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The influence of digital leadership on innovation management based on dynamic capability: Market orientation as a moderator

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A B S T R A C T

Due to market changes in the digital era, we argue that innovation based on dynamic capability is accelerated when aligned with market orientation. Digital leadership will significantly enable sensing market changes, seizing opportunities, and reconfiguring organizations. Previous studies on digital leadership, dynamic capability, and innovation management focus mainly on constructs, benefits, and implications. However, a study on the role of digital leadership based on dynamic capability in fostering innovation and the impact of market orientation have not been thoroughly explored, which is the aim of this study, taking market orientation as a moderating variable. Employing a quantitative methodology, data were collected through online questionnaires, distributed through email and messaging applications to a purposive sample of 88 senior managers of Indonesian telecommunication firms. The results reveal that digital leadership based on dynamic capability impacts directly and indirectly on developing innovation. Market orientation also plays an important role in accelerating innovation. Due to limitations in terms of research model, sample size, and time, further research using larger samples in other industries and countries should be undertaken.

1. Introduction

Digital technologies are increasingly used for driving change in various industries. They impact on two aspects: (1) in terms of process and organization, they positively affect costs, increasing competiveness and the opportunity for new business; (2) due to the nature of digital technology to level the global playing field, they impact on revenue enhancement. Hence, many enterprises develop intensive knowledge on processes to speed up decision-making and their effectiveness, flexibility, automation, and smart digitization (Gerlitz, 2015; Zhang et al., 2015). The Volatility, Uncertainty, Complexity, and Ambiguity (VUCA) paradigm reflects the turbulence in the market (Pandit et al., 2018), which impacts on and may change strategic leadership, organization, and innovation. The market becomes turbulent due to digital technology, resulting in leadership that is a dynamic or continuous learning process in optimization and adaption to deal with the complexities (Maurice, 2013; Chidoko and Mashavira, 2014; Yuliansyah, 2015;

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Kadasala, et al. 2016; Cockburn & Smith, 2016). The digital era requires a new capability to create an urgency for digitization, to drive this vision forward, and to implement an appropriate leadership model (Kohnke, 2017). The role of leadership in the digital era becomes important to ensure the creation of development capabilities and the mobilization of organization to secure its sustainability under VUCA. Development capabilities are closely related to innovation, especially disruptive innovation. Disruptive innovation stems from a firm's failure to anticipate changes in the customer base and market (Christensen, 1997; Vecchiato, 2017); hence, market orientation is part of accelerating innovation. The mobilization of organization is related to the decision-making process, requiring the dynamism to sense change, seize opportunities, and reconfigure the organization (Abiodun, 2014; Sabri & Sweis, 2015; Elkhayat & ElBannan, 2018; Syadullah, 2018; Forgha, et al., 2018; Pisano, 2015; Schoemaker et al., 2018; Teece, 2014). Those collective capabilities are aimed at sustainability.

Many studies have assessed the foundation of development capabilities and the mobilization of organization in adapting to change; however, their connection to how decision-making processes effect higher-order dynamism in terms of sensing change, seizing opportunities, and reconfiguring organizations, and thus drive digital innovation, has not been revealed in any depth (Schoemaker et al., 2018). In addition, a study of the role of market orientation in accelerating the innovation process needs to be explored, especially in relation to the development of disruptive innovation to support dynamic capability. Hence, this study examines the development of digital transformation that requires new capabilities to break free from the routine business model and skill set. The study also assesses existential threats, analyzing the links between the changing environment, due to VUCA or industry 4.0, and innovation management and digital leadership based on dynamic capability (Nze, et al., 2016; Hang, et al., 2016; Hallunovi & Berdo, 2018; Obodo, 2018; Ali & Haseeb, 2019; Haseeb et al., 2018; Haseeb et al., 2019; Suryanto et al., 2018).

