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Exploring the Interplay Between Digital Technology, Transformational Leadership and Agility for Enhancing Organisational Performance

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Abstract: *The volatility in the business environment requires innovation, and to keep up with technological advancements, leaders must determine whether to encourage organizational transformation into digitalization. Therefore, the study aims to explore and bridge the existing gaps by integrating the relationship between digital technology, transformational leadership, and agility association to enhance organizational performance. The authors employed a quantitative approach, utilizing the structural equation model with Partial Least Squares, to evaluate the hypotheses by administering a questionnaire to 207 respondents in Indonesia from August 2022 to November 2022. The study period choice is justified by recognizing the impact of the COVID-19 outbreak on how individuals perceive aspects like digital technology adoption, leadership, and agility. Indonesia's dynamic economy and diverse industries with unique socio-cultural characteristics make it an ideal setting to explore how digital technology, transformational leadership, and agility impact organizational performance. This study demonstrated that digital technology positively influenced the agility and performance of an organization, respectively. Subsequently, the authors found that transformational leadership positively influenced digital technology, agility, and organizational performance. In addition, this study disclosed that agility positively influenced organizational performance. Further, our investigation discovered the mediating role of agility in the correlation between digital technology and organizational performance and between transformational leadership and organizational performance. Finally, digital technology was able to act as the mediator in the correlation between transformational leadership and agility, as well as between transformational leadership and organizational performance. This study brings practical implications for leaders by investing in digital technology and fostering transformational leadership, which could make an organization more agile, innovative, competitive, and better equipped to navigate volatility in the business environment. This study also emphasizes the need to increase the number of subjects related to technology in academics to ensure a better understanding of the role of digitalization because today's life heavily depends on technology. The study develops a novel perspective for subsequent studies on the interplay of digital technology and transformational leadership on agility and organizational performance.*
Keywords: agility, digitalization, innovation, leadership, performance, technology, volatility.
JEL Classification: M10, M15, M19.

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Exploring the Interplay Between Digital Technology, Transformational Leadership and Agility for Enhancing Organisational Performance

1. Introduction

Rapid technology advancements over the past few years have altered how firms act, requiring a digital transformation of their operations to be more innovative (Khin & Ho, 2019). Moreover, in 2020, the COVID-19 outbreak impacted health problems in many countries and devastated an economic perspective (El Idrissi et al., 2023). This turbulence has created volatility, uncertainty, complexity, and ambiguity (VUCA) (Barber, 1992; Bundtzen & Hinrichs, 2021). Every aspect of life has been spared by the COVID-19 pandemic, which has permanently changed lives worldwide (Satinder, 2022).

It has also generated numerous work-life balance challenges (Venz & Boettcher, 2022). Most organisations installed and developed information technology devices and transformed them into digitalization that minimizes human contact or social distance to cope with the risk of COVID-19 transmission (Alrashed et al., 2022; Soto-Acosta, 2020). The transformation into digital to replace traditional processes has gained momentum during this crisis (Kudyba, 2020). Because of the COVID-19 outbreak, many people started working from home, so interactions and communications between employees and their leaders changed. These shifts were especially noticeable when there was a move towards greater use of technology (Venz & Boettcher, 2022; Yagublu, 2022). To lead the organisation through the crisis, the leaders must act and think differently in the VUCA environment (Satinder, 2022). Thus, our study will capture those phenomena and address the following issues.

First, the empirical study by Astuti & Augustine (2022) has highlighted that digital technology does not affect organisational performance. Even though Tajudeen et al. (2022) explored the relationship between information technology flexibility and innovation performance, the results of their empirical testing were not statistically supported. In addition, some studies have discovered that digital capabilities (Heredia et al., 2022) and information technology capabilities (Queiroz et al., 2018) statistically do not influence organisational performance. Usai et al. (2021) have argued that there is little correlation between digital technology and innovation performance. Felipe et al. (2020) have come to a similar conclusion that information system technology capabilities do not influence organisational performance. However, Bello-Pintado et al. (2019) have found that adopting technology overcomes productivity and performance. Recent studies have also demonstrated that digitalization positively correlates with performance (Marino-Romero et al., 2022; Prawati & Augustine, 2022; Tortorella et al., 2023) and employee satisfaction to stand out (Topcuoglu, 2023).

Many recent studies have argued that digitalization does not significantly influence performance because they argued that digital technology alone is insufficient to achieve a successful performance (Heredia et al., 2022; Hooi & Chan, 2022; Usai et al., 2021). For instance, several prior studies have found that technology does not directly influence performance, but it has an indirect influence through agility as a mediator (Felipe et al., 2020; Queiroz et al., 2018). These results challenge the inaccurate notion that digital technology boosts performance (Usai et al., 2021). Those studies go against Tortorella et al. (2023), inferring that technology, directly and indirectly, affects performance through several leadership behaviours. Besides, Grover et al. (2022) have asserted that leadership style and digitalization fundamentally change organisational structures and processes, affecting people's interactions. A Ly (2023) study has discovered that transformational leadership positively and significantly influences digitalization. Nevertheless, an empirical study by Hooi & Chan (2022) has concluded that transformational leadership does not significantly influence digitalization.

