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## **IT Governance Mechanisms Influence on Digital Transformation: A Systematic Literature Review**

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# **IT Governance Mechanisms Influence on Digital Transformation: A Systematic Literature Review**

*Completed Research*

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## **Abstract**

Many organizations are concerned about growing their direct investments in digital technologies and going through a digital transformation (DT) that offers value creation opportunities. It has been found that IT governance (ITG) plays an important role in organizations' digital initiatives. Previous studies have identified ITG structures, processes, and relational mechanisms to increase the firms' performance. However, the traditional ITG mechanisms might no longer be valid in this digital era. Unfortunately, few studies have investigated this area. Therefore, a systematic literature review was performed to identify the ITG mechanisms that influence DT. During the review process, 46 articles were selected from top-rank journals and conference proceedings and analyzed. The process revealed 28 ITG mechanisms that influence DT. The study contributes to both research and practice, providing researchers with the ITG mechanisms that influence DT and informing practitioners on which ITG mechanisms to focus on towards a successful DT.

## **Keywords**

Digital Transformation, IT Governance Mechanisms, IT Governance Structures, IT Governance Processes, IT Governance Relational Mechanisms, Systematic Literature Review.

## **Introduction**

The emergence of digital technologies, the fast pace of competitors' digital innovation, and consumer behavior changes have disrupted many incumbent companies and made them lose their market share swiftly (Warner and Wäger 2019). To recover their market share and survive their digital transformation (DT) journey (Gurbaxani and Dunkle 2019), these companies will need to develop new IT governance (ITG) mechanisms (Vejseli et al. 2019) to support them in reinventing their business models and embracing digital technologies as their competitive advantage (Hess et al. 2019). Previous studies have identified that ITG structures, processes, and relational mechanisms increase the firms' performance (Vejseli and Rossmann 2017). However, DeLone et al. (2018) argued that the traditional ITG mechanisms might no longer be valid in this digital era. Unfortunately, few studies have investigated ITG mechanisms that influence DT (Vejseli et al. 2019). Therefore, to address this knowledge gap, we have formulated the following research question: "*What are the ITG mechanisms that influence DT?*"

## **Background**

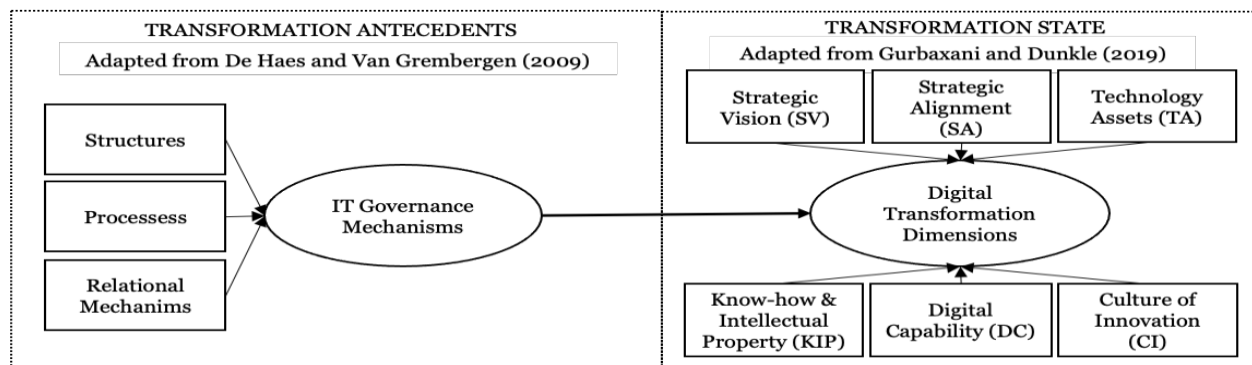
Hanelt et al. (2020, p. 2) define DT as "organizational change that is triggered and shaped by the widespread diffusion of digital technologies." Whereas De Haes et al. (2020, p. 3) define ITG as "an integral part of corporate governance for which, as such, the board is accountable. It involves the definition and implementation of structures, processes, and relational mechanisms that enable both business and IT

