

Digital Transformation: IT Governance In The Agile Environment A Study Case Of Indonesia High Regulated Company

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Abstract— The rapid transformation in the field of ICT influence more and more organizations. In recent years, firms in almost all industries have conducted several initiatives to obtain benefits from digitalization. The organizations decide to perform digital transformation and move from the traditional approach to the agile approach for anticipating the rapid changes in the current digital era. This research will investigate the impact of digital transformation to the IT governance mechanism in established company using study case methodology. We analyse two companies in Indonesia: banking and telecommunication companies that have adopted agile and DevOps team. For this purpose, a qualitative study using Focus Group Discussion (FGD) and in-depth interview method were conducted. Our findings show that digital transformation brings many challenges in the established organization. This transformation impacted key elements of IT governance: structure, process, and relational mechanism. IT managers can benefit from this research as guidelines to implement IT Digital Framework in the transition of digital transformation phase

Index Terms— Agile, DevOps, Digital Transformation, IT Governance, IT Digital Governance.

1 INTRODUCTION

The rapid shifting in digital technology has changed our personal lives, work, and society. In the business world, digital technology have transformed the face of business and will continue in the coming years [1] Firms from all industries domains are starting many project initiative to explore and exploit digital technology to obtain more benefits. [2] Established organizations are under pressure to speed up with the rapid innovation management and searching new ways for creating customer value and competing with start-up companies. Globalization is convinced to be a main driver of increasing competition, creating higher customer expectations and thus shorter product life cycles.[3] Banking and telecommunication are two sectors that have complex IT systems. Most of established company in banking and telecommunication have very formally organized, with inflexible organization structure.[4] Traditional IT functions cannot able to response fast to the customers' needs with their current set-ups. The organizations are at significant risk of lost their investments and missing key opportunities for growing and competing with their competitors.[5] To stay competitive many organizations, start to perform digital transformation. However, many companies fail in the process of digital transformation. For preventing this failure, IT governance can be implemented as guideline for the organization to ensure the transformation process running well. IT governance presents a mechanism for a strategic IT-business alignment to achieve maximum business value generated by the consumption of IT resources. [6] In today situation, while business world become an agile environment, performing digital transformation while still performing main activity such as: (i) delivering new products/services (ii) controlling development and operation, (iii) implementing IT governance principles for control integration, become main challenges for the IT executives. Every organization should have agility, because it became crucial for driving innovation and gaining competitive

advantage. Today in the practice world, IT executive must shift their perspective from the traditional service-provider role to more agile and becoming a partner for the business. Agility is defined as

“the ability to respond operationally and strategically to changes in the external environment. The response has to be quick and effective for the organization to be considered agile”.

[4] This study will contribute to the literature of IT Governance in the context of digital transformation in the agile environment. We draw up recommendations for established highly regulated companies which perform digital transformation based on IT governance framework in the agile environment. The main question is:

“what is the impact of digital transformation to the IT Governance Framework and how established highly regulated can improve its agility to the organizations in the digital transformation process?”

The paper is structured as follows. We start by discussing the theoretical foundation and reviewing the concept of digital transformation, agile and DevOps model in the agile environment. We also discuss the theory of IT governance mechanisms. Afterwards, we outline the case study approach adopted. Subsequent to the presentation of the findings, we discuss how our findings extend existing research and conclude with theoretical and practical implications. We finish with conclusions and avenues for future research.

2 LITERATURE REVIEW

2.1 Digital Transformation

Main topic for organizations all over the world today is digital transformation. It is anticipated that companies that are incapable to conform to the digital world will undoubtedly fall victims to “digital Darwinism”, where incumbents may vanish and only the most adaptable firms, responsive to technological trends, will stand to remain on the competitive landscape. [7]

Digital Transformation can be defined as follow:

Use of new digital technologies, such as mobile, social media, analytics or embedded devices, that enable major business improvements like leveraging customer experience, achieving operational efficiency and creating new business models. [8]

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While many firms are performing digital transformations, recent studies of success stories have shown that building comprehensive strategy will be more influential to the improvement of the organization's competitive position, compare to the technology adopted. The strategy implemented by management will impacted to the success of digital transformation.[6] Digital transformation strategy has several elements. There are four important dimensions: (i) the use of technology, (ii) changes in value creation, (iii) structural changes, and (iv) financial aspects. [9] Figure 1. presents the digital transformation framework.