Second, in a study by Donkor et al. (2021), leadership styles have varying effects on employee and work performance. According to the studies, transformational leadership significantly influences organisational and work performances (Khan et al., 2020) and employee performance (Donkor et al., 2021; Qalati et al., 2022). Besides, the empirical studies of Nazarian et al. (2017) and Haile (2022) have inferred that leadership significantly contributes to organisational performance. However, a similar study by Ebrahimi et al. (2016) has shown differently since their research concluded that transformational leadership does not significantly impact innovation. However, innovation as a mediator significantly affects organisational performance. Ultimately, based on their empirical studies, transformational leadership has no significant impact on work performance (Eliyana et al., 2019) and task performance (Lai et al., 2020).

Third, one of the organisational successes in an environment experiencing rapid change is its ability to adapt agility (Joiner, 2019), continuously adjust its business strategy, and develop innovative ways (Tallon et al., 2019). Studies have concluded that agility has significantly influenced organisational performance (Bai et al., 2022; Rafi et al., 2022). On the contrary, an empirical study by Saputra (2022) has discovered that operational agility does not significantly influence organisational performance.

Finally, according to Fletcher & Griffith (2020), an organisation with low digital maturity is more fragile; it must improve its digital maturity to have the highest level of digital maturity and become more flexible. Digital technology is generally considered an enabler of organisational agility (Bai et al., 2022; Pinsonneault & Choi, 2022). Nevertheless, it is common for technology to hamper and sometimes even impede organisations from being agile (Tallon et al., 2019). In addition, some individuals are uncomfortable with technological changes, do not enjoy uncertainty, and are reticent to embrace technology tools (Geissler & Edison, 2003). Bai et al. (2022) have outlined that technology capabilities significantly influence organisational agility. Although research by Ly (2023) has discovered that transformation in digital significantly influences organisational agility, a similar empirical study by Saputra (2022) has statistically revealed that digital technology capabilities do not considerably affect operational agility.

2. Literature Review and Hypotheses Development

2.1 Digital Technology. Davis (1989), through the technology acceptance model (TAM), has underlined that people use technology because of its usefulness and ease of use, and they believe using a particular system will improve performance (Heredia et al., 2022; Hwang, 2015). In addition, the theory of planned behaviour (TPB) states that individual behaviour is driven by intention; they will perform when they intend to do so and will not when they do not want to do so (Ajzen, 1991). Some researchers have used those two model theories to explore individual behaviour and intention to leverage technology (Qijun Xie, 2017; Rahayu, 2017; Taherdoost, 2018). However, some believe that persuading individuals to use recent technology at the workplace is challenging because sometimes people contest change even when the changes bring a better outcome (Bunjak et al., 2022). However, others have asserted that technology enables digitalization by providing the tools and platforms to process and manage vast data, automate processes, and connect people and devices in a networked ecosystem (Verhoef et al., 2021). Therefore, digitization benefits eliminating errors, duplication, and rigidness, enabling effortless storage, transfer, manipulation, and presentation of digitized data and information, resulting in a paperless, significantly enhancing efficiency and productivity (Gong & Ribiere, 2023).

2.2 Transformational Leadership. The contingency theory assumes that different circumstances require different leadership styles (Attar & Abdul-kareem, 2020). One of the leadership styles used in the existing study is transformational leadership. Transformational leadership is how leaders and their subordinates collaborate to achieve optimal motivation and morale (Burns, 1978). Transformational leadership theory leverages emotions and values to transform followers, which differs from conventional leadership theory, which focuses on logical functions (Avolio et al., 2004). They need to utilize thoughtfulness and creativity in making decisions and involving followers that will benefit their followers (Northouse, 2019; Satinder, 2022). In summary, transformational leaders alter followers' emotions by instilling a sense of achievement and competence through straightforward communication (Khan et al., 2020). Organisational research has historically focused on leadership, with studies broadly exploring how leaders affect performance (Haile, 2022; Piwowar-Sulej & Iqbal, 2023). For instance, Nasir et al. (2022) have concluded that transformational leadership is a significant factor in driving innovation performance. In addition, leadership can foster organisational value (Gentsoudi, 2023). However, leadership with unethical and unfair behaviours leads to undesirable outcomes for the organisation (Wiguna et al., 2023) and its members (Batchelor, 2023).

2.3 Agility. The business fluctuates tremendously in the VUCA, so it is difficult to understand how an organisation should take its steps (Attar & Abdul-Kareem, 2020). Moreover, agility has become a global necessity in the current business atmosphere, with potential prospects and significant challenges (Joiner, 2019). Agility is a comprehensive capability of an organisation to estimate, respond, adjust, and seize exceptional market possibilities in the pursuit of thriving within the VUCA and in global business competitiveness (Attar & Abdul-Kareem, 2020) proactively and continuously. In unpredictable circumstances, the critical objective for any firm is to have outstanding business performance, and organisational agility is a viable strategy for succeeding in such cases (Walter, 2021). In short, organisations are making efforts to foster agility to survive (Gong & Ribiere, 2023), and the leaders require greater agility to compete in today's VUCA (Joiner, 2019), leading to higher engagement and performance (Gouda & Tiwari, 2022).