stakeholders to execute their responsibilities in support of business/IT alignment and the creation and protection of IT business value." ITG plays an essential role in supporting digital initiatives in organizations. In the opinion of Tannou and Westerman (2012, p. 13), "The right governance model provides appropriate levels of coordination and sharing for digital initiatives, in line with the company's structure, culture, and strategic priorities." Whereas in the opinion of Vejseli et al. (2018), DT has fundamentally changed organizations and their IT environment; therefore, agile strategies in ITG are very important for organizations. Nevertheless, De Haes & Van Grembergen (2015) have noticed that ITG is deployed in organizations using a mix of structures (e.g., IT steering committees), processes (e.g., portfolio management), and relational mechanisms (e.g., job-rotation). They mentioned there is no "silver bullet approach" as "Each organization has to select its own set of enterprise governance of IT practices, suitable for their sector, size, culture, etc." (De Haes & Van Grembergen, 2015, p. 12). Moreover, according to Whalen (2021), to succeed in digital transformation an organization needs to develop new IT capabilities that align with strategic digital priorities that require the following four elements: technology, governance, processes, and talent. Furthermore, according to Osmundsen et al. (2018, p. 11), "Research on the role of IT governance in relation to digital transformation could provide valuable insights to the IS field and practitioners."

## Research Methodology

### Conceptual Framework

To identify the ITG mechanisms that influence DT, we have defined a conceptual framework in Figure 1. We have ITG mechanisms in the Transformation Antecedents and the DT dimensions in the Transformation State.



**Figure 1. The ITG Mechanisms Influence on DT: Conceptual Framework (Adapted from De Haes and Van Grembergen (2009) and Gurbaxani and Dunkle (2019))**

As is presented in Figure 1, on the left side of the transformation antecedents are the ITG mechanisms according to De Haes and Van Grembergen (2009), and these are ITG structures, processes, and relational mechanisms. While in the right side, we have the transformation state with the six dimensions of successful DT defined by Gurbaxani and Dunkle (2019, p. 212) that are: 1) Strategic Vision (SV), i.e., the existence of strategic digital future visualization; 2) Strategic Alignment (SA), i.e., the commitment and collaboration to support DT from strategic to operational level; 3) Technology Assets (TA), i.e., the ownership of digital technologies; 4) Know-how and Intellectual Property (KIP), i.e., the proficiency on how to use digital platforms as leverage; 5) Digital Capability (DC), i.e., the availability of digital talents; 6) Culture of Innovation (CI), i.e., the presence of mechanisms that encourage invention and estimated risk-taking.

### Literature Review Process

The systematic literature review for ITG mechanisms that influence DT was done according to Okoli (2015). The study aims to provide an overview of the current knowledge on the phenomenon and reveal a gap in the literature and potential future research opportunities (Okoli 2015).

Keyword's combinations		
Information technology governance OR IT governance OR enterprise IT governance OR enterprise governance of IT OR information systems governance OR IS governance OR governance of IS	influence OR impact	digital transformation

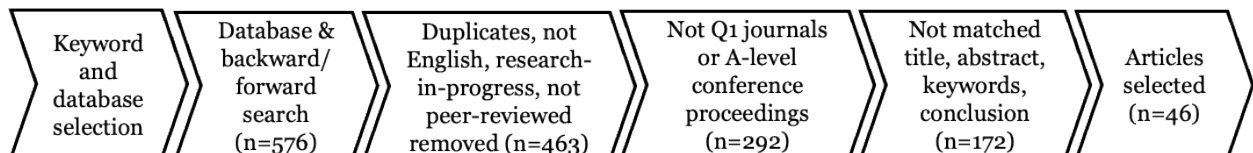
**Table 1. Search Keywords Combinations**

The review process has been done to address the research question and incorporate supportive evidence from top rank journals and conference proceedings in IS area. The search of the publications was performed through well-known databases by using the combinations of the words shown in Table 1. The databases used in search of the literature review are the following: ACM Digital library, AIS eLibrary, Business Source Premier, EBSCO Host, Emerald, IEEE Xplore, ISI web of knowledge, and SpringerLink. The publication year has not been limited in the search. We employed both forward and backward searches. The inclusion and exclusion criteria are presented in Table 2.