2. Literature Review

2.1. Digital Leadership

In the context of leadership, digital leadership refers to core competence in communication, content, and computing as a contribution toward a knowledge society (Goethals et al., 2002). The nature of digital leadership is dynamic and central to driving digital transformation (Oberer & Erkollar, 2018), integrating culture and competence in optimizing digital technology to create value (Mihardjo & Rukmana, 2018). The characteristics of leadership in the digital age comprise (Toduk & Gande, 2016): (1) entrepreneurship related to creativity and innovation, (2) digital skills to make a competitive difference with technology and strengthen the personal value of knowledge, (3) implementing digital technology to create strong domestic and global networks and enable collaboration, and (4) inspiring loyal participation in an overall vision. Another study found five similar characteristics: (1) being creative (2) continuously looking to make a difference, (3) participating in a global vision to drive change and collaboration, (4) remaining inquisitive to learn and adapt to change, and (5) acquiring in-depth knowledge and competence (Zhu, 2015). Yet another study also found leaders are required to be not only creative and innovative but also able to collaborate to seize opportunities (Sandell, 2013; Owusu-Antwi, et al., 2017; Ahmed, et al., 2018). Hence, in this study, we used the following dimensions of digital leadership: creativity, in-depth knowledge, global vision and collaboration, reflectiveness, and inquisitiveness.

2.2. Innovation Management

Currently, innovation management equates to technological innovation, especially digital technology (Tsai & Peng, 2017; Weinman, 2015). In the digital era, however, the concept of innovation in relation to business models plays a significant role for entrepreneurs in the digital industry and service sectors (Lee & Vonortas, 2004; Zott & Amit, 2017). Innovation can be divided into four categories: product, process, position and paradigm (Tidd, 2015). Product innovation depends on the firm's core competence

and capability to develop a distinct product; process, or technological, innovation is a key for enabling research and development, and for speeding up development and decision-making; position innovation refers to the firm's market positioning and its adaptability to both the changing and new demands of customers, and it is also closely related to innovation in incremental or new products; paradigm innovation incorporates transforming the business model underlying the organizational framework.

2.3. Dynamic Capability

Dynamic capability emerges as an enhancement of the resource-based view, addressing issues with the routine process—in terms of resources, process, product, and services—that the organization needs to adapt (Helfat & Peteraf, 2003; Schoemaker et al., 2018). The first theory of dynamic capability emphasized the resource capability of organizations: to create, extend, and modify their resources in line with changes (Salunke et al., 2011) by integrating, building, and reconfiguring their competence as part of sensing change, seizing opportunities, and transforming the organization (Eisenhardt & Martin, 2000; Teece et al., 1997). To create dynamic capability, firms have to develop adaptive capability (Swanson et al., 2017) and build innovation (Bessant & Phillips, 2013), and the development of dynamic capability can be strengthened when management capability aligns with strategic capability (Arief & Basuki, 2015; Wasono et al., 2018). Hence, in this study, we use dimensions of adaptive, innovation, management, and strategic capabilities.

2.4. Market Orientation

Market orientation explains an organization's behavior toward implementing a marketing concept (Narver & Slater, 1990). Market orientation has been conceptualized by both behavioral and cultural approaches (Gaur et al., 2011): behavioral focuses on delivering services and products to increase customer engagement and experience (Kohli & Johnson, 2011); cultural prioritizes the customers by creating superior value. In the digital era, market orientation tends to focus on personalization and customization, by the customer using data analytics and big data (Berman & Marshall, 2014). The development of market orientation requires three capabilities, used as variables in this study: intelligence generation, intelligence dissemination, and responsiveness (Amfo et al., 2018; Protcko & Dornberger, 2014).

2.5. Hypothesis Development

Previous studies have revealed that digital leadership, incorporating dynamic capability and innovation management, is related to a firm's performance, strategic alliances, and development of leadership as central to enabling innovation (Basuki et al., 2015; Schoemaker et al., 2018; Schweitzer, 2014). One study of the Indonesian market has found that digital leadership exerts a strong influence on dynamic capability (Mihardjo & Rukmana, 2018). Consequently, the following hypotheses were developed:

H1: Digital leadership has a significant impact on dynamic capability in the Indonesian telecommunication industry.