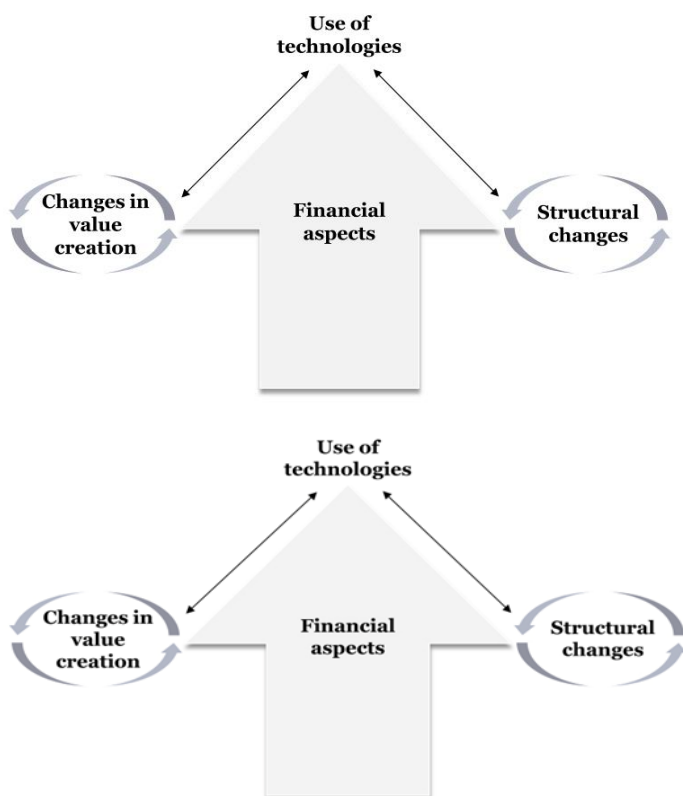


Figure 1. Digital transformation framework: balancing four transformational dimensions[9]

In the agile business environment faced by all organizations. The transformation strategic route can be summarized with these basic approaches: (i) Focus on customer value propositions, (ii) Change in operating model, (iii) the combination of the two approaches simultaneously. It will change the customer's value proposition and organizing operations for delivery.[10]

2.2 IT Governance

Prior literature highlighted the idea that the firms which have distinct IT governance models do better than their competitors. Van Grembergen shows that structure, processes, and relational mechanisms are the key elements of IT governance. *Structure* involve in defining roles and responsibilities, as well as committees for each division of the company. *Processes* consist of decision-making, as well as planning and monitoring such that IT policies are suitable to business needs. The third element, *relational mechanisms*, refers to the exchange between IT and business, dialogs, shared knowledge, and communication.[11] Research conducted by Weill and Ross

supports that effective IT governance deploys three types of mechanisms: (i) decision-making structures, (ii) alignment processes, and (iii) communication approaches. The *decision-making structure* is carried out by forming organizational units such as committees, executive meetings or other business / IT executive agreements for decision making. *The alignment process* consists of aligning IT with organizational policies through the definition of formal processes such as IT investment and evaluation. *The communication approach* enables better communication of IT governance principles and policies in the company. Another IT governance approach developed by Weill illustrates five major IT decisions (including IT principles, IT architecture, IT Infrastructure strategy, business application needs, and Investment and IT priorities). Weill categorizes the six governance classifications available to IT organizations based on ideal of political archetypes (Business Monarchy, IT Monarchy, Feudal, IT Duopoly, and Federal). [12] Business Monarchy and IT Monarchy archetypes represent a centralized decision-making structure, IT decisions are made by Chief Officers and Corporate IT professionals. Feudal archetype reflects a decentralized structure where business unit owners are the primary decision makers within their dominion of control. The IT duopoly archetype instead, represents a two-party arrangement between a business group and IT executives and is more restrictive and specialized than the Federal model. The Federal functions as an "hybrid" decision making model. IT Duopoly model seems to allow for creative business solutions within agreed-upon controls. Weill also considers anarchy as model, where each small group can make decisions. The importance of Weill's contribution to the IT governance framework does not reflect the reality of the current phenomenon in the digital world. Recent studies by Arkhipova and Vaia investigated the IT Governance model in the digital era. The studies highlighted IT governance trends shifting from traditional to digital perspectives. The new "digital" IT Governance Model requires more collaboration and alignment between the functional responsibilities of business and IT and the integrated understanding that accompanies it.[13]