Inclusion	Exclusion
Completed research that is investigating at least one ITG mechanism that influences DT.	<ol style="list-style-type: none"> <li>1. The paper is duplicate, or not English language, or research-in-progress, or not peer-reviewed.</li> <li>2. The paper is not from Q1 journals or A-level conference proceedings.</li> <li>3. The paper is not matched by title, abstract, keywords, or conclusion with at least 1 ITG structure, process, or relational mechanism that influences DT.</li> <li>4. The paper content is not matched with at least 1 ITG mechanism that influences DT.</li> </ol>

**Table 2. Inclusion and Exclusion Criteria**

The literature search and selection process are illustrated in Figure 2. There are 576 articles identified, 413 from the database search, and 163 from backward and forward search. The articles were filtered using criteria shown in Table 2, such as duplication, not English, research-in-progress, or not peer-reviewed, resulting in 463 articles. Moreover, we excluded the articles that are not from Q1 journals based on Scimago or A-level conference proceedings based on CORE, resulting in 292 articles. Likewise, we excluded an article if the article's title, abstract, keywords, or conclusion have not matched with at least 1 ITG mechanism.

**Figure 2. The Literature Search and Selection Process**

After this step, we have 172 articles. In the next step, the process was to review the content of the selected articles and checked if they are contained at least 1 ITG mechanism that influences DT. After this step, the 46 selected articles are presented in Table 3. Based on the channel, type, and methodology, we found 17 journals and 29 conference proceedings papers, from which 36 are empirical and 10 conceptual, and 42 are using qualitative methods, 2 quantitative, and 2 mixed methods. Following the guideline from Webster and Watson (2002), the identified articles were analyzed first author-centric and then concept-centric. We have defined the analysis unit previously. Author-centric coding was checked until we produced a matrix of the coded literature. Then, it was further organized into coded concepts with frequency data as described here.

## Analysis

We traced the influence of every ITG mechanism found in each article into the six dimensions of DT.

### **Transformation Antecedents: IT Governance Structures**

ITG structure is defined as "structural (formal) devices and mechanisms for connecting and enabling horizontal, or liaison, contacts between business and IT management (decision-making) functions"

(Peterson 2004, p. 14). The first structure is **Chief Information Officer** (CIO), who leads the IT function and is responsible for IT strategy and its execution. The ambidexterity theory implies that CIO should master to balance between IT exploration and exploitation leadership. However, achieving ambidexterity is difficult in practice; thus drives the arguments to split the role to **Chief Digital Officer** (CDO), who focuses on the exploration side (Haffke et al. 2016). Another executive rank to support the organization to address data innovation challenges within DT is the **Chief Data Officer** as the principal architects of data strategy and governance for data-driven organization transformation (Schilling et al. 2020; Xu et al. 2016). Moreover, to strengthen the demand-side, there is a need to establish a company's digital division led by the CDO called a **digital unit** (Haffke et al. 2016), also called digital transformation unit (Vejseli et al. 2019) or digital innovation unit (Raabe et al. 2020; Warner and Wäger 2019). This digital units' role is to perform rapid prototyping experimentation to investigate early-stage digital technologies' contributions (Warner and Wäger 2019). Furthermore, another governance structure is the **transformation board** (Horlacher et al. 2016; Vejseli et al. 2019), a board-level business/IT committee to enable strategic alignment and fast decision-making. On the other hand, the more technical one is the **digital committee** (Haffke et al. 2016), similar to the innovation or technology-enabled research steering committee (Horlacher et al. 2016; Vejseli et al. 2019) that facilitates cross-functional innovation collaborations. Concerning DT dimensions, the CDO leads other structures to ensure that the firms' digital vision (SV) is aligned with digital strategy (SA). The strategy is the infusion of digital technology (TA) into business strategy that is supported by cross-functional collaboration, innovative and risk-taking culture (CI), mindset & skillset (KIP, DC) across the organization (Haffke et al. 2016; Warner and Wäger 2019). However, the digital committee and unit are not influencing the strategic visioning (SV) since it is a more technical collaboration (Horlacher et al. 2016; Raabe et al. 2020), as shown in Table 3.