2.4 The Interplay Between Digital Technology, Agility, and Organisational Performance. Prior studies on technology have found that perceived usefulness and ease of use influence users' behavioural intentions and attitudes toward technology (Davis, 1989; Taherdoost, 2018). More organisations are adopting agility to deal with increased VUCA in an uncertain business atmosphere (Eilers et al., 2022). Recent studies have outlined agility and technology embrace simultaneously, and some insights argue that technology promotes agility (Bai et al., 2022; Queiroz et al., 2018; Tallon et al., 2019). Further, Solheim et al. (2023) have highlighted that agility requires digitalization, particularly in a crisis. Several empirical studies have outlined a significant association between agility and digitalization (Ahmed et al., 2022; AlNuaimi et al., 2022; Riberio, 2020). Empirical studies have also pointed out that digitalization significantly influences performance (Khin & Ho, 2019; Prawati & Augustine, 2022; Tortorella et al., 2023) and competitiveness (Priyanto et al., 2023). Besides, recent studies have used agility as a mediator to predict its association with organisational performance. They have found that the association between technology and organisational performance is fully mediated by agility (Bai et al., 2022; Felipe et al., 2020). A study by Li et al. (2022) during the COVID-19 outbreak has a similar conclusion that agility statistically could mediate the association between digital technology and organisational performance.

Given the arguments and discussion above, the authors hypothesize that:

H1a: Digital technology positively influences organisational agility.

H1b: Digital technology positively influences organisational performance.

H1c: Agility mediates the relationship between digital technology and organisational performance.

2.5 The Interplay Between Transformational Leadership, Digital Technology, Agility, and Organisational Performance. Transformational leadership fosters and inspires subordinates to put the organisation's interests above their interests (Burns, 1978) because they have charisma and inspirational motivation to influence (Avolio et al., 2004). Organisational agility refers to the competency in taking immediate proactive responses to unforeseen changes in VUCA situations by utilizing effective leadership and prompt decision-making (Gong & Ribiere, 2023). Therefore, leadership significantly influences organisational success (Adhiatma et al., 2022). Transformational leadership attains agility by conveying and sharing a vision, building principles and values, and developing directives for followers in turbulent situations (Prabhu, 2023). Studies on the interaction between leadership and agility have uncovered that leadership significantly influences agility (Cyfert et al., 2022; Hofman et al., 2023; Sari & Ahmad, 2022). A similar empirical study by Ly (2023) found that digital transformational leadership positively and significantly affects agility.

Further, Haile (2022) has concluded that leadership is key in organisational operations. In addition, some studies outlined that transformational leadership statistically influences organisational performance (Jr et al., 2018; Khalid Abed Dahleez, 2022; Nazarian et al., 2017), project success (Afzal et al., 2018; Fareed et al., 2023), and work performance (Gemeda & Lee, 2020; Khan et al., 2020; Prawati & Augustine, 2022). Further, studies have demonstrated how digital leadership promotes innovation, collaboration, and continuous learning while driving organisational transformation through effective technology use (Gemeda & Lee, 2020; Tajudeen et al., 2022; Tortorella et al., 2023). Accordingly, transformation requires agile leadership, which is an approach that emphasizes flexibility, adaptability, and continuous improvement (Attar & Abdul-kareem, 2020). An empirical study by Hooi & Chan (2022) has confirmed that transformational leadership indirectly influences digitalization through innovation. Bunjak et al. (2022) have emphasized that transformational leadership inspires subordinates to motivate a digital transformation. In their recent studies on leadership, Ly (2023) and AlNuaimi et al. (2022) have also discovered that transformational leadership significantly affects digitalization.

Solheim et al. (2023) have inferred that digitalization is required for agility to be fostered but must be combined with having a leadership mindset. Another study by Prabhu (2023) has indicated that a transformational leader drives an agile initiative to achieve high-performance standards. Besides, Sari & Ahmad (2022) have underlined a mediating role of agility in the association of leadership and organisational competitiveness. In their empirical study, Tortorella et al. (2023) have verified that some leader behaviours significantly influence the association between digitalization and operational performance. On the other hand, AlNuaimi et al. (2022) have reported a similar result from their empirical study that transformational leadership significantly influences digitalization through agility. Other studies have also outlined that leadership has a significant indirect effect on performance through some mediators like organisation commitment (Donkor et al., 2021), innovation (Ebrahimi et al., 2016), work engagement (Lai et al., 2020),

and market orientation (Khalid Abed Dahleez, 2022). In addition, Martín-Peña et al. (2020) have found that digitalization directly and indirectly influences organisational performance.

Considering recent studies, the authors propose hypotheses as follows:

H2a: Transformational leadership positively affects agility.

H2b: Transformational leadership positively affects digital technology.

H2c: Transformational leadership positively affects organisational performance.

H2d: The relationship between transformational leadership and agility is mediated by digital technology.

H2e: The relationship between transformational leadership and organisational performance is mediated by agility.

H2f: The relationship between transformational leadership and organisational performance is mediated by digital technology.