H2a: Digital leadership has a significant impact on innovation management in the Indonesian telecommunication industry.

Furthermore, as a moderating variable, market orientation plays a significant role in accelerating dynamic capability, as shown in a previous study on entrepreneurial industries' adaptation to change (Musa, Ghani, & Ahmed, 2011). Hence, a hypothesis was formed as follows:

H2b: Market orientation accelerates the relationship between digital leadership and dynamic capability in the Indonesian telecommunication industry.

Finally, as dynamic capability has been shown by previous studies to significantly affect innovation management (Bessant & Phillips, 2013; Breznik & Hisrich, 2014; Gao & Zhu, 2015; Wasono et al., 2018), the third hypothesis, in which the relationship between innovation management and dynamic capability are addressed, was reinforced:

H3: Innovation management has significant impact on dynamic capability in the Indonesian telecommunication industry.

Hence, Fig. 1 demonstrates the current research model.

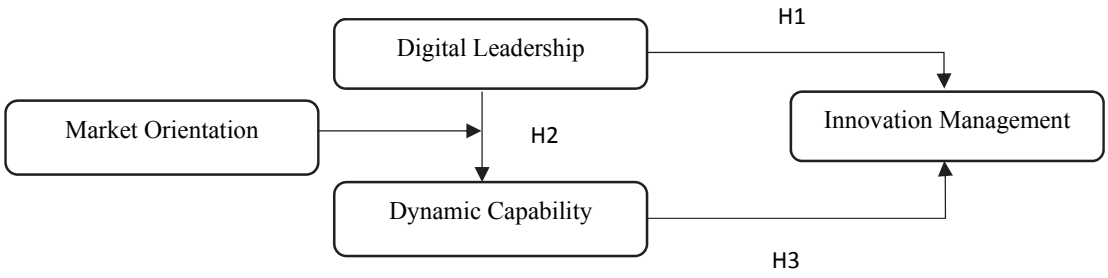

Fig. 1. Research Model

3. Methodology

This is a quantitative research study based on a questionnaire survey, using purposive sampling. The unit of analysis is the senior management of telecommunication firms that have been operating for more than five years and demonstrated investment spending over USD 10 million. The questionnaire survey was conducted between November 2017 and January 2018. The minimum required sample size is based on Hair et al. (2014), who recommended a minimum of 52 respondents for a structural model with a maximum of 2 arrows pointed at an endogenous construct, 5% significance level, and 80% statistical power to detect a minimum R^2 value of 0.25. The sample size in this study of 88 respondents is larger, comprising: 75% working as general manager or manager and 25% as vice president (VP) or president of the board; 88% were men and 12% women; 83% worked for network and 17% for service providers. The data were collected through a self-administered online questionnaire, which was distributed through Messenger, WhatsApp, Telegram, and email. Due to the limitation of the data sample, SmartPLS is used to conduct the statistical analysis.

4. Result

To test the relationship between latent variables and their indicators, as well as the hypotheses and model, both the measurement and structural tests are used.

4.1. Evaluation of Measurement Tests

Measurements to evaluate validity and reliability consist of the following parameters:

- Cronbach's alpha with a minimum threshold of 0.7, testing reliability
- Composite reliability with a minimum threshold of 0.7
- Average variance extracted (AVE), expected to be more than 0.5

Other measurements can be used to assess discriminant validity, comparing whether the correlation with the intended construct is higher than any other, and convergent validity and whether the loading factor is higher than 0.7 for all latent variables and dimensions. The results are presented in Table 1. As shown in Table 1, the values for all latent variables and dimensions are valid, demonstrating good reliability. The results for the discriminant validity are shown in Table 2.

Table 1
Construct Reliability Test

	Cronbach's Alpha	Composite Reliability	AVE
Digital Leadership	**0.972**	**0.975**	**0.675**
In-depth Knowledge	0.913	0.939	0.794
Global Vision and Collaboration	0.931	0.951	0.830
Inquisitiveness	0.945	0.960	0.858
Reflectiveness	0.915	0.946	0.854
Creativity	0.872	0.912	0.723
Dynamic Capabilities	**0.959**	**0.964**	**0.657**
Adaptive Capability	0.917	0.948	0.858
Innovation Capability	0.817	0.892	0.734
Management Capability	0.915	0.940	0.797
Strategic Capability	0.851	0.900	0.694
Innovation Management	**0.960**	**0.968**	**0.835**
Paradigm Innovation	0.855	0.932	0.872
Position Innovation	0.906	0.955	0.914
Process Innovation	0.941	0.971	0.944
Product Innovation	0.837	0.924	0.859
Market Orientation	**0.908**	**0.935**	**0.783**

Table 2
Discriminant Validity

No	Latent Variable	1	2	3
1	Digital Leadership	**0.822**		
2	Dynamic Capabilities	0.800	**0.811**	
3	Innovation Management	0.719	0.898	**0.914**

As shown in Table 2, the values of the intended constructs (on the diagonal) are higher than the figure to the left, indicating good discriminant validity for each latent variable. The results for the convergent validity, assessing whether indicators are higher than a 1.96 t-value and lower than a 0.05 p-value for the loading factor are shown in Table 3.

Table 3
Outer Path Analysis

	Path	t-values	p-values
AC1 ← Adaptive Capability	0.952	83.663	0.000
AC2 ← Adaptive Capability	0.923	46.926	0.000
AC3 ← Adaptive Capability	0.903	31.647	0.000
IC1 ← Innovation Capability	0.891	35.285	0.000
IC2 ← Innovation Capability	0.894	42.560	0.000
IC3 ← Innovation Capability	0.780	12.868	0.000
IP1 ← Process Innovation	0.971	95.076	0.000
IP2 ← Process Innovation	0.972	103.152	0.000
IPAR1 ← Paradigm Innovation	0.944	65.018	0.000
IPAR2 ← Paradigm Innovation	0.924	31.934	0.000
IPO1 ← Product Innovation	0.936	85.905	0.000
IPO2 ← Product Innovation	0.918	41.042	0.000
IPOS1 ← Position Innovation	0.956	87.839	0.000
IPOS2 ← Position Innovation	0.956	92.671	0.000
IT1 ← Inquisitiveness	0.917	46.143	0.000
IT2 ← Inquisitiveness	0.940	52.727	0.000
IT3 ← Inquisitiveness	0.903	42.770	0.000
IT4 ← Inquisitiveness	0.946	59.661	0.000
K1 ← Creativity	0.756	18.440	0.000
K2 ← Creativity	0.910	44.377	0.000
K3 ← Creativity	0.864	21.182	0.000
K4 ← Creativity	0.865	18.748	0.000
MC1 ← Management Capability	0.919	50.562	0.000
MC2 ← Management Capability	0.862	25.732	0.000
MC3 ← Management Capability	0.881	27.950	0.000
MC4 ← Management Capability	0.909	44.666	0.000

Table 3
Outer Path Analysis (Continued)

	Path	t-values	p-values
MO1 ← Market Orientation	0.877	24.200	0.000
MO2 ← Market Orientation	0.921	48.879	0.000
MO3 ← Market Orientation	0.879	26.899	0.000
MO4 ← Market Orientation	0.863	18.507	0.000
P1 ← Reflectiveness	0.916	49.879	0.000
P2 ← Reflectiveness	0.930	60.744	0.000
P3 ← Reflectiveness	0.927	48.307	0.000
PM1 ← In-depth Knowledge	0.844	22.638	0.000
PM2 ← In-depth Knowledge	0.901	33.860	0.000
PM3 ← In-depth Knowledge	0.913	49.697	0.000
PM4 ← In-depth Knowledge	0.905	39.418	0.000
SC1 ← Strategic Capability	0.879	40.756	0.000
SC2 ← Strategic Capability	0.902	38.598	0.000
SC3 ← Strategic Capability	0.771	15.271	0.000
SC4 ← Strategic Capability	0.771	12.075	0.000
VG1 ← Global Vision and Collaboration	0.925	42.890	0.000
VG2 ← Global Vision and Collaboration	0.921	47.667	0.000
VG3 ← Global Vision and Collaboration	0.879	17.403	0.000
VG4 ← Global Vision and Collaboration	0.918	51.473	0.000

As shown in Table 3, all the indicators have path scores higher than 0.7, t-values higher than 1.96, and p-values of 0.000, lower than 0.05, meaning all have good convergent validity.

4.2. Structural Model (Inner Model)

Based on blindfolding scores, the Q2 for dynamic capabilities is 0.386, demonstrating adequate predictive relevance. The complete research model is shown in Fig. 2.

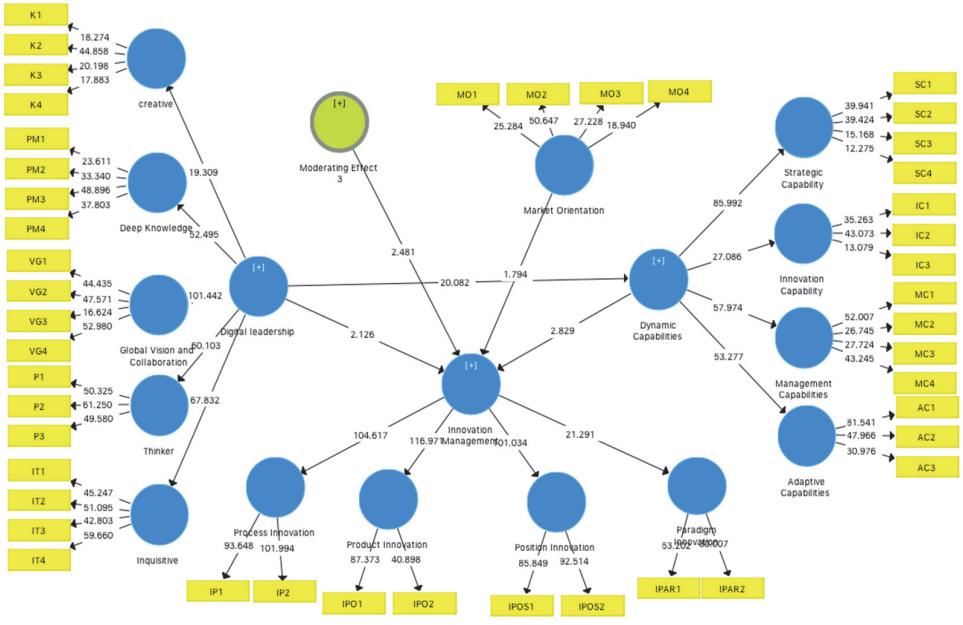

Fig. 2. The Complete Research Model

4.3. Hypothesis Testing

Partial testing of the hypotheses measured the direct relationship between the variables. The results are shown in Table 4.

Table 4
Partial Hypotheses Testing

	Path	Standard Deviation	t-values	p-values
Digital Leadership → Dynamic Capabilities	0.800	0.040	20.055	0.000
Digital Leadership → Innovation Management	0.687	0.322	2.134	0.033
Dynamic Capabilities → Innovation Management	0.500	0.173	2.882	0.004
Moderating Effect 3 → Innovation Management	0.185	0.076	2.421	0.016

As shown in Table 4, digital leadership exerts a direct, significant influence on innovation management and dynamic capabilities, as does dynamic capabilities on innovation management (t-values >1.96; p-values <0.05). Moreover, where marketing orientation acts as a moderating variable, the development of dynamic capabilities is accelerated under the influence of digital leadership. Simultaneous testing of the hypotheses assessed the indirect effect of the independent on the dependent variables. The result is shown in Table 5.