### **Transformation Antecedents: IT Governance Processes**

ITG process is defined as "the formalization of strategic IT decision-making, monitoring procedures, and performance" (Peterson 2004, p. 15). As presented in Table 3, a DT journey requires an ITG process of **digital strategy management** (Warner and Wäger 2019), also called digital transformation strategy (Chanas and Hess 2016) or digital business strategy (Kahre et al. 2017), as DT's most vital differentiator (Kane et al. 2017). The digital strategy goes beyond the IT strategic initiatives, even a fusion between IT and business strategy (Kahre et al. 2017). Furthermore, we need **agile enterprise architecture management** (Hanschke et al. 2015) that is similar to adaptive enterprise architecture (EA) (Qumer Gill 2015) to cascade the strategy into architecture. It is an adaptation of agile methods into traditional EA management that has fulfilled the missing link on how strategic architecture can support agile development (Hanschke et al. 2015; Qumer Gill 2015). Correspondingly, the business architecture from EA is the reference for business process management (BPM) to structure and coordinate relevant activities (Fischer et al. 2020). Nevertheless, BPM techniques are often criticized for their inability to cope with change and uncertainty, thus calls for **agile business process management** (Badakhshan et al. 2019) that need to be unified with digital technology to deliver successful DT (Warner and Wäger 2019). There is a critical ITG process of **big data management** concerning enterprise digital data analytics to sense consumer behaviors and digital competitors' trends to facilitate fast decision-making (Krumay and Rückel 2020; Mikalef et al. 2018; Warner and Wäger 2019). Since data is a valuable asset, DT demands **cybersecurity management** as part of information security governance, from the strategic perspective of the security architecture that will drive the secure development and operations, to overcome the disruption's potential issues regarding data protection, including privacy (Vial 2019). Based on the ambidexterity approach, we need strategically balance between prevention and response (Baskerville et al. 2014) while managing its tensions and shifts (Raza et al. 2020). Moreover, to strategically align the digital vision, strategy, and architecture into action, the organization needs **agile portfolio management** (Stettina and Hörz 2015), also called digital portfolio management (Warner and Wäger 2019) that handle the prioritization and distribution of resources across projects. Adopting agile methods means that the process needs to be performed with agility by iterative learning and cycles. Given the above, the digital strategy and enterprise architecture motivate the DT vision (SV) (Kahre et al. 2017; Qumer Gill 2015). As shown in Table 3, the business, big data, and cybersecurity strategy and architecture are cascaded into the digital portfolio. All of the processes are also influencing the strategic alignment (SA), driving assets realization (TA), and its know-how (KIP) toward the firms' digital capability (DC) and innovative culture (CI) establishment (Fischer et al. 2020; Mikalef and Krogtie 2018; Stettina and Hörz 2015; Vial 2019).

Correspondingly, the portfolio is cascaded into projects, is taken care of by an **agile project management** approach. While in incumbent firms, it will elicit strains from agile meets non-agile situations (Gerster et al. 2018). More projects that adopt agile methods will call for large-scale agile transformation (Fuchs and Hess 2018). The systems development level will appeal for **agile systems development management** such as scrum, DevOps, or design thinking supported by the cross-functional team (Vejseli et al. 2019). Even, DevOps approach deals not only with fast digital technology assets provision but also cohesive operations capabilities (Ghantous and Gill 2017). Furthermore, concerning quick and supple digital service conveyance, the firms can rely on **digital outsourcing management** (Rueckel et al. 2020). Previous empirical study has explored the influences to harness vendor's innovative capacity (Gambal et al. 2020). The agile projects, systems development, and digital outsourcing management influence DT as presented in Table 3. They act as references to develop or procure the solutions (TA), providing the skills and licenses (KIP), and suggesting the suitable capability (DC) and culture of innovation (CI) (Gerster et al. 2018; Ghantous and Gill 2017; Rueckel et al. 2020).