2.6 The Interplay Between Agility and Organisational Performance. Organisational agility, the capacity to foresee or instantly adapt to severe external turbulence, is of utmost importance to be sustainable and to thrive in uncertain circumstances marked by technological disruption and digitalization (Troise et al., 2022). Joiner (2019) has argued that companies with advanced agility are better equipped to navigate rapid change, producing superior business performance and delivering high value for their stakeholders. Empirical evidence strongly supports the notion that agility is vital in driving organisational performance, as demonstrated by recent studies (Eilers et al., 2022; Manurung & Kurniawan, 2022; Rafi et al., 2022; Troise et al., 2022).

The authors posit last hypothesis as follows:

H3: Agility positively affects organisational performance.

According to the hypotheses, we conceptualized our research model as shown in Figure 1.

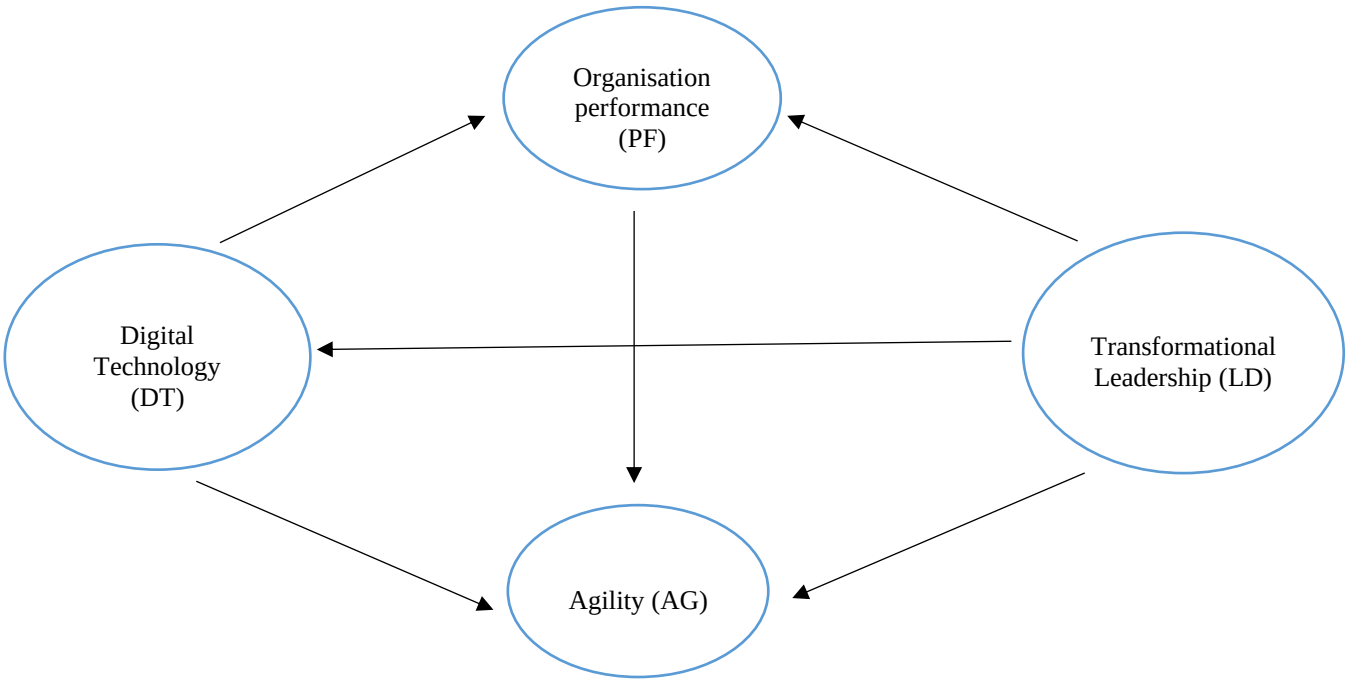

Figure 1. Research Model

Source: Compiled by the authors

3. Methodological Framework

3.1 Population, Sample, and Data Collection. The respondents in our study were in Indonesia. The method of collecting data through a questionnaire was carried out in a combination of the following ways: (a) through a courier service, (b) directly by researchers, and (c) via an online survey from August 2022 to November 2022. The total number of questionnaires distributed was 309. The number of questionnaires used was 207;

the remaining questionnaire could not be used because it was incomplete and did not match our study requirements. The authors tested the hypotheses in our model using Partial Least Square Structural Equation Modelling (PLS-SEM) because it facilitates predicting complicated models with various path structures without normality distribution assumptions in the observed data (Hair et al., 2019). Table 1 describes the respondents' demographic profile.

3.2 Measurement of Variables. This study measured digital technology (DT) by adopting nine indicators from Geissler & Edison (2003), which later was updated by Maran et al. (2022). We used four items to measure transformational leadership (LD) from McColl-Kennedy & Anderson (2002) and Khan et al. (2020). Organisational agility (AG) was measured using indicators adapted from Lu (2011), which were later updated by Soto-Acosta et al. (2015) and Cegarra-Navarro & Martelo-Landroguez (2020), with six items. Our study used nine Soto-Acosta et al. (2015) items to measure organisational performance (PF). We used an ordinal scale with a Likert scale of 6 (strongly agree) to 1 (strongly disagree) to verify the items used. Table 2 shows the constructs and their measurement of all variables used in this study.