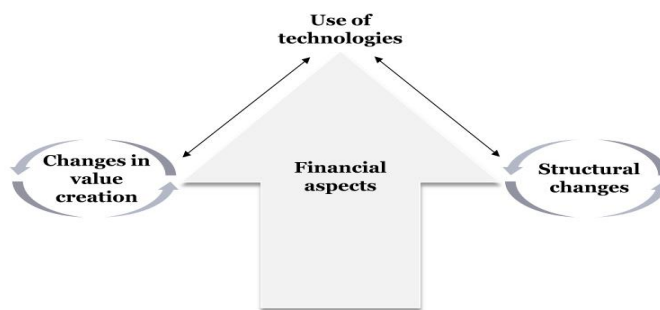


TABLE I. GOVERNANCE TRENDS FROM TRADITIONAL AND DIGITAL PERSPECTIVES

Traditional perspective	Digital perspective
Vertical communication	Horizontal communication
Hierarchical culture	Democratic culture
Shared understanding between IT and business	Unique understanding between IT and business

2.3 Agile & DevOps

Agile methodology and DevOps model have been applied in practiced world and studied by scholars in recent years. Agile used for bridging the gap between product owner and IT developer in software development process, and DevOps used for bridging the gap between IT developer and IT Operation. Until today there are still any research gap to integrate between these methods with digital transformation strategy and IT governance mechanism. Hence, we consider this gap as an opportunity to expand and explore on this research area. Since in the practice world those concepts sometimes implemented at the same period and can be confusing for many IT managers to deploy it in tactical level.

Agile Methodologies are a group of software development methods that are based on recurrent and incremental development. The four major characteristics that are fundamental to all agile methodologies are: adaptive planning, iterative and evolutionary development, rapid and flexible response to change and promote communication[14] Agile focuses on keeping the process lean and creating minimum viable products (MVPs) that run through several iterations before anything is final. Feedback is gathered for continuous improvement. The products development process become much more dynamic process where everyone is working together towards one goal. The DevOps model is a new phenomenon in software engineering. The aim of DevOps is to enhance collaboration, automation, virtualization as well as tools to bridge activities of software development and operation.[4] Through DevOps, companies are enabled to frequently and automatic release new software features. Hence, risks that are linked with software releases can be reduced, and feedback of new software features is received faster. This paper describes how organizations perform digital transformation in the agile environment and how IT department applied IT governance framework on tactical level. For further investigation, we adapt the structure and processes concept from Van Grembergen and Weill and Ross, also the relational mechanisms from De Haes and Van Grembergen. In last few years, Agile and DevOps applied for many organizations as part of strategic routes to digital transformation. Hence, we decided to integrate concept of Digital Transformation, Agile and DevOps integrated with IT Governance Framework. The ideal setting for an IT governance mechanism will be different in each environment. However, this study will provide insight into the dynamics of IT governance frameworks that must be aligned with the development of the business world.

3 METHOD

3.1 Research Methodology

In part to enhance our understanding of what is the impact of digital transformation to the IT Governance framework and how established highly regulated company can improve its agility to the organizations in the digital transformation process, a case study approach was adopted. This is one of the first studies that investigates IT governance mechanisms in the agile environment in Indonesia. The advantage of case study research is that it can present real situations and test or develop theoretical perspectives in relation to phenomena when they are revealed in practice. Therefore, summarizing case studies is the right method to enhance our understanding of the structure of IT governance mechanisms, processes, and relational mechanisms. To identify and select appropriate

cases several criteria were set. First, the team must have implemented agile methodology and the DevOps at least six months. Second, the team must be part of an established highly regulated company. Third, IT Executives and Business Manager must influence in the FGD. Selecting both participants from IT and Business enable us to gain knowledge of the IT governance mechanisms and their effects from a IT and business perspective. Two companies agreed to participate in the case study.