The **digital competency management** implementation is essential to promote the pertinent abilities, knowledge, attitudes, and traits to perform all given digital processes for governance and management know-how (Valentine and Stewart 2015) and technical aptitudes (Wiedemann 2018). Correspondingly, both development and procurement will upkeep heterogeneous knowledge convergence for innovation to be accomplished by **digital knowledge management**, which digital unit orchestrated (Hund et al. 2019) to provide the know-how and intellectual property required to manage the innovation exploited from digital technology. Given the above, **digital innovation management** will drive firms' DT to deliver values that led to the firms' performance in surviving the competitive environment (Nwankpa and Roumani 2016), reinforced by the innovation culture (Weritz et al. 2020). Furthermore, the companies that want to achieve competitive advantages through DT will require an **agile change management** program (Mitra et al. 2019) by creating a sense of urgency with new approaches to enable value creation (Tobias et al. 2020), also supported by technologies to drive culture changes (Hartl 2019). Furthermore, the company will need **agile risk management** to survive in this turbulent digital world. Not only to readily address threats related to digital technologies but also to grasp the opportunities to achieve the objectives (Chiu et al. 2017). Consequently, the significance of risk-taking culture is necessary to proactively support experimentation that influences DT (Weritz et al. 2020).

Likewise, to survive DT, companies need to be agile and flexible enough to grasp the business opportunities based on the identified and prioritized digital technology through **digital business value management** (Weritz et al. 2020). The value is defined from a clear vision and then acquired, assimilated, transformed, and exploited (Nwankpa and Roumani 2016), like the example revealing the big data value (Günther et al. 2017). In the same way, **digital maturity management** is about how organizations systematically prepare to adapt consistently and compete effectively to ongoing digital changes by comparing with the ideal organization transformed by digital technologies (Kane et al. 2017). They benchmark the firm by using digital maturity level assessment (Thordsen et al. 2020). Finally, the companies need to increase the chances of achieving successful DT by performing **agile audit and assurance management** (Mkoba and Marnewick 2020). An audit is an evaluation of the organization's statements to ensure that the records are a fair and accurate representation of the claim to represent. At the same time, assurance is to reassure the stakeholders by providing performance measurement, consulting, etc. (Manita et al. 2020). For example, there is an empirical framework in performing an audit to an agile project (Mkoba and Marnewick 2020).

The digital competency, knowledge, innovation, and change management align with the ITG process of digital strategy and agile enterprise architecture management defined earlier according to Table 3. Likewise, they are influencing the DT strategic alignment (SA). Then, DT solution provision (TA) and its know-how (KIP) will eventually affect the firms' DT capability and nurturing its innovation culture (CI) (Hund et al. 2019; Khin and Ho 2019; Valentine and Stewart 2015; Wiedemann 2018). The other processes that play more roles in the monitoring and evaluation cycle are risk, business value, maturity, and audit & assurance management. They are influencing the alignment (SA), technology solution (TA), know-how (KIP), capability (DC), and culture (CI) dimensions. They also provide feedback to DT visioning (SV) based on risk, value, maturity assessment results, and audit and assurance reports (Chiu et al. 2017; Kane et al. 2017; Mkoba and Marnewick 2020; Nwankpa and Roumani 2016).

### Transformation Antecedents: IT Governance Relational Mechanisms

ITG relational mechanism is defined as "the active participation of, and collaborative relationship between corporate executives, IT management, and business management" (Peterson 2004, p. 15). To enable DT, organizations need to establish **transformational leadership** and play a crucial role in empowering employees (Vejseli et al. 2019) by fostering a sense of urgency to adapt and be involved in DT (Weritz et al. 2020). The role is to lead the business model's strategic renewal and collaborative approaches as capabilities that influence DT (Warner and Wäger 2019) to out-perform competitors (Valentine and Stewart 2015). Furthermore, at the initial stage of ITG implementation, relational mechanisms are essential to ensure stakeholders' commitment and involvement until the culture is embedded in the structures and processes communication (De Haes and Van Grembergen 2009). Although prior literature acknowledges the role of culture in facilitating organizational transformation, surprisingly, the **digital organizational culture** influence for DT research is still scarce (Duerr et al. 2018). Thus, some exploratory studies shed light by revealing the importance of cultural values that influence DT (Duerr et al. 2018; Hartl and Hess 2017; Warner and Wäger 2019), which characterized the digital culture change (Hartl 2019). Moreover, **cross-functional collaboration** aligns the business units' work using new ways of thinking and working (Weritz et al. 2020). For example, when the CDO develops a company-wide digital strategy (Warner and Wäger 2019). Another instance is instituting an agile cross-functional team that needs more autonomy to out-perform traditional structures to gain competitive advantages (Wiedemann 2018). Internal collaboration and **external collaboration** that led to better alignment between related parties enhance responsiveness to business transformation. For example, with startups, business, outsourcing, and research partners (Vejseli et al. 2019), even collaboration with customers to fully develop the competitive product (Duerr et al. 2018). Likewise, a similar idea underlies the urgency of **cross-functional training** on agile working (Vejseli et al. 2019) that will empower employees to acquire the cross-functional knowledge to activate the organization's digital innovation (Hund et al. 2019). It is integral to renew strategies and business models as DT outcomes. Based on Table 3, the transformational leadership, digital organizational culture, and cross-functional collaboration mechanisms impact all DT dimensions. Those processes provide relational mechanisms for strategic visioning (SV) when the boards collaborate and communicate to define the firms' holistic digital vision, led by the CDO and infused by the culture's innovation spirit. The vision then will be translated into strategy (SA), aligned to technology provision (TA), supported by the related skillsets (KIP) to achieve organization capability (DC) and culture of innovation and risk-taking (CI) (Duerr et al. 2018; Horlacher et al. 2016; Warner and Wäger 2019). Similarly, the rest relational mechanisms affect the alignment (SA) through communication from the board level into middle management and the cross-functional team. They are supporting the digital assets development collaboration (TA), the competency (KIP), and capability (DC) and culture (CI) (Duerr et al. 2018; Haffke et al. 2016; Horlacher et al. 2016).