Table 1. The Respondents' Demographic Profile

Demographic profile	N	%		Demographic profile	N	%
Age				Work experience		
25-35	91	43.96%		<5	47	22.71%
36-45	41	19.81%		5-10	49	23.67%
46-55	51	24.64%		11-15	20	9.66%
56-65	22	10.62%		>15	91	43.96%
66-75	2	0.97%		Education		
				Diploma	8	3.86%
Current position				Bachelor	164	79.23%
Top manager	47	22.71%		Master	35	16.91%
Senior manager	43	20.77%		Gender		
Middle manager	48	23.19%		Man	104	50.24%
Assistant manager	69	33.33%		Woman	103	49.76%

Note: N = Frequency

Source: Compiled by the authors

4. Empirical Results

4.1 Measurement Model Assessment. The authors applied Average variance extracted (AVE), Composite reliability (CR), Cronbach's alpha (CA), and individual item loading to verify the reliability and validity (Hair et al., 2018). Table 2 displays our validity and reliability testing. It showed that all items have a loading factor above 0.5, a minimum threshold proposed by Sarstedt et al. (2022) and Hair et al. (2018). CA and CR are used to examine the reliability and consistency of the items with a threshold above 0.7 each (Hair et al., 2018), and our testing showed that all constructs have CA and CR above 0.7. We also used AVE with a threshold above 0.5 to test convergent validity (Hair et al., 2018; Henseler et al., 2016), and authors' testing showed that all constructs have AVE above 0.5.

We used the AVE square root to verify discriminant validity to ensure each construct was distinguishable (Fornell & Larcker, 1981). The shared variance among constructs should not exceed the respective AVEs of constructs (Hair et al., 2019). Further, the authors followed Hair et al. (2019) and Sarstedt et al. (2022) in using Heterotrait-Monotrait (HTMT) to verify discriminant validity. HTMT is an excellent tool for detecting the absence of discriminant validity with a cut-off value below 0.90 (Henseler et al., 2015). Table 3 describes the discriminant validity criterion for both Fornell & Larcker (1981) and HTMT. Our study revealed that the root of AVE constructs in diagonal (0.849, 0.775, 0.876, 0.782) was higher than any other constructs in the model. The correlation of each construct has HTMT below 0.90, so all constructs are conceptually different and empirically distinct from each other for both using Fornell-Larcker and HTMT.

4.2 Structural Model Assessment. Using the variance inflation factor (VIF) to prevent bias, the authors' examined the collinearity before assessing the structural relationships with a value close to 3 and or lower to avoid a potential collinearity problem (Hair et al., 2017; Ringle & Sarstedt, 2021; Sarstedt et al., 2022). This study found inner VIF in the model ranging from 1.000 to 2.511, as displayed in Table 5, indicating no collinearity problem. We continued with the recommendation from Ringle et al. (2018) and Hair et al. (2019) to evaluate our structural models, such as R2 value (coefficient of determination), Q2 value (cross-validated redundancy measurement with blindfolding), f2 (effect size), and PLSpredict. Additionally, Hu & Bentler

(1999) and Henseler et al. (2016) have advocated a fit model of less than 0.08 using standardized root mean square residual (SRMR). This model showed a good fit model because the SRMR was 0.06. Then, authors evaluated the model's explanatory power using the R2 value for endogenous constructs with cut-off = 0.67, 0.33, and 0.19 for substantial, moderate, and weak, respectively (Chin, 1998; Henseler et al., 2009). The R2 of the structural model for AG, DT, and PF was 0.60, 0.26, and 0.48, respectively.

This result means that the two variables of DT and LD were close to high, explaining 60% of the variance in AG. In addition, LD weakly explained 26% of the variance in DT. Moreover, DT, LD, and AG together explained moderately 48% of the variance of PF. Besides, the authors evaluated the Q2 value for the path model's predictive accuracy with a rule of thumb of values higher than 0, 0.25, and 0.50 to depict the path model's small, medium, and large predictive relevance, respectively (Hair et al., 2019). This study showed Q2 for AG = 0.43 (close to large), DT = 0.15 (small), and PF = 0.28 (medium). Moreover, the authors followed Hair et al. (2019) to evaluate the structural model further because using R2 only to predict the model is not entirely accurate. Hence, PLSpredict is used to verify the prediction model's effectiveness (Hair et al., 2019; Ringle & Sarstedt, 2021; Shmueli et al., 2016).