3.2 Data Collection and Analysis

We conducted qualitative research, based on analysis to the primary and secondary data. The figure 2 show detail data collection used for research.

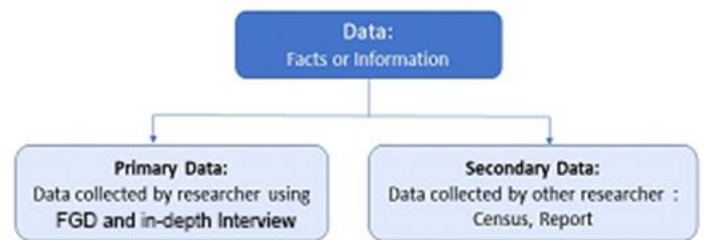


Figure 2. Data Collection & Analysis

A semi-structured interview and Focus Group Discussion (FGD) was conducted with each participant, supported by a guideline that contained a list of questions or general topics that the interviewers wanted to touch on. The questions were mainly open ended, so that the interviewees had the opportunity to explore their experiences and views. The research participants are as follow:

TABLE II. CHARACTERISTICS OF CASE STUDY PARTICIPANTS

Description	Team 1	Team 2
Industry	Banking	Telecommunication
Interview	IT Executive Business Manager	IT Executive Business Manager
Employee	39,809	10,000
Agile Method	Scrum	Scrum
DevOps Orientation since	1 year	6 months

4 RESULT

4.1 Finding

Our findings present recommendations for highly regulated companies that carry out digital transformation based on IT governance frameworks in an agile environment. Since the beginning of the new millennial age, in early 2000's, customer preferences have begun by shifting to digital channels. As stated by IT executives from banking in the FGD:

"Today the business world is undergoing a transformation to digital. 94% of banking transactions currently originate from digital channels, while only 6% originate from branches. Therefore, digital transformation is important for the organizations, because organizations need to create competitive advantages by increasing capabilities in the speed of delivery new products and services, which will impact to define superior customer experience."

Following are our findings on challenges in banking and telecommunication in digital era.

TABLE III. CHALLENGES IN BANKING AND TELECOMMUNICATION IN DIGITAL ERA

Banking Company	Telecommunication Company
1. New products and services speed delivery	1. New products and services speed delivery
2. Define superior customer experience to win the competition	2. Define superior customer experience to win the competition
3. Technology changes	3. Connection and support all industry
4. Government regulation	4. Connection and support all over the world
5. IT Governance mechanism, switching from waterfall model to agile model	5. Technology changes
6. Talent challenge	6. Government regulation
7. Security	7. IT Governance mechanism, switching from waterfall model to agile model
	8. Talent challenge
	9. Security

Digital transformation changes relationship between internal IT functions and business functions. This relation reflected new IT structures, processes and governance. During the pre-transformation period, the business monarchy and the IT monarchy approach were used to set investment decisions and prioritize the stages before the digital transformation. The role of IT is limited to providing technical evaluation and cost assessment of a project; and the final decision on whether the initiative is in line with the bank's overall strategic agenda and how much funds are allocated to the project must be authorized by each bank's management and investment committee. In the digital transformation period, the scope and volume of IT related business applications increasing significantly. In this phase, the IT duopoly governance model is used for decision making related to the business applications. Based on the initial business request, an IT representative will be assigned to manage the application project. While technical development, testing, and deployment are part of IT responsibilities, most choices related to the requirements and functions of business software are made together with each business user. Both teams have begun to adjust their IT functions by adopting the Agile model and the DevOps. team model. Following are the changes of governance structures.

TABLE IV. FINDING FOR GOVERNANCE STRUCTURES

Team	Team Roles	Decision Making	Organizational Structures
Team 1	Product Owner Scrum Master UI/UX Designer Front End Developer Back End Developer	Team can decide the best approach to implement the user story that has been agreed with the business	Digital Delivery Group. Within the company, inside digital delivery group.
Team 2	Product Owner Scrum Master UI/UX Designer Front End Developer Back End Developer	Team can decide the best approach to implement the user story that has been agreed with the business	1 VP Digital 1 VP Business office 1 VP Business Intelligence 1 VP Infrastructure

Our findings present evidence that the integration of Agile and DevOps create more effective communication and shared knowledge. Following are our funding for IT Governance Mechanism.

