=Y2).

The goodness of fit of the model or structural model was tested by examining the R-squared value. R-squared calculation results and the total determination coefficient are presented in Table 4.

Table 4. Total determination of coefficient

Variables	R-square	R-squared adjusted	NFI	SRMR
Y	0.790	0.787		
Z1	0.695	0.694	0.91	0.067
Z2	0.619	0.618		

Note: R-square 0.790, 0.695,0.619 categorized strong: NFI > 0.90 (Hair Jr et al., 2021): SRMR < 0.08 (Henseler, 2017).

The model fit requirements were standardized root mean square residual (SRMR) < 0.08 and normed fit index (NFI) > 0.90. Based on Table 4, the equation derived from exogenous variables predicted endogenous factors. For change management, the R-squared (R2) value of 0.790 or 79.0% indicates a strong relationship between exogenous variables and their endogenous predictions is very strong with the remaining 100%-79.5% = 20.5% due to factors outside this study. For technology, the R-squared (R2) value of 0.695 or 69.5% indicates that the exogenous variables have strong endogenous predictive ability with the remaining 100%-69.5% = 30.5% due to other factors outside this study. For the online marketing information system for business products, the R-squared (R2) value of 0.615 or 61.5% categorizes it as an exogenous variable with strong correlation criteria that can be predicted endogenously with the remaining 100%-61.5% = 38.5% due to factors outside this study. The model's suitability was further suggested by the normed fit index (NFI) value of 0.91, which exceeded the 0.90 threshold, reflecting an acceptable model fit with a performance of more than 50%. Therefore, the study model met the uniformity criteria (Hair Jr et al., 2021). SRMR was defined as the difference between the observed correlation and the implied correlation matrix of the model. The average standardized root mean square residual (SRMR) value of 0.067, being < 0.08 was interpreted as the difference between the observed and expected correlations, serving as an absolute measure of model fit (Henseler, 2017). The calculation results and hypothesis testing results were summarized in Table 5.

Table 5. Hypothesis testing results

Variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P-values	Decision
Direct effects						
X1 -> Y	0.115	0.114	0.056	2.063	0.039	H1 accepted
X1 -> Z1	0.834	0.835	0.017	47.995	0.000	H2 accepted
Z1 -> Y	0.113	0.112	0.057	1.972	0.049	H3 accepted
X2 -> Y	0.009	0.009	0.060	0.148	0.882	H5 rejected
X2 -> Z2	0.786	0.787	0.022	35.376	0.000	H6 accepted
Z2 -> Y	0.073	0.072	0.056	1.301	0.193	H7 rejected
Y1 -> Y	0.334	0.333	0.061	5.458	0.000	H9 accepted
Y2 -> Y	0.321	0.325	0.067	4.761	0.000	H10 accepted
Total indirect effects						
X1 -> Z1 -> Y	0.094	0.093	0.048	1.971	0.049	H4 accepted
X2 -> Z2 -> Y	0.058	0.057	0.044	1.296	0.195	H8 rejected

Note: Accepted; p value > 0.05, rejected.

The results of this study were consistent with previous publications where related analysis stated that business managers had a direct influence on change and technology management with a value of 0.039 <0.05, H1 was accepted and business managers had a direct influence on technology with a value of 0.000 < 0.05, H2 was also accepted. Technology and OMISBP also showed a direct effect on change management with values of 0.000 < 0.05. H3 stated hypothesis was accepted. In this context, digital entrepreneurship did not directly affect change management with a significant value of 0.882 > 0.05 prompting H5 to be rejected. On the other hand, digital entrepreneurship had a significant influence on OMISBP with a value of 0.000 < 0.05 prompting H6 to be accepted. Next testing OMISBP direct influences change management with a value of 0.000 < 0.05 then the tests H7 accepted. Based on the testing results, internal factors were found to affect change management directly with a value of 0.000 <0.05 and 0.000 <0.05 prompting H9 and H10 to be accepted.

5. DISCUSSION

Based on the results, this study develops a digital marketing system which is the design for business products. The system is intended for current use by SMEs managers to expand market share and increase economic income from online product marketing results. It also supports SMEs managers in implementing online product marketing

information systems effectively. Consequently, managers can extend the reach of online product marketing and gain recognition in regional, national, and international communities. Changes in information technology are crucial for assisting web-based online marketing information system activities that can be accessed through computers and smartphones. This shift is crucial as most business product sales are still conducted manually, relying on customer feedback within the local environment. The system also helps optimize the product marketing process and offers insights into processing competitive data between entrepreneurial products. Therefore, implementing digital marketing as an electronic communication tool to promote SMEs is crucial.

The findings of this study support the theory of change management (Rismansyah, 2024) emphasizing the role of planning, governance, and communication in adapting to new technological changes to reduce resistance. The results indicate that business managers have a direct influence on change management and technology, with a significance value of 0.039 (< 0.05), confirming the acceptance of H1. These findings align with previous studies for instance (Kala Kamdjoug, 2024) highlighted the success of change management projects and digital transformation in SMEs, emphasizing that effective implementation of information technology projects is crucial for enhancing SME performance and resilience. Similarly, Trzeciak (2024) found that change management significantly impacts the success of information technology program changes. H2 was also accepted with a significance value of 0.000 (< 0.05). Furthermore, these results are consistent with prior research demonstrating that change management has a direct positive impact on the digital maturity of SMEs (Irimiás & Mitev, 2020) and influences entrepreneurs' intentions to adopt digital technology on entrepreneurial platforms (Oppong, Singh, & Kujur, 2020). However, they contrast with the findings of Coman and Kifor (2024), who reported that the implementation of new technology often leads to challenges and disruptions related to changing trends in products.

Technology also shows a direct effect on technology with a value of 0.000 <0.05 for the H3 stated hypothesis accepted. These results are supported by experts (Turi, 2020). Technology for modern digital entrepreneurship is an understanding of the development of a new digital entrepreneurship economic system and several studies such as Bresciani, Huarng, Malhotra, and Ferraris (2021) show that digital transformation significantly affects individuals, businesses, and information technology systems. Studies on information technology also outline the importance of information technology as a predictor of digital entrepreneurship success (Abubakre et al., 2022). while web-based digital marketing had become increasingly popular (Yunita et al., 2024). However, the results contradicted the findings of previous studies by Montero Guerra and Danvila-Del Valle (2024) showing that business technology did not directly benefit performance and digital transformation had no impact on digitalization.

In this context, digital entrepreneurship did not directly affect change management with a significant value of 0.882 > 0.05 prompting H5, to be rejected. The results of the study do not support digital entrepreneurship theory (Allen, 2019) explaining that the business world creates new challenges by using technology platforms to start new businesses to change entrepreneurship by reducing barriers to creating new businesses and by creating new opportunities for entrepreneurs. The results of this study contradict previous research by Slavković, Pavlović, Mamula Nikolić, Vučenović, and Bugarčić (2023) showing that digital capabilities have a significant positive impact on change management. However, this digital entrepreneurship requires other factors to adapt to the changes that will occur and if not implemented will have a negative impact on entrepreneurs competing.

On the other hand, digital entrepreneurship had a significant influence on OMISBP with a value of 0.000 < 0.05 prompting H6, to be accepted. These findings support the theory of digital entrepreneurship and several previous studies support the results of this study which show that online pioneering behavior contributes significantly to e-entrepreneurship (Qasim, Shuhaiber, Bany Mohammed, & Valeri, 2024). In addition, digital literacy has been shown to increase sales turnover, improve product packaging, and enhance social media promotion capabilities through web-based platforms (Wahyudi, 2023). Social media celebrities have succeeded in influencing consumer intentions to make purchases through the internet.

OMISBP also shows a direct effect on change management with a value of 0.193 <0.05 for the H7 stated hypothesis rejected. The results of this research do not support the marketing information system (O'brien & Marakas, 2006). Online marketing information systems (Charlesworth, 2011) explain that a web-based platform that provides businesses with tools, data, and resources to manage, analyze, and enhance their marketing efforts effectively. The results of the study do not support digital. Digital marketing (Rachmad, 2024) refers to the use of digital channels, platforms, and technologies to promote products, services, or brands. It encompasses a wide range of online marketing strategies and tactics designed to engage with a target audience, build brand awareness, and drive conversions. Based on previous research by Badrinarayanan, Rangarajan, Lai-Bennejean, Bowen, and Kaski (2024), the perceived effects of digital transformation increase the impact of organizational resources on change readiness. However, digital transformation in today's digital era is very important because it promotes and introduces products widely to consumers.

Based on the testing results, internal and external factors have a direct impact on change management, with significance values of 0.000 (< 0.05), leading to the acceptance of H9 and H10. The results of this study support the theory of internal and external factors of change (Gerritsen & Stein, 1992; Thompson, 2013) which explains that internal factors originate within an organization, group or individual and drive change, whereas external factors stem from outside the organization or individual, influencing or necessitating change. However, these factors must adapt to emerging technological advancements that alter work processes and business models. These results align with prior studies on the influence of internal and external factors on management effectiveness, which further contribute to long-term organizational progress (Sanchaniya, Kundziņa, Thomas, Geipele, & Naimavičienė, 2023). This study also offers new insights into effective change management mechanisms, particularly in internal organizational practices (Reimer, Haensse, & Lin-Hi, 2024) showing a positive relationship between external factors and readiness for change. Furthermore, Kheyfets and Chernova (2022) found a significant positive influence of both internal and external factors on SME performance. Based on these findings, internal and external factors play crucial roles in change management. This is consistent with previous studies by Abrantes, Bakenhus, and Ferreira (2024) which highlighted the complexity of communication during change and emphasized the role of internal and external variables in shaping organizational change communication, with implications for change agents.

Furthermore, the indirect influence of business managers on change management was mediated by technology, with a significance value of 0.049 (< 0.05) confirming the acceptance of H4. These findings support the theory of technological change (Emerson & Stewart, 2013; Tidd & Bessant, 2020) which defines technological change as the process of developing, adopting or replacing technological tools, systems or methods to enhance efficiency, productivity, or functionality. The results indicate that technology serves as a mediating factor between business managers and change management. An increase in business manager involvement by one unit indirectly enhances change management through technology, showing a positive effect and positioning technology as a partial mediating variable. These findings align with previous research by Jalil, Ali, and Kamarulzaman (2022) which found that technology mediates the relationship between innovation capabilities and SME performance. Similarly, Le and Ha (2024) identified information technology as a moderating factor in the relationship between knowledge management practices and marketing innovation capabilities.

The indirect influence of digital entrepreneurs on change management through OMISBP mediation with a significance value of 0.195 (> 0.05), led to the rejection of H8, indicating that OMISBP does not mediate the relationship between digital entrepreneurs and change management. A decrease of one unit in digital entrepreneurship does not result in an indirect effect on change management through OMISBP. The findings of this study do not support the concept of a marketing information system (O'brien & Marakas, 2006) or the online marketing information system (Frost, Fox, & Strauss, 2016) which is defined as a structured and integrated system for collecting, processing, analyzing, and distributing marketing information to support decision-making in a digital marketing environment. This result suggests that OMISBP is not a mediating variable in this context. However,

these findings contrast with Abubakre et al. (2022) who found that digital entrepreneurship innovation and information technology had a negative moderating effect on digital entrepreneurship.

6. CONCLUSION

This study concludes that business managers directly influence change management and technology. The hypothesis regarding business managers' impact on change management is accepted, supporting the theory of change management (Rismansyah, 2024). Technology also has a direct effect on change management, confirming the stated hypothesis. These findings align with expert opinions on technology's role in modern digital entrepreneurship (Turi, 2020). However, digital entrepreneurship does not directly affect change management, leading to the rejection of the hypothesis. This result contradicts digital entrepreneurship theory (Allen, 2019). Conversely, digital entrepreneurship significantly influences OMISBP, supporting the hypothesis and aligning with the theory of digital entrepreneurship (Allen, 2019). Although OMISBP directly affects change management, the related hypothesis is rejected. These findings do not support the marketing information system theory (O'brien & Marakas, 2006) or the online marketing information system theory (Charlesworth, 2011). Furthermore, the test results indicate that internal and external factors directly influence change management. Both direct and indirect hypothesis testing confirm their impact, supporting the theory of internal and external factors of change (Gerritsen & Stein, 1992; Thompson, 2013).

Furthermore, the indirect influence of business managers on change management was mediated by technology meaning the hypothesis was accepted. These findings support the theory of technological change (Emerson & Stewart, 2013; Tidd & Bessant, 2020). The indirect influence of digital entrepreneurs on change management through OMISBP mediation led to the rejection of the hypothesis, suggesting that OMISBP could not mediate between digital entrepreneurs and change management. When digital entrepreneurs decreased by one unit, OMISBP could not indirectly influence change management. The results of this research do not support the marketing information system (O'brien & Marakas, 2006) and the online marketing information system (Frost, Fox, & Strauss, 2016). Based on online marketing theory, validity and reliability were supported, meeting the requirements as well as the suitability of the model based on the test results (Donaldson et al., 2017). For hypothesis testing, direct and indirect tests proved to be influential. In technology testing, technology variable served as a partial mediation variable due to the mediation in the relationship between business managers and management change. However, digital entrepreneurs did not affect change management and OMISBP was not identified as a mediating variable. Novelty in this study is an online marketing information system for business products (OMISBP) Web-based (https://sipopu.com/) for SMEs and technology as a mediating variable. This research is interesting and sustainable by adding UKM criteria and a large number of samples by using OMISBP as a predictor variable.

6.1. Implication Theory

The purpose of this study is also to see the application of digital technology adoption and how it can implement technology to improve business performance, especially in terms of marketing and operational efficiency of SMEs. Online product marketing information systems have significant impacts and benefits in the business world (Laudon & Laudon, 2017; Rainer et al., 2020). The implications of digital marketing included the creation of an online marketing information system for SMEs as the level of understanding of technology was still very low. Therefore, SMEs managers need to improve their abilities in the field of technology. The proposition in this study suggested that a higher ability of business managers to enhance technological knowledge led to better governance of SMEs in facing changes and adapting to digital marketing transformation. Digital entrepreneurs (Shulha et al., 2024) could manage businesses by using digital technology and capitalizing on opportunities through digital platforms to sell products. The development of a web-based online marketing information system for business products helped SMEs managers expand the market and improve their ability to actively use internet technology in online

marketing which was crucial for business managers (Bregar, Zagmajster, & Radovan, 2022). This study aimed to improve digital entrepreneurial transformation technology by using online product marketing information system applications to increase market share to be wider. However, more work was needed as other important factors should be considered to deal with rapid changes that could not be avoided. Future publications should consider the adaptation of technological changes in the information system to make the study more appealing for further investigation. The implications of this study have an impact on the theory of adaptation to changes in digital entrepreneurship transformation technology by using the OMISBP application which is important for SMEs to increase a wider market share.

6.2. Practical Implications

Practical implications on the application of digital technology adoption and the ability to implement technology improve business performance, especially in terms of marketing and operational efficiency of SMEs. Mastering technology through the application features of an online web-based product marketing information system provided new knowledge and skills for SMEs, enabling the enterprises to continue innovating and expanding market share through digital marketing. This was essential for survival and rapid growth in the future. Future publications were expected to incorporate adaptation theory as SMEs managers could enhance the ability to master new technology, despite the challenges of implementation. This allowed managers to adapt to fast change online marketing trends and further assist in competing as well as expanding desired market share.

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