Table 2. The Validity and Reliability of the Structural Model

Construct		Measurement item	Loading factor	CA	CR	AVE
Digitization Technology (DT)	DT1	Enjoying learning new computer programs and hearing about new digital technologies	0.724	0.916	0.931	0.601
	DT2	Expecting to know about digital technology and does not want to disappoint anyone	0.625			
	DT3	When given an assignment that requires learning to use a new technology or how to use it, it usually succeeds	0.817			
	DT4	Having a good relationship with digital technology and computers	0.823			
	DT5	Feeling comfortable learning new digital technologies	0.809			
	DT6	Not knowing how to deal with technology malfunctions or problems	0.775			
	DT7	Solving technology problems seems like a fun challenge	0.770			
	DT8	Finding most digital technology is easy to learn	0.813			
	DT9	Feeling up-to-date on digital technology like other peers	0.803			
Transformational Leadership (LD)	LD1	Paying attention to every follower	0.866	0.898	0.929	0.767
	LD2	Transmitting missions to followers	0.889			
	LD3	Increasing the level of enthusiasm	0.903			
	LD4	Emphasizing the use of expertise possessed	0.844			
Agility (AG)	AG1	Quickly responding to customer needs	0.817	0.922	0.939	0.720
	AG2	Adjusting production with fluctuations in demand	0.845			
	AG3	Able to quickly resolve issues from suppliers	0.881			
	AG4	Implementing decisions quickly to deal with market changes	0.884			
	AG5	Seeking opportunities to reconceptualize or reformulate the organisation	0.847			
	AG6	Seeing market adjustment as an opportunity for rapid fluctuation	0.815			
Organisation Performance (PF)	PF1	Offering better quality services	0.842	0.918	0.933	0.612
	PF2	More efficient internal process	0.853			
	PF3	More efficient in terms of resource use	0.834			
	PF4	Serving customer satisfaction	0.838			
	PF5	Serving customers faster	0.748			
	PF6	Keeping grow	0.823			
	PF7	More profitable	0.822			
	PF8	Having less staff turnover	0.544			
	PF9	Having fewer staff absences	0.681			

Source: Compiled by the authors

Table 3. The Discriminant Validity

Construct	AG	DT	LD	PF
Fornell–Larcker				
AG	**0.849**			
DT	0.594	**0.775**		
LD	0.732	0.511	**0.876**	
PF	0.604	0.595	0.583	**0.782**
Heterotrait-Monotrait				
AG				
DT	0.643			
LD	0.801	0.555		
PF	0.654	0.640	0.632	

Source: Compiled by the authors

Based on Table 4 of the PLS section, all values of Q2_predict are above zero, indicating our structural model was outstanding. Hair et al. (2019) have mentioned that when the PLS-SEM analysis shows that a minority of indicators yield prediction errors higher than those in the LM benchmark, it suggests a medium level of predictive accuracy. The authors compared the RMSE between the PLS result and the linear model (LM) result and found that the values were smaller for seventeen out of twenty-four items in the PLS section. This result suggested a medium level of out-of-sample predictive accuracy in our model.

Table 4. Prediction Power Analysis Using PLSpredict

	PLS result			LM result		
Item	RMSE	Q^2_predict		RMSE		RMSE (PLS-LM)
DT1	0.751	0.112		0.764		-0.013
DT2	0.840	0.124		0.842		-0.002
DT3	0.763	0.181		0.778		-0.015
DT4	0.777	0.176		0.793		-0.016
DT5	0.781	0.149		0.790		-0.009
DT6	1.091	0.024		1.104		-0.013
DT7	1.102	0.133		1.099		0.003
DT8	0.943	0.150		0.968		-0.025
DT9	0.891	0.195		0.907		-0.016
AG1	0.636	0.344		0.632		0.004
AG2	0.676	0.311		0.670		0.006
AG3	0.680	0.328		0.691		-0.011
AG4	0.664	0.417		0.677		-0.013
AG5	0.682	0.457		0.687		-0.005
AG6	0.631	0.363		0.636		-0.005
PF1	0.705	0.251		0.714		-0.009
PF2	0.739	0.195		0.741		-0.002
PF3	0.725	0.232		0.733		-0.008
PF4	0.649	0.207		0.645		0.004
PF5	0.831	0.119		0.831		0.000
PF6	0.660	0.223		0.654		0.006
PF7	0.702	0.251		0.703		-0.001
PF8	1.202	0.085		1.227		-0.025
PF9	1.016	0.117		0.990		0.026

Source: Compiled by the authors

Table 5 details our hypotheses testing, including direct and indirect effects, and Figure 2 displays our structural model evaluation. Hypotheses H1a, H1b, and H1c were supported statistically, concluding that digital technology positively and significantly influenced agility and organisational performance and that agility could mediate digital technology and organisational performance. Our hypotheses testing of H2a, H2b, and H2c were supported statistically, inferring that transformational leadership positively and significantly influenced agility, digital technology, and organisational performance. The result of hypothesis H2d also showed that digital technology could mediate the association of transformational leadership and agility. The statistical testing also supported hypotheses H2e and H2f, confirming the mediating role of agility and digital technology in the association between transformational leadership and organisational performance. Finally, agility positively and significantly influenced organisational performance, ensuring hypothesis H3 was supported.