TABLE VI. FINDING FOR RELATIONSHIP MECHANISM

Team	Business IT Interaction	Communication and shared knowledge
Team 1	The product owner is the contact person for the customer	Improving collaboration between technical and business. Implementation of Scrum Meeting.
Team 2	The product owner is the contact person for the customer	Improving collaboration between technical and business. Implementation of Scrum Meeting.

4.2 Discuss

The goal of this study was to draw up recommendations for established highly regulated companies which perform digital transformation based on IT governance framework in the agile environment. Our findings extend existing knowledge about IT governance mechanisms in Agile Environment through study case method. Past literature focused primarily on traditional IT functions and their IT governance mechanisms—e.g. De Haes and Van Grembergen or Weill and Rose. However, there is no research available that provides IT governance mechanisms for Agile environment. Only a few investigations give insights into agile IT environments and their transformation towards an agile working mode. The results indicate that, in the digital transformation stage there are change of three main dimension of IT governance: (i) structure, (ii) process and (iii) relationship mechanism. We identify changes in 3 main dimensions of the IT governance framework. In terms of structure, it is necessary to change the structure in accordance with digital transformation and adaptation to the agile environment. In the digital transformation phase there are 4 dimensions, which need to be balanced: (i) changes in value creation (ii) use of technology (iii) structural change (iv) financial aspects. Organizations need to implement clear roles in order to achieve balance in the implementation of the 4

rules. On the resource side, where in the digital era it is often referred to as a squad. Squad is needed that can adapt quickly to changes in organizational culture and new assignments. Besides special talents are also needed such as T-shape talent, which in prior literature refers to someone who can think as an entrepreneur. A Scrum Master is also needed to lead an IT project implementation. Scrum Master guarantees that the team members follow the Scrum processes and acts as their coach as well promoting the importance of collaboration within the team. Organizations also need technical talent as a developer, for User Interface / User Experience, front end developer, backend developer. For generating an agile-oriented structure, the cases examined used different approaches. Our findings present various forms organization structure, e.g. the foundation of a new spin-off, ad-hoc or long-term change-over from silo structures to cross-functional structures. Team 1 from banking company applied hybrid in IT functions, providing services through traditional organized services as well as through DevOps teams. Team2 from telecommunication company already have a completely decentralized structure. Within a decentralized IT function, the teams have great decision-making autonomy. All the participants interviewed demonstrate that it is important to persuade the employees of the cultural aspect of Agile and DevOps. That means the employees need awareness of cultural changes in their daily mode of operation. The findings of this research indicate that competitive advantage through Agile and DevOps teams can be achieved through the implementation of a decentralized or hybrid organizational structure. Cross-functional teams need decision-making autonomy to outperform traditional structures and achieve the key advantages mentioned. In terms of process, it is necessary to align the process in accordance with digital transformation. These include: (i) create joint process that enable IT function and business organisations to manage day to day activity in development and operation by adopting DevOps Team. (ii) Develop IT governance policy regarding 7 core process. In term of relational mechanism, it is necessary to (i) align business and IT function, (ii) shared knowledge and collaboration, (iii) implement the regular meetings that are part of agile mechanism. With the help of agile IT organizations, the IT function devolves to a partner instead of a service provider for the business. Thereby, the gap between business and IT functions can be reduced. The gap analysis between the traditional IT governance framework with the IT digital governance framework presented in Appendix A.

4.2 Implication in research and practice

Our research has implications for future research and practice. With the present research we delivered new insights into the research area of IT governance mechanisms. To be more concrete, we presented IT digital governance framework. Our findings present precise IT digital governance mechanisms in the area of structure, processes, and relational mechanisms for agile environment in the digital transformation stage. Hence, our contribution is that IT governance mechanisms are important for digital transformation process. In addition, we confirmed that DevOps teams enhance IT and business collaboration, as mentioned in prior literature.