Table 5
Simultaneous Hypothesis Testing

	Path	Standard Deviation	t-values	p-values
Digital Leadership → Dynamic Capabilities → Innovation Management	0.400	0.144	2.782	0.005

As shown in Table 5, digital leadership exerts a strong influence, directly and indirectly, on dynamic capabilities and innovation management. The t-values and p-values of the direct relationship for digital leadership are higher than 1.96 and lower than 0.05, respectively, rejecting H0; hence, H1 is accepted. The result of the simultaneous testing is similar for the indirect influence of digital leadership on innovation management. Once more, the role of marketing orientation as a moderating variable is to accelerate the development of dynamic capabilities.

5. Discussion and Implications

This study has revealed that the development of innovation management based on dynamic capabilities will strengthen process, product, and position innovation, as shown in Fig. 2. Paradigm innovation is required more than the others for exerting a significant impact on factors such as social entrepreneurship (Sullivan Mort et al., 2003), co-creation (Ramaswamy, 2009), organizational culture, and entrepreneurial capability (Kirkley, 2016). As dynamic capabilities were found to consist of strong adaptive and management capabilities in decision-making, this study reinforces the findings of previous studies: dynamic capabilities enable organizations to innovate, by detecting even the weakest signals to sense changes in the market, developing scenarios to seize opportunities and mitigating risks to avoid the threats, and finally, reconfiguring the organization and reshaping the environment to navigate volatile and turbulent markets in the future (Mezger, 2014; Schoemaker et al., 2018; Teece et al., 1997). Innovation-based dynamic capabilities put dynamic capability at the center of innovation and the business model. The formulation of business models articulates a firm's innovation in delivering value to the customer and its plan for the associated costs and profits (Osterwalder, 2004). Navigating a dynamic and VUCA environment in the digital era requires special leadership that combines leadership capabilities with optimizing digital opportunities and threats to ensure a sustainable and profitable organization. Leaders must develop the individual capacity and competence to better manage uncertainty and create organizations with strong

dynamic capabilities with which to adapt to change; likewise, leaders should define a vision and develop growth for the future**.** The findings of this study are in line with those of earlier studies by Schoemaker et al. (2018) and Zhu (2015) that the most important aspects of digital leadership are global vision and collaboration, followed by reflectiveness and in-depth knowledge. Reflectiveness and inquisitiveness are related to leaders interpreting, and challenging their interpretation of, situations; in other words, possessing the curiosity and ability to sense market changes, seize opportunities, and mitigate threats. In-depth knowledge is related to decision-making supported by digital technology, and is part of leaders' continuous learning. Finally, creativity is critical in the digital era to suggest numerous innovative business models. The emergence of the Internet of things (IoT) has enabled all parties in an industrial sector to be connected and collaborate virtually, which could transform the new model and create remarkable innovation. This study has revealed digital leadership focused on market orientation, revealing disruptive innovation to be where the leader fails to adapt to changes in the market and customer demand, and thus to sustain the firm's competitiveness (Christensen, 1997; Markides, 2006). The implication of these results is the urgency to develop digital leadership with which a firm can transform its dynamic capabilities and adaptability to change. Digital leadership is central to this transformation due to its significant direct and indirect influence on managing innovation: a digital leader possessing not only capability and competence in digital technology but also a focus on market orientation accelerates innovation. Such findings lead to the digital transformation model, based on Schoemaker et al.'s framework (2018), shown in Fig. 3.