The findings and references of ITG mechanisms that influence DT dimensions such as Strategic Vision (SV), Strategic Alignment (SA), Technology Assets (TA), Know-how and Intellectual Property (KIP), Digital Capability (DC), and Culture of Innovation (CI) are shown in Table 3.

No	ITG Mechanisms	DT Dimensions						References
		SV	SA	TA	KIP	DC	CI	
1	Chief Information Officer	X	X	X	X	X	X	(Haffke et al. 2016), (Vejseli et al. 2019)
2	Chief Digital Officer	X	X	X	X	X	X	(Haffke et al. 2016), (Vejseli et al. 2019), (Warner and Wäger 2019)
3	Chief Data Officer	X	X	X	X	X	X	(Xu et al. 2016), (Schilling et al. 2020)
4	Digital unit	-	X	X	X	X	X	(Haffke et al. 2016), (Warner and Wäger 2019), (Vejseli et al. 2019)
5	Transformation board	X	X	X	X	X	X	(Horlacher et al. 2016), (Vejseli et al. 2019)
6	Digital committee	-	X	X	X	X	X	(Haffke et al. 2016), (Horlacher et al. 2016), (Vejseli et al. 2019)
7	Digital strategy management	X	X	X	X	X	X	(Horlacher et al. 2016), (Kahre et al. 2017), (Chanias and Hess 2016), (Warner and Wäger 2019)
8	Agile EA management	X	X	X	X	X	X	(Qumer Gill 2015), (Hanschke et al. 2015), (Warner and Wäger 2019), (Fischer et al. 2020)

