General Approach for Formulating a Digital Transformation Strategy

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Original Research Paper

General Approach for Formulating a Digital Transformation Strategy

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Abstract: To take advantage of information technologies, organizations need to define a clear strategy. Numerous works have provided definitions and phases of digital strategies. Some of these strategies are context-specific, while others deal with the common elements of digital strategies regardless of the digital transformation context. However, these works do not address a holistic approach. This raises ambiguity regarding digital strategy definitions and approaches. To eliminate this ambiguity, the current research tries to take advantage of existing digital strategies to propose a general digital strategy definition and build a general digital transformation approach. This work analyses various digital transformation strategies, to extract and classify their common elements in order to build a general approach that frame and drive the formulation of digital transformation strategies. To define such a general approach, the current paper analyses the effects of IT Governance and Management Strategy on the Digital Transformation Maturity. This analysis identified how IT Governance and Management Strategy can contribute to formulating a digital transformation strategy. Partial Least Square (PLS) was adopted in this research to develop an empirical evaluation for the case of 30 digital strategies and frameworks. Based on this empirical study several results have been presented in this work, namely: determination of a digital strategy definition and identification of a digital strategy approach. The proposed approach is composed of the following building blocks: Strategic Awareness, Business Strategic Planning, IT Organizational Structure, Steering committee, IT Prioritization Process, IT Investment Decisions, IT Strategic Planning, IT Budgeting, IT Reporting, IT Reaction Capacity and Management Strategy.

Keywords: Digital Strategy, Digital Strategy Definition, Digital Transformation Approaches, Information Technology (IT), IT Governance, Structural Equation Modeling (SEM)

Introduction

New digital technologies allow companies, firms, industries and organizations to radically change and improve their business models (Ziyadin *et al*., 2019). To keep pace with the new digital reality and meet the digital transformation challenges, organizations need to define and implement an unmistakable digital transformation strategy (Matt *et al*., 2015) that embrace the implications of digital transformation and drive operational performance (Hess *et al*., 2016). Researchers highlight the importance of formulating a digital transformation strategy, although digital strategy formulation has not been fully investigated

and the specific guidelines of digital strategy formulation are still vague (Mitroulis and Kitsios, 2019). Recent works have dealt with different aspects of digital transformation; however, they have not addressed a holistic approach (Hansen and Sia, 2015; Hess *et al*., 2016). Managers need to have a clear vision and roadmap about the different concerns, aspects and blocks to be considered in their digital transformation journey.

There are many digital strategies in the literature. Some of them are context-specific, while others are general. Some works present general steps of digital transformation, while others provide a lot of details. However, these works are not dealing with a holistic

digital transformation approach. There is no universal agreement on the approach that framing the digital transformation strategy. Moreover, there is no universal digital strategy definition (Dang and Vartiainen, 2019). This raises ambiguity regarding digital strategy definitions and approaches. In order to eliminate this ambiguity, the current work tries to take advantage of existing digital strategies to determine a general digital strategy definition and provide a holistic digital transformation approach.

One of the main focuses of an organization is to align its Information Technology (IT) Strategy with its Business Strategy to create value (Frank, 2014). IT Governance promotes the alignment of business with information technology.. IT Governance offers practices, mainly frameworks and standards to support the organization's business strategy regarding IT (Percheiro *et al.*, 2017). Although organizations have recognized the importance of IT governance practices, many have yet to adopt them. And it is better if IT Governance is involved in the digital transformation strategy. From this point of view, digital strategy formulation can take advantage of IT Governance solutions and frameworks.

Independent of the organizations' characteristics, digital strategies have several aspects in common, such as the use of technologies, changes in value creation, structural changes and financial aspects (Matt *et al.*, 2015). This research aims to define the impact of IT governance on the digital strategy. It focuses on reviewing, analyzing and comparing different digital strategies to collect the most relevant common blocks of digital transformation strategies regardless of the organizations' characteristics. These blocks will be organized and structured into a general approach. The purpose of this research is to consider this approach as a reference for digital strategy development for all firms, industries and organizations, regardless of their characteristics.

Organizations should know and determine a digital transformation framework to frame and facilitