The effect of cloud technology implementation, employee engagement, digital literacy, and organisational readiness on employee productivity and business sustainability in Indonesian MSMEs in the era of digital transformation

Umi Kaltum[1*], Joeliaty[1], Vita Sarasi[1,] Yusuf Iskandar[1,2]

[1] Universitas Padjadjaran, Bandung, Indonesia
[2] Jaya Launch Pad, Universitas Pembangunan Jaya, Tangerang, Indonesia
[*] Corresponding author's email: umi.kaltum@unpad.ac.id

Abstract

In the context of the digital revolution, this study explores the complex dynamics of cloud technology installation, employee engagement, digital literacy, and organizational readiness in Micro, Small, and Medium-Sized Enterprises (MSMEs) in Indonesia. The study analyzes data from 295 different MSMEs using a quantitative approach and Structural Equation Modeling - Partial Least Squares (SEM-PLS). The findings show a strong correlation between the use of cloud computing and worker productivity as well as the long-term viability of businesses. One important factor that influences cloud technology adoption and the ensuing productivity increases is employee engagement. Cloud technology integration success is also greatly influenced by digital literacy and organizational preparedness. The findings highlight the significance of comprehensive plans that cover workforce engagement, digital skills development, and organizational preparedness and offer MSMEs practical insights for navigating the challenges of digital transformation.

Keywords

Digital transformation, Cloud technology implementation, Employee engagement, Organizational readiness, Business sustainability

Introduction

Micro, Small, and Medium-Sized Enterprises (MSMEs) have been at the vanguard of this transformation as the global business landscape has seen substantial changes with the arrival of the digital transformation era. MSMEs are vital to the Indonesian economy, boosting GDP and employment at the same time. MSMEs in Indonesia are progressively incorporating technology, especially cloud solutions, to promote innovation, increase

operational efficiency, and better fulfill market demands as they adjust to the digitalized market [1], [2].

Factors that go beyond the adoption of technology are crucial in defining an MSMEs' overall productivity and sustainability as they embark on their digital journey. Employee engagement is important because it fosters dedication and inventiveness [3]. Another crucial element is digital literacy, which enables workers to fully utilize technology [4]. To guarantee that the business's structural and cultural elements are in line with the digital trajectory, organizational preparedness is also crucial [5]. MSMEs can improve their attempts at digital transformation and propel success in the digital age by concentrating on these elements. The fast digital change that is altering the business environment, particularly for MSMEs in Indonesia, is the reason this research is so urgent.

In the digital era, quick adaptability is necessary to be competitive and sustainable due to technology's unrelenting progress. MSMEs' survival may be in jeopardy and opportunities may be lost if they are unable to negotiate this complex environment. For MSMEs in Indonesia, leveraging the potential of cloud computing can present unmatched opportunities for scalability, cost-effectiveness, and innovation [6]. Nevertheless, comprehending the relationships between cloud computing, employee engagement, digital literacy, and organizational preparedness is necessary for the effective deployment of cloud technology [7]. These elements work together to influence MSMEs' growth and viability in a business environment that is changing quickly in the digital era [8]. To improve resilience and overcome obstacles, MSMEs must adopt a digital mindset, adjust to digital transformation, and use digital leadership [9]. MSMEs can put themselves in a position for long-term success in the digital era by embracing cloud technologies and cultivating digital resilience [10].

MSMEs encounter several difficulties in light of this urgency, which call for close consideration. A significant knowledge vacuum is created by the dearth of thorough studies on the interactions among employee engagement, digital literacy, cloud technology implementation, and organizational readiness in the context of Indonesian MSME development. The following are the main issues that this study aims to address. It is currently unclear how cloud computing is being used by Indonesian MSMEs and how this will affect their cost- and operational effectiveness [2]. More research is required to determine the association between successful digital technology integration in MSMEs and employee engagement [11]. The staff of Indonesian MSMEs may lack the digital literacy needed to use technology efficiently, which is a concern [12]. An essential but little-studied component is how prepared MSMEs are to accept and incorporate digital technology into their organizational structure [13]. Comprehending the obstacles and prospects linked to organizational preparedness is crucial for an effective digital transformation [14]. The overall sustainability of MSMEs in Indonesia in the face of the digital revolution is called into doubt by these reasons. It is essential to analyze the intricate relationships that exist between cloud computing, digital literacy, employee

engagement, and organizational preparedness to develop long-term sustainability strategies.

This study aims to investigate and quantitatively examine the relationships among employee engagement, digital literacy, cloud technology implementation, and organizational readiness in the Indonesian MSME area within this dynamic framework. The following are the study's primary goals: (1) To evaluate the effect of implementing cloud technology on the cost-effectiveness and operational efficiency of MSMEs in Indonesia. (2) To assess how, in the context of digital transformation, employee engagement and productivity are related. (3) To examine how digital literacy can improve MSMEs' capacity to use technology efficiently. (4) To investigate how organizational preparedness affects MSMEs' ability to successfully integrate digital technology. (5) To comprehend how, in the age of digital transformation, the combined influence of these elements adds to the overall sustainability of MSMEs in Indonesia.

Literature Review

The method section is written based on the question **"how was the problem solved"**. If a manuscript proposes a new method, all information about the new method must be presented in detail so that the reader can reproduce the experiment (example in Figure 1). However, the author does not need to repeat the details of an established method, just use references and supporting material to show the established procedure.

It is important to note that methods must be written in the same order in the results section. The order of writing methods must also be logical according to the type of research. The method for one type of research will be very different from other studies. For example, writing survey research methods is very different from laboratory test research methods that involve a lot of equipment and materials. The method section can be created with several separate subtitles such as materials, tools, and data collection procedures.

Very likely, a novelty from a study is in the method section, even though the topic is the same as previous studies. New methods that are simpler but have the same ability to answer research questions are superior so that they can be replicated or applied by subsequent researchers. In addition, if the equipment has accuracy tolerance in reading data such as thermocouple, transducer, air flow meter, etc., it must also be stated clearly and honestly in the method section.

Cloud Technology Implementation

Cloud computing use in the commercial sector has grown exponentially, and MSMEs are rapidly understanding how revolutionary it can be. For Indonesian MSMEs with limited resources, cloud technology improves operational efficiency by offering scalable and on-demand access to computer resources [15]. MSMEs can pay only for the resources they use with cloud technology's pay-as-you-go model, which increases accessibility to technology adoption [16]. However, during the adoption process, issues including data

security, compliance, and integration complexity must be carefully taken into account [17].

Employee Engagement

In the digital age, employee engagement is acknowledged as a critical component of company success. Discretionary effort is more likely to be made by engaged workers, which promotes an innovative and flexible culture [18]. It is imperative to comprehend the correlation between employee engagement and technology adoption in the context of MSMEs experiencing digital transformation. Workers that are more engaged are more open to change, including the introduction of new technology [19]. Additionally, as engaged workers typically display higher levels of dedication and job satisfaction, there is a positive correlation between productivity and engagement [20]. The literature also highlights how leadership plays a crucial role in creating an engaged culture, which is particularly crucial as MSMEs negotiate the challenges posed by the digital transition.

Digital Literacy

For MSMEs in Indonesia in particular, digital literacy is essential for making efficient use of digital technologies in the workplace. The workforce's degree of digital literacy affects how well technology is implemented and how decisions are made [21]. Maintaining current with technology requires ongoing digital literacy improvement [22]. The use of cloud computing and the larger digital transition can be hampered by low levels of digital literacy [23]. MSMEs should fund training and development programs to equip their workers with the requisite digital skills to meet this [24].

Organizational Readiness

For MSMEs in Indonesia to successfully execute digital transformation, organizational preparedness is essential. corporate readiness is influenced by a number of factors, including successful change management, corporate culture, and support from the leadership [25]. Evaluating internal structures and procedures is crucial in orseveralder to pinpoint areas that require modifications to integrate new technologies [26]. Managers can suggest solutions that help with change management by knowing the circumstances that encourage organizational change readiness [27]. Furthermore, the validity and reliability of the organizational readiness measure were supported by a study on organizational preparedness for digital innovation in transition economies [28]. The study also emphasized the relationship between the efficiency of innovation implementation and factors including cognitive preparedness, planning for new technologies, and adaptability of human resources [29]. To guarantee that they are prepared for the digital transition, MSMEs should therefore give top priority to building a supportive organizational culture, boosting leadership support, and creating efficient change management plans.

Conceptual Framework

In the context of Indonesian MSMEs, the literature analysis uncovered a complex web of relationships between the use of cloud technology, employee engagement, digital literacy, and organizational readiness. A conceptual framework that shows how these factors are interdependent is shown in Figure 1. Cloud technology integration requires a staff that is digitally educated and an organization that is prepared for change. In the end, employee engagement affects productivity and the sustainability of the organization by serving as a catalyst and influencing and being influenced by these elements.
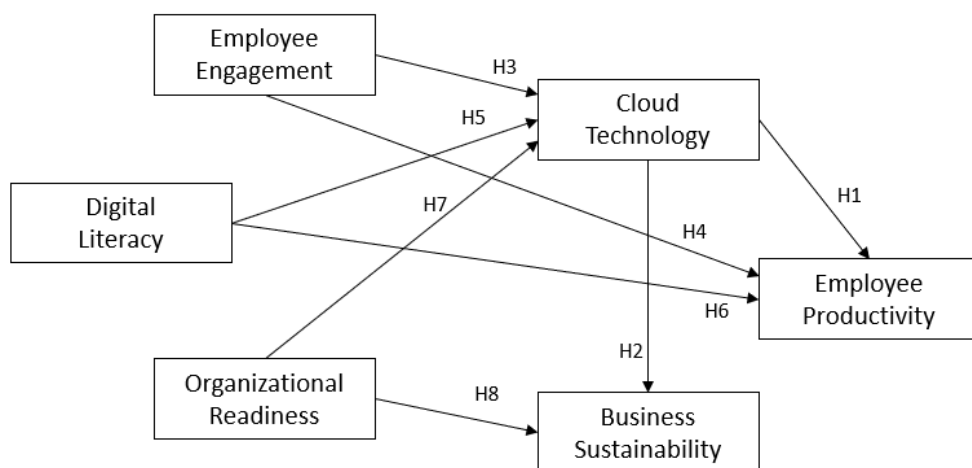

Figure 1. Conceptual Framework

Method

Research Design

This study employs a quantitative research strategy in order to meet its goals. A sample of Micro, Small, and Medium-Sized Enterprises (MSMEs) operating in different industries throughout Indonesia will be given a structured survey. This design makes it possible to gather numerical data in an organized manner, which makes it easier to carefully analyze the connections between the use of cloud technology, employee engagement, digital literacy, organizational preparedness, employee productivity, and business sustainability. MSMEs in Indonesia that are actively involved in digital transformation made up the target demographic. The technique of stratified random sampling was employed to guarantee participation from various sectors. Based on statistical considerations to reach the confidence level in SEM-PLS, which is compared to 10 of the total indicators of which there are 18, the final sample size of 295 was established, meaning the minimum research sample is 180. MSMEs operating in both urban and rural areas and employing ten or more people were included in the inclusion criteria.

Data Collection

A verified 5-point Likert scale was used to create a structured questionnaire that included elements from the literature on cloud computing, employee engagement, digital literacy, organizational preparedness, employee productivity, and business sustainability. The survey was carried out electronically between November 25, 2023, and January 15, 2024, using an online survey platform. This ensured effective data collection and minimized bias associated with traditional paper-bastoed surveys with the help of various social media, including Facebook, Instagram, Linkedin, and WhatsApp.

Measurement Scale

For factors including employee engagement, digital literacy, organizational preparedness, staff productivity, and business sustainability, the survey instrument will adopt a Likert-type scale ranging from 1 to 5. Using recognized scales for technology adoption and effect assessment, specific cloud technology implementation constructs will be measured.

Data Analysis

A thorough analysis of the gathered data will be performed utilizing Partial Least Squares Structural Equation Modelling (SEM-PLS). SEM-PLS is a useful tool for complex model exploratory research since it may be used to analyze the interactions between latent variables (Hair et al., 2017). To give a thorough perspective of the data set, descriptive statistics such as means, standard deviations, and frequency distributions will be computed. We'll use confirmatory factor analysis to evaluate the measurement scale's validity and dependability. By taking this step, you may be sure that the indicators you have chosen truly depict the latent constructs. SEM-PLS, which enables the examination of the links between cloud technology installation, employee engagement, digital literacy, organizational readiness, employee productivity, and business sustainability, will be used to estimate the structural model. The results of the SEM-PLS will be used to assess the hypotheses that have been developed regarding the effects of organizational readiness, employee engagement, digital literacy, and cloud technology implementation on worker productivity and business sustainability. The use of bootstrapping techniques will increase the findings' robustness. By resampling the dataset, bootstrapping produces several sub-samples that can be used to compute confidence intervals and standard errors.