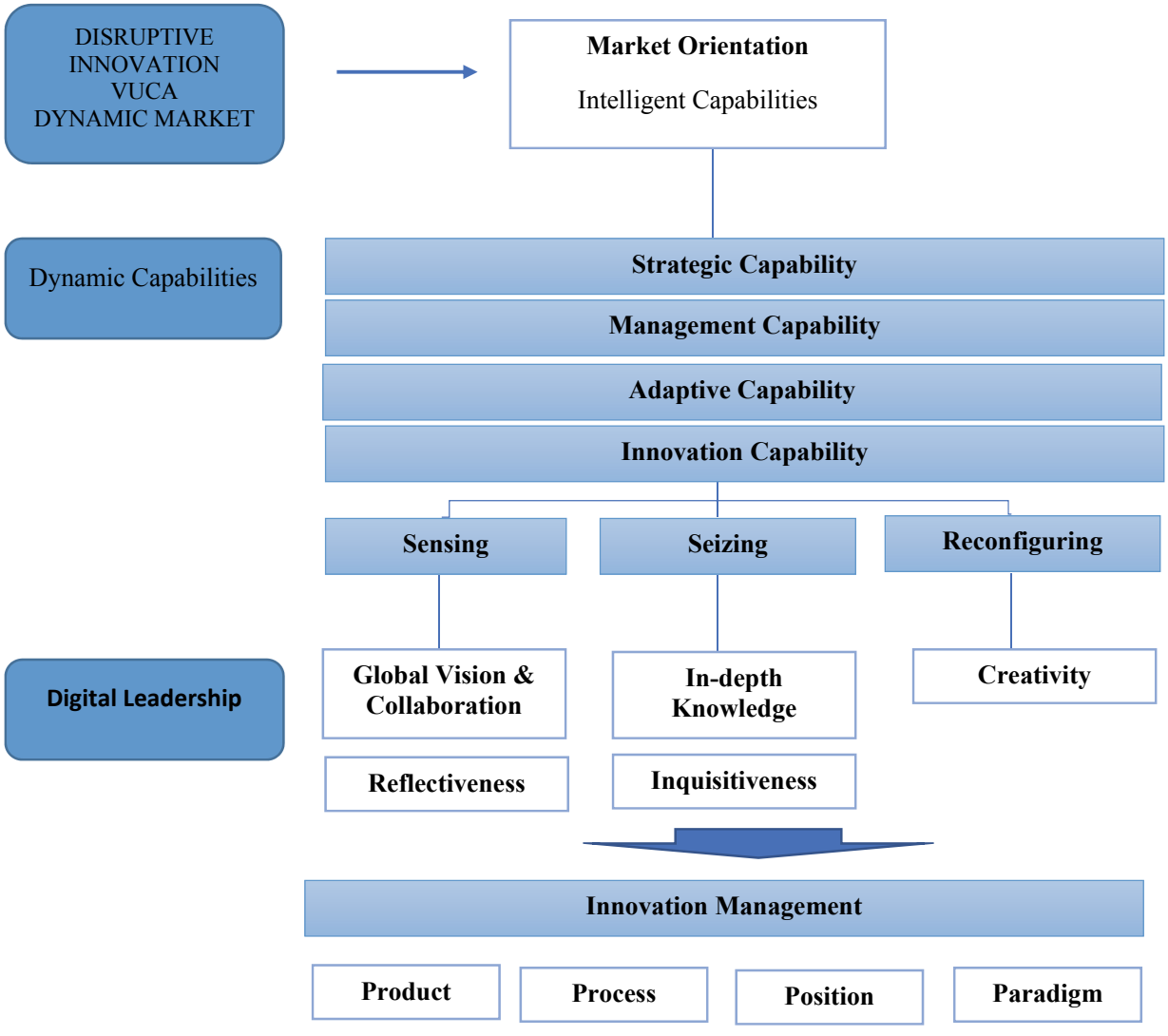

Fig. 3. Innovation-Based Dynamic Capability Framework (Schoemaker, 2018)

In summary, at the center of innovation management lies digital leadership based on dynamic capability, which enables the firm to transform its digital capability. Meanwhile, the development of digital leadership is contingent on continuous learning in adapting to change.

6. Conclusion, Limitations, and Further Developments

Digital leadership based on dynamic capability has a significant direct and indirect effect on innovation, which, critically, can be accelerated when the leader focuses on market orientation. This reveals disruptive innovation to be where the leader fails to consider changes in the market and customer demand. There were limitations to this study in terms of sample size, methodology, time, and research model; hence, the findings could be enhanced further by research in industries and countries other than telecommunications in Indonesia, using a larger sample and advanced statistical analysis. In addition, a longitudinal study could better assess the long-term impact of digital leadership.

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