No	ITG Mechanisms	DT Dimensions						References
		SV	SA	TA	KIP	DC	CI	
9	Agile business process management	-	X	X	X	X	X	(Badakhshan et al. 2019), (Warner and Wäger 2019), (Fischer et al. 2020)
10	Big data management	-	X	X	X	X	X	(Mikalef et al. 2018), (Krumay and Rückel 2020)
11	Cybersecurity mgt.	-	X	X	X	X	X	(Baskerville et al. 2014), (Raza et al. 2020)
12	Agile portfolio management	-	X	X	X	X	X	(Stettina and Hörz 2015), (Vejseli et al. 2019), (Warner and Wäger 2019), (Horlach et al. 2020)
13	Agile project management	-	-	X	X	X	X	(Fuchs and Hess 2018), (Gerster et al. 2018), (Vejseli et al. 2019)
14	Agile sysdev. mgt.	-	-	X	X	X	X	(Ghantous and Gill 2017), (Vejseli et al. 2019)
15	Digital outsourcing mgt.	-	-	X	X	X	X	(Gambal et al. 2020), (Rueckel et al. 2020)
16	Digital competency mgt.	-	X	X	X	X	X	(Valentine and Stewart 2015), (Wiedemann 2018)
17	Digital knowledge mgt.	-	X	X	X	X	X	(Hund et al. 2019), (Weritz et al. 2020)
18	Digital innovation management	-	X	X	X	X	X	(Nwankpa and Roumani 2016), (Khin and Ho 2019), (Vejseli et al. 2019), (Weritz et al. 2020)
19	Agile change management	-	X	X	X	X	X	(Hartl 2019), (Mitra et al. 2019), (Vejseli et al. 2019), (Tobias et al. 2020)
20	Agile risk management	X	X	X	X	X	X	(Chiu et al. 2017), (Vejseli et al. 2019), (Weritz et al. 2020)
21	Digital business value management	X	X	X	X	X	X	(Nwankpa and Roumani 2016), (Günther et al. 2017), (Weritz et al. 2020)
22	Digital maturity management	X	X	X	X	X	X	(Kane et al. 2017), (Warner and Wäger 2019), (Thordsen et al. 2020)
23	Agile audit and assurance management	X	X	X	X	X	X	(Vejseli et al. 2019), (Warner and Wäger 2019), (Manita et al. 2020), (Mkoba and Marnewick 2020)
24	Transformational leadership	X	X	X	X	X	X	(Horlacher et al. 2016), (Kahre et al. 2017), (Vejseli et al. 2019), (Warner and Wäger 2019)
25	Digital organizational culture	X	X	X	X	X	X	(Hartl and Hess 2017), (Duerr et al. 2018), (Warner and Wäger 2019), (Fischer et al. 2020)
26	Cross-functional collaboration	X	X	X	X	X	X	(Haffke et al. 2016), (Vejseli et al. 2019), (Warner and Wäger 2019)
27	Cross-functional training	-	X	X	X	X	X	(Horlacher et al. 2016), (Vejseli et al. 2019)
28	External collaboration	-	X	X	X	X	X	(Haffke et al. 2016), (Horlacher et al. 2016), (Duerr et al. 2018), (Vejseli et al. 2019)

Table 3. IT Governance Mechanisms that Influence Digital Transformation

### Transformation State

We have identified 28 ITG mechanisms that influence the organizations' capabilities to successful DT. The CDO drives the firm's digital strategic vision and its alignment across all stakeholders. He is supported by the CIO for IT-wise and Chief Data Officer for data-wise and facilitate strategic and fast decision-making collaboration through the transformational board, digital committee and supported technically by the digital unit and related cross-functional team (Haffke et al. 2016; Raabe et al. 2020; Xu et al. 2016). Likewise, in collaboration with all the change agents in the digital committee, the chiefs act as transformational leaders that foster innovation culture throughout the enterprise (Hartl and Hess 2017; Valentine and Stewart 2015). Correspondingly, the cross-functional collaboration generates aligned digital strategy, agile enterprise architecture, and portfolios into seamless and secured data-driven business processes (Badakhshan et al. 2019; Kahre et al. 2017; Qumer Gill 2015; Raza et al. 2020; Stettina and Hörz



2015). Meanwhile, the portfolio translated iteratively into agile projects by the cross-functional team based on the agile systems development approach or might be digitally outsourced to deliver technology assets as the firms' intellectual property that reinforced by their digital know-how (Fuchs and Hess 2018; Gambal et al. 2020; Hund et al. 2019; Wiedemann 2018). Moreover, the digital innovation deliverables are the business value that is safeguarded by agile change, risk, and audit & assurance management as collaboration efforts in improving the firms' digital capability and maturity (Chiu et al. 2017; Mitra et al. 2019; Mkoba and Marnewick 2020; Nwankpa and Roumani 2016).

## Conclusion, Limitations, and Future Agenda

This study has some limitations as the literature review has limited to the specific databases we have queried and the keywords used to search the articles. Nevertheless, we managed to identify the knowledge gap and identify the ITG mechanisms that influence DT. The systematic literature review has provided a number of 28 ITG mechanisms that influence DT, which consists of 6 ITG structures, 17 ITG processes, and 5 ITG relational mechanisms, as presented in Table 3. The study wishes to contribute to both research and practice by providing the researchers the ITG mechanisms that influence DT and by supporting practitioners to focus on these ITG mechanisms towards a successful DT. As a future agenda, we see the need to validate further the identified IT governance mechanisms that influence DT in different organizations and find their influence on the organizations' performance.

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