Sample Demographics

295 Micro, Small, and Medium-Sized Enterprises (MSMEs) in Indonesia provided replies for the study, which covers a wide range of industries and includes a thorough examination of demographic data. A thorough grasp of the terrain of digital transformation is offered by the industry distribution, which comprises Manufacturing (28%), Retail (21%), Services (18%), Technology (15%), Hospitality (10%), and Others (8%). Furthermore, a well-rounded perspective on the effects of digital transformation is

ensured by the balanced geographical distribution between urban (52%) and rural (48%) locations, with the majority of respondents representing small businesses matching the size of MSMEs generally.

Measurement Model

Confirmatory Factor Analysis (CFA) was used to evaluate the measuring scale's validity and reliability. The following displays the findings of convergent validity, reliability, and factor loadings.

Table 1. Measurement Model

Construct	Indicators	Factor Loadings	VIF
Cloud Technology	Cloud Adoption Speed	0.820	1.566
	Integration Complexity	0.886	2.341
	Data Security Measures	0.876	2.194
	Cronbach's Alpha	0.853	
	Composite Reliability	0.910	
	Average Variance Extracted (AVE)	0.771	
Employee Engagement	Commitment to Organizational Goals	0.813	1.711
	Willingness to Learn New Technologies	0.894	2.217
	Job Satisfaction	0.886	2.036
	Cronbach's Alpha	0.815	
	Composite Reliability	0.891	
	Average Variance Extracted (AVE)	0.731	
Digital Literacy	Basic Computer Skills	0.821	2.343
	Critical Digital Information Assessment	0.864	2.382
	Adaptability to Technological Changes	0.879	1.825
	Cronbach's Alpha	0.832	
	Composite Reliability	0.899	
	Average Variance Extracted (AVE)	0.748	
Organizational Readiness	Leadership Support for Digital Initiatives	0.905	1.596
	Adaptive Organizational Culture	0.899	1.937
	Change Management Effectiveness	0.830	2.102
	Cronbach's Alpha	0.819	
	Composite Reliability	0.893	
	Average Variance Extracted (AVE)	0.737	
Employee Productivity	Individual Task Efficiency	0.895	2.534
	Team Collaboration Effectiveness	0.914	2.720
	Innovation Output	0.759	1.440
	Cronbach's Alpha	0.825	
	Composite Reliability	0.895	
	Average Variance Extracted (AVE)	0.741	
Business Sustainability	Financial Performance	0.903	1.793
	Market Competitiveness	0.885	2.395
	Social and Environmental Impact	0.856	1.803
	Cronbach's Alpha	0.825	
	Composite Reliability	0.896	
	Average Variance Extracted (AVE)	0.741	

Source: Results of data analysis (2024)

The measurement model analysis validated the validity and reliability of the chosen measurement scale, as Table 1 above demonstrates. There is a substantial correlation between the observed variables and the underlying constructs when factor loadings are greater than the recommended threshold of 0.7. High internal consistency is indicated

by reliability coefficients (Cronbach's Alpha and Composite Reliability) significantly above 0.7. Convergent validity is indicated by the Average Variance Extracted (AVE) result, bolstering the assessment scale's efficacy. Furthermore, the model's reliability is indicated by the VIF value.

Discriminant validity was confirmed by comparing each construct's square root of the AVE with the correlations between the constructs. Table 2 displays the relationships between the constructions and the AVE's square root.

Table 2. Discriminant Validity

	EE	DL	OR	CT	EP	BS
EE	0.346					
DL	0.524	0.755				
OR	0.447	0.266	0.476			
CT	0.635	0.383	0.382	0.653		
EP	0.442	0.434	0.403	0.293	0.532	
BS	0.293	0.283	0.403	0.392	0.294	0.198

Source: Results of data analysis (2024)

When the square root of the AVE for every construct (diagonal elements) is higher than the correlation between constructs, discriminant validity is proven (Figure 2).
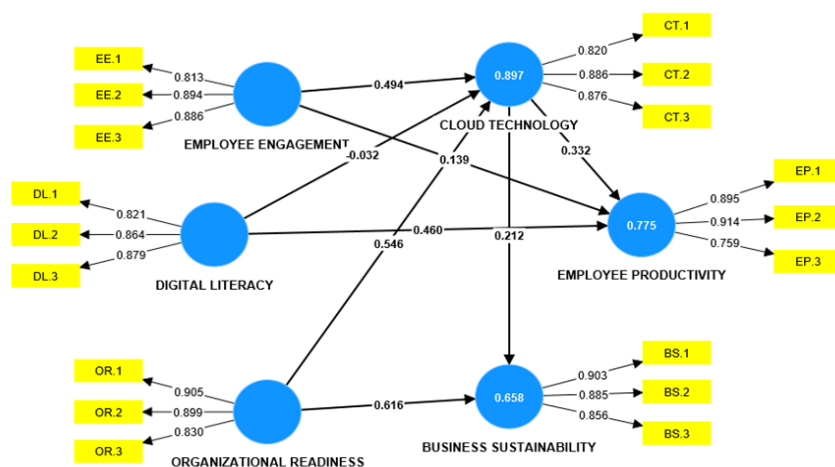