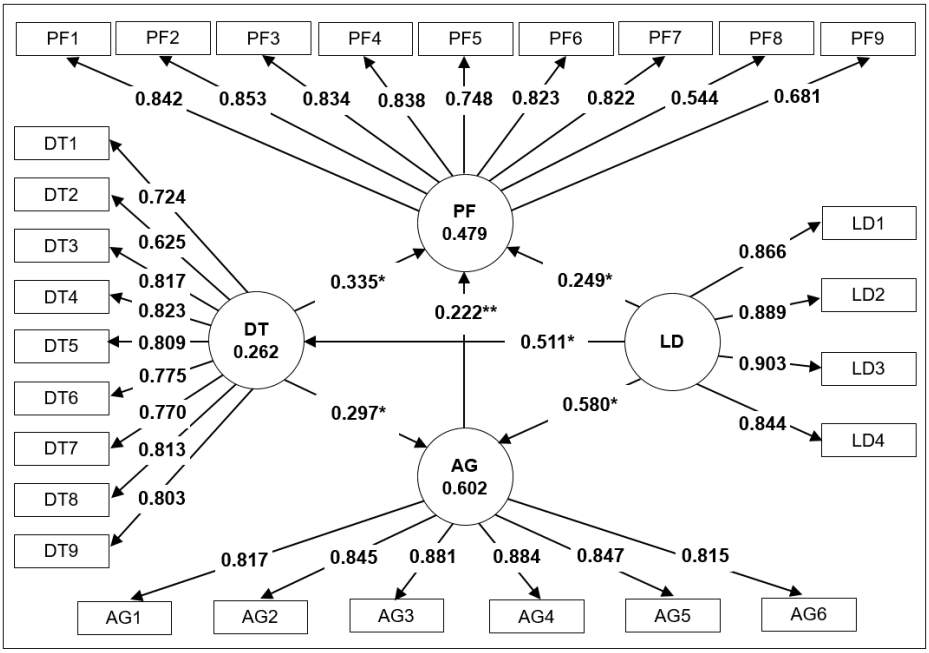

Figure 2. Measurement of Structural Model Evaluation

*Note: *is significant at 1%; **is significant at 5%*

Source: Compiled by the authors

The authors used the thresholds from Hair et al. (2017) to interpret direct effect sizes (f2) with 0.02 as a small direct effect size, 0.15 as a medium direct effect size, and 0.35 as a large direct effect size, respectively. The effect size for each hypothesis was H1a = medium, H1b = close to medium, H2a = large, H2b = large, H2c = small, and H3 = small. Then, we followed Lachowicz et al. (2018) to interpret the effect size of mediation using upsilon v. Ogbeibu et al. (2021) have advocated that the smallest v effect is 0.01, the medium effect size is 0.075, and the largest v effect size is higher than 0.175. We found that all mediation effects in this study were small effect sizes. Hair et al. (2017) and Ringle & Sarstedt (2021) have mentioned that mediation is complimentary when both indirect and direct effects are significant and have a consistent direction. Thus, this testing results indicated that digital technology or agility was a complementary mediator, partially explaining the relationship between the constructs.

Table 5. The Structural Model's Results

Hypothesis	Coefficient	t statistic	p-value	f^2/ upsilon v	VIF	Confidence Interval		Supported
						2.50%	97.50%	
Direct								
H1a: DT -> AG	0.297	5.232	0.000*	0.164	1.354	0.178	0.400	Yes
H1b: DT -> PF	0.335	4.523	0.000*	0.137	1.576	0.190	0.481	Yes
H2a: LD -> AG	0.580	10.863	0.000*	0.625	1.354	0.474	0.681	Yes
H2b: LD -> DT	0.511	9.532	0.000*	0.354	1.000	0.419	0.625	Yes
H2c: LD -> PF	0.249	2.680	0.008*	0.054	2.200	0.081	0.440	Yes
H3: AG -> PF	0.222	2.307	0.021**	0.038	2.511	0.028	0.402	Yes
Indirect								
H1c: DT -> AG -> PF	0.066	2.036	0.042**	0.004	-	0.008	0.139	Yes
H2d: LD -> DT -> AG	0.152	4.841	0.000*	0.023	-	0.093	0.215	Yes
H2e: LD -> AG -> PF	0.129	2.278	0.023**	0.017	-	0.016	0.237	Yes
H2f: LD -> DT -> PF	0.172	4.119	0.000*	0.029	-	0.097	0.259	Yes
		R2	Q2					
AG		0.60	0.43					
DT		0.26	0.15					
PF		0.48	0.28					

*Note: *is significant at 1%; **is significant at 5%*

Source: Compiled by the authors

4.3 Robustness Check. Few researchers use nonlinearities to assess their PLS-SEM model (Sarstedt et al., 2019). Therefore, to substantiate our model, we ran a robustness check in PLS-SEM to determine the potential nonlinearities in the relationships of our structural model following the suggestion of Hair et al. (2019) and Sarstedt et al. (2019). We followed the approach of Ghasemy et al. (2021) and Donkor et al. (2021) by setting the significance level below 5% to test for linearity. We found statistically insignificant quadratic effects showing the linearity of all relationships between latent, implying our model's robustness because PLS-SEM assumes linear relationships (Sarstedt et al., 2022). Table 6 details the nonlinearity assessment result.