4.3 Limitation

This research presents impact of digital transformation to the IT Governance Framework and how established highly regulated can improve its agility to the organizations in the digital transformation process. Some limitations should, however, be considered while interpreting the results. The generalizability of the findings is limited, because we conducted a qualitative study. It will be very interesting to validate the IT governance framework based on significantly more cases. Further research is needed before it is possible to use the value add of this framework outside of other companies.

5 CONCLUSIONS

Digitalization create challenges for organizations almost in all industries. Digital transformation is one main issues, but very limited literature discussed about how organizations can improve its agility to the organizations in the digital transformation process. The findings in this study deliver insights into the implementation of IT digital governance for the current or future implementation. This paper provides a starting point for researchers and people in practice on IT digital governance. The IT digital governance mechanisms were derived with the help of case studies which we conducted in two organizations. We investigate impact of digital transformation to the IT governance dimension: structure, process, and relationship mechanism. IT managers can benefit from this guidance if they want to implement IT digital framework in the transition of digital transformation phase.

References

- [1] J. C. Spohrer and J. J. Welsler, "Digital Innovation and Strategic Transformation," no. December 2016, 2020.
- [2] M. Amorim and N. Mel, "Digital Transformation: A Literature Review and Guidelines for Future Research," vol. 1, pp. 411–421.
- [3] A. F. Sommer, I. Dukovska-popovska, and K. Steger-jensen, "Agile Product Development Governance – On Governing the Emerging Scrum / Stage-Gate Hybrids," pp. 184–191, 2014.
- [4] A. Wiedemann, "IT Governance Mechanisms for DevOps Teams – How Incumbent Companies Achieve Competitive Advantages," vol. 9, 2018.
- [5] W. Van Grembergen, M. Queiroz, T. Coltman, and P. Tallon, "Introduction to the Minitrack on IT Governance and its Mechanisms," vol. 9, pp. 4877–4879, 2018.
- [6] A. Qumer, "Defining an Integrated Agile Governance for Large 2 IT Governance: A Systematic Review and Analysis," pp. 157–160, 2007.
- [7] M. H. Ismail, M. Khater, and M. Zaki, "Digital Business Transformation and Strategy: What Do We Know So Far?," no. November 2017.
- [8] M. . Fitzgerald, M., Kruschwitz, N., Bonnet, D., Welch, "Embracing Digital Technology: A New Strategic Imperative. MIT." Sloan Management Review., 2013.
- [9] C. Matt, T. Hess, and A. Benlian, "Digital Transformation Strategies," *Bus. Inf. Syst. Eng.*, vol. 57, no. 5, pp. 339–343, 2015.
- [10] S. J. Berman and S. J. Berman, "Digital transformation: opportunities to create new business models," 2012.
- [11] E. Guldentops, "Structures , Processes and Relational Mechanisms for IT Governance," pp. 1–36.

- [12] J. W. R. Peter Weill, *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*. Harvard Business School Press, 2004, 2004.
- [13] D. Arkhipova and G. Vaia, "William DeLone and Carolina Braghin IT Governance in the Digital Era," no. October, 2016.
- [14] G. Kumar and P. K. Bhatia, "Impact of Agile Methodology on Software Development Process," no. August 2012, 2014.

Appendix A:

What are the gaps between the traditional IT governance framework with the IT digital governance framework?



STRUCTURE

- Need to review structure to accommodate digital transformation and agile IT organizations
- Implementing clear roles that communicate on four aspects in digital transformation:
 - changes in value creation.
 - use of technology.
 - structural change.
 - financial aspects
- The members of team should adaptive in term of culture change and new tasks.
- There is new special talents requirements: scrum master, T-shaped employees (entrepreneur talent), UI/UX, Developer (front end, backend)



PROCESS

- Create joint processes that enable IT Function and business organisations to manage day to day activity in Development and Operation by adopting DevOps Team
- Develop IT governance policy Regarding 7 core process:
 - Requirements Management
 - Software Development
 - Quality Assurance
 - Test Management
 - Software Operation
 - Support Process
 - Contiguous Integration
 - Delivery / Deployment
 - Service Level Agreement



RELATIONAL MECHANISM

- Aligning business and IT Function
- Shared knowledge and collaboration
- Implement the regular meetings that are part of agile allow project teams to share progress, discuss problems and work out solutions. They also help make the entire process more transparent.