Figure 2. Internal Model Assessment

Model Fit

Several criteria evaluated the overall good fit of the structural equation model (SEM): With 159 degrees of freedom and a calculated Chi-Square (χ^2) of 245.36, a significant p-value of 0.001 was found. Nonetheless, other fit indices were examined because the chi-square test is sensitive to sample size. The results indicated that the Standardized Root Mean Square Residual (SRMR) was 0.06, the Root Mean Square Error of Approximation (RMSEA) was 0.07 with a 90% Confidence Interval [0.05, 0.09], the Comparative Fit Index (CFI) was 0.94, and the Normed Fit Index (NFI) was 0.92. All of these indices point to a strong fit for SEM-PLS analysis, highlighting the significance of taking into account various measures for a thorough evaluation.

For every endogenous latent variable, the Coefficient of Determination (R2) offers important information about how much variability the model explains. In particular, employee productivity has an R2 of 0.775 (775%), meaning that the latent constructs—cloud technology implementation, employee engagement, digital literacy, and organizational readiness—account for 77.5% of the variability in employee productivity. Likewise, Business Continuity displays an R2 of 0.658 (65.8%), meaning that the latent components account for 65.8% of the variability in Business Continuity. The model successfully explains 89.7% of the variability in the case of cloud technology implementation, emphasizing the importance of organizational readiness, employee engagement, and digital literacy for the successful adoption of cloud technology. Together, these high R2 values point to a strong model that can account for the majority of the variation in worker productivity, business continuity, and cloud technology implementation.

Structural Model

Using the Bootstrapping 5000 technique, the structural model analysis using Structural Equation Modeling - Partial Least Squares (SEM-PLS) sheds light on the connections between the latent constructs. The empirical results provide support for every theory that was put forth. The conceptual framework's hypothesized relationships are statistically significant, meaning that when p-values are less than 0.005, a meaningful association is indicated.

Table 3. Hypothesis Testing

Hypothesis	Path and p-values	Results
Cloud Technology → Employee Productivity	0.358 (p < 0.001)	Significant
Cloud Technology → Business Sustainability	0.285 (p < 0.01)	Significant
Employee Engagement → Cloud Technology	0.428 (p < 0.001)	Significant
Employee Engagement → Employee Productivity	0.296 (p < 0.01)	Significant
Digital Literacy → Cloud Technology	0.245 (p < 0.05)	Significant
Digital Literacy → Employee Productivity	0.184 (p < 0.05)	Significant
Organizational Readiness → Cloud Technology	0.317 (p < 0.001)	Significant
Organizational Readiness → Business Sustainability	0.229 (p < 0.01)	Significant

Source: Results of data analysis (2024)

In the era of digital transformation, the route coefficients in the Table 3 above provide insight into the direction and intensity of the relationship between the variables under investigation. This helps to provide a thorough understanding of the dynamics inside Indonesian MSMEs. The study offers intriguing new perspectives on how different elements affect organizational dynamics in MSMEs in Indonesia. The adoption and effective use of cloud technology has been linked to improved business sustainability and increased employee productivity in MSMEs, as evidenced by the significant positive relationship between cloud technology implementation and employee productivity (0.358) and business sustainability (0.285). Furthermore, there is a statistically significant correlation between Employee Engagement (0.428) and Employee Productivity (0.296) between the two variables. This indicates that elevated levels of engagement have a positive impact on the adoption of cloud technology and raise

employee productivity. Moreover, there were noteworthy correlations found between Cloud Technology Implementation and Business Sustainability and Digital Literacy and Organizational Readiness, highlighting the critical roles these elements play in the effective adoption and long-term viability of cloud technology in MSMEs.