Table 6. Nonlinearity Assessment

				Confidence Interval		Sig
Quadratic Effect	**Coefficient**	**t statistic**	**p value**	**2.50%**	**97.50%**	
DT -> PF	-0.067	1.893	0.059	-0.139	0.006	No
AG -> PF	0.044	1.116	0.265	-0.032	0.119	No
LD -> PF	0.061	1.694	0.091	-0.014	0.125	No
LD -> DT	0.082	1.908	0.057	-0.038	0.144	No
DT -> AG	0.064	1.836	0.067	-0.001	0.132	No
LD -> AG	0.026	0.988	0.324	-0.035	0.066	No

Source: Compiled by the authors

5. Conclusion

The authors investigated the interplay between digital technology, transformational leadership, agility, and organisational performance to bridge the existing gaps. First, this study has found that digital technology positively affects organisational agility, which is consistent with the conclusions in the studies of Riberio (2020) and Ahmed et al. (2022). The study revealed a contrasting finding to that of Astuti & Augustine's study (2022), as the authors found that digital technology positively affects organisational performance. However, it is worth noting that some empirical studies have reached the same conclusion as this study concerning the interaction of digitalization and performance outcomes (Marino-Romero et al., 2022; Martín-Peña et al., 2020). Following Li et al. (2022) and Tortorella et al. (2023), findings enrich the existing empirical studies on digitalization and organisational performance by suggesting that agility is a critical mediator in facilitating the linkage between those two constructs. The results indicate that organisations that transform in digitalization are more likely to be agile, competitive, and innovative, which can lead to improved performance. Second, the study adds to the body of literature by demonstrating the direct positive association of transformational leadership on agility, digitalization, and organisational performance, conforming with the empirical studies by AlNuaimi et al. (2022), Ly (2023) and Khalid Abed Dahleez (2022) for each respective area.

Moreover, this study reported that agility and digital technology could mediate the association of transformational leadership and organisational performance, corroborating the recent studies that have established the mediating influence of agility (Bai et al., 2022; Rafi et al., 2022) and digitalization (Benitez et al., 2022; Martín-Peña et al., 2020) on organisational performance. Thus, the result challenges the recent studies of Usai et al. (2021) and Heredia et al. (2022), claiming digitalization has no direct influence on performance by demonstrating direct and indirect effects. The findings imply that firms should focus on leaders to stimulate agility and digitalization to enhance performance. Finally, findings indicate that agility has a positive and significant correlation with organisational performance, reiterating the substantial role of agility in the firm as documented in recent literature (Eilers et al., 2022; El Idrissi et al., 2023). This study emphasizes that agility, digital technology, and transformational leadership are vital in boosting organisational performance, leading to competitiveness and innovation. Findings in this study indicate that these elements are interconnected and fit for fostering success in a volatile business atmosphere. In addition, the most critical result is to support the TAM and transformational leadership theories.

This present study has several theoretical implications:

- The authors contribute to the existing leadership and TAM theories. This study demonstrates how digital technology, leadership, agility, and organisational performance are interconnected to address the gaps in the existing literature. Besides, the result enriches the leadership theory by adding the leadership role in boosting digitalization, fostering innovative cultural practices, and providing clear strategic goals to subordinates for the best of the firms' performance.

- Managers who invest in digital technology and promote transformational leadership are more likely to be adaptable and provide more excellent results. The report also highlights the significance of agility as a bridge between digitalization, transformational leadership, and organisational success.
- The theoretical ramifications of this study offer insightful information for academics and practitioners, highlighting the necessity of a comprehensive strategy for organisational success that considers the relationships between digital technology, leadership, agility, and organisational performance.

Overall, this work provides significant theoretical advancements, particularly leadership and TAM theories, that may be useful for academics and future research.

The findings of this study also have practical implications for managers and other organisational leaders. An organisation is more likely to be flexible, inventive, and able to adapt quickly to changes in the business environment if it invests in digital technology and fosters transformational leadership. Additionally, some organisations may struggle to make the significant infrastructure, training, and investments necessary to promote agility and digitalization. Therefore, managers must carefully assess the potential advantages and disadvantages of investing in these areas and create strategies aligning with their organisational objectives and available resources. This study also proposes increasing the number of subjects related to technology in academics, considering that today's life heavily depends on and uses technology to make it more efficient and effective. Overall, this work assists managers and practitioners in formulating digitalization plans to improve performance.

Despite numerous contributions to the existing literature, the authors recognize the limitations of this study. First, they used cross-sectional data, so it may be challenging to ascertain the relationships between the constructs observed. Further, their study picked up the sample from respondents in Indonesia. Therefore, the results may not be suitable for specific contexts or environments. Second, the present study used transformational leadership; different circumstances and approaches require different leadership styles based on contingency theory. The digital technology used in this study is still general because it does not describe the digital transformation, digital literacy, capabilities in using digital tools, etc. Besides, this study did not elaborate on the constructs used in various dimensions. Finally, the study results may be impacted by the COVID-19 outbreak crisis since the authors researched when the outbreak occurred, and people were experiencing the benefits of using technology to make remote work possible.

The final remarks for future research may include the following: first, using longitudinal studies to establish the causal interaction of leadership, digital technology, agility, and organisational performance. In addition, comparative studies across different regions or countries may generalize the results. Second, establishing different leadership styles in the study, among which authentic leadership, servant leadership, dark-side leadership, etc. Additionally, using other constructs for digitalization may enrich the studies. Studies may explore different dimensions and indicators of those constructs as well. Finally, comparative studies before and after the COVID-19 outbreak may add value to the existing literature. These approaches can aid in a more comprehensive understanding of the complex interplay between digital technology, leadership, agility, and performance. They can also inform strategies for organisations seeking to improve their competitiveness and performance.

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