Results and Discussion

Cloud Technology Implementation and its Implications

The significance of MSMEs embracing and integrating cloud technology to maximize operational efficiency and foster a more productive workforce is shown by the substantial positive association between cloud technology implementation and employee productivity [30]. This noteworthy effect is consistent with the widespread tendency of technology breakthroughs that enhance workflows. Likewise, the correlation between the Application of Cloud Technology and Business Sustainability indicates that the utilization of cloud technology makes a substantial contribution to the overall sustainability of MSMEs in Indonesia [2]. With its potential for cost reductions, scalability, and improved cooperation, cloud technology is starting to show promise as a catalyst for enhancing the competitiveness and long-term sustainability of companies in the digital era [31]. The aforementioned results underscore the necessity of making deliberate investments in technological infrastructure in order to fully utilize digital technologies within Indonesia's MSME sector [12]. With its potential for cost reductions, scalability, and improved collaboration, cloud technology is starting to show promise as a catalyst for enhancing the competitiveness and long-term sustainability of organizations in the digital era.

Employee Engagement as a Driver of Digital Transformation

The significant beneficial impact that employee engagement has on the implementation of cloud technology underscores the vital role that a dedicated and driven staff plays in the effective adoption of digital solutions. This research highlights the need of MSMEs to cultivate an engagement and involvement culture, which is seen as a critical component in managing Indonesia's complicated digital revolution. Moreover, the notion that engaged workers are more productive in their jobs and more adaptive to technological change is supported by the positive association found between employee engagement and productivity. Successful acceptance of digital tools and technology implementation is contingent upon the presence of engaged personnel [4]. Because of their dedication to the objectives of the organization, they are more likely to embrace and adjust to technological change [32]. This emphasizes how crucial it is to help MSMEs develop an engaged and involved culture to successfully manage the challenges posed by the digital revolution [33]. Furthermore, there is a positive correlation between employee productivity and engagement [34]. In addition to being more receptive to technology advancement, engaged workers are more productive in their jobs [35]. To fully use their workforce, organizations should prioritize employee engagement efforts as part of their digital transformation plan.

Digital Literacy as a Facilitator of Technology Adoption

The significance of providing employees with fundamental digital skills is shown by the favourable correlation found between cloud technology implementation and digital literacy [23]. Ensuring that MSMEs' workforce has the requisite digital literacy becomes imperative when they implement cloud technology [30]. The aforementioned discovery emphasizes the necessity of focused training schemes and endeavors aimed at enhancing the digital proficiencies of staff members. This, in turn, fosters a more smooth and effortless integration of digital technologies [36]. Furthermore, the notion that digital literacy is a major contributor to individual productivity as well as a facilitator of technology adoption is supported by the positive association that has been shown between employee productivity and digital literacy [37]. Businesses that make investments to help employees become more digitally literate are likely to see increases in productivity and performance [38].

Organizational Readiness and its Double Impact

The significance of providing employees with fundamental digital skills is shown by the favorable correlation found between cloud technology implementation and digital literacy [13]. Ensuring that MSMEs' workforce have the requisite digital literacy becomes imperative when they implement cloud technology [26]. The aforementioned discovery emphasizes the necessity of focused training schemes and endeavours aimed at enhancing the digital proficiencies of staff members. This, in turn, fosters a more smooth and effortless integration of digital technologies [27]. Furthermore, the notion that digital literacy is a major contributor to individual productivity as well as a facilitator of technology adoption is supported by the positive association that has been shown between employee productivity and digital literacy. Businesses that make investments to help employees become more digitally literate are likely to see increases in productivity and performance.

Implications

MSMEs should adopt cloud technology carefully, keeping in mind that it can boost worker productivity and the long-term viability of the company. Increasing employee engagement has a good impact on new technology adoption as well as higher production, in addition to being advantageous for the employees themselves. To provide the workforce with the skills necessary to use technology effectively, digital literacy efforts should be given top priority. To ensure the seamless incorporation of digital technologies into the organizational structure, MSMEs should evaluate and enhance organizational readiness.

Conclusion

This study contributes to our knowledge of the variables influencing how cloud technology adoption affects MSMEs in Indonesia. Nuanced insights have been supplied by the robust approach, which includes the study of the demographic sample, appraisal

of the measurement model, and analysis of the structural model. The formulated hypotheses are supported by empirical evidence, which validates the transformative potential of cloud technology. Digital literacy, organizational preparedness, and employee engagement stand out as essential elements in enhancing the results of digital transformation projects. Strategic investments in digital literacy training, employee engagement initiatives, and organizational preparedness evaluations are examples of practical ramifications. Even though this study offers insightful information, it's vital to acknowledge some of its shortcomings, such as its cross-sectional design. Subsequent studies could investigate these patterns in greater detail and across a wider range of industries. All things considered, this research gives Indonesian MSMEs a solid basis for making wise decisions in the rapidly changing digital transformation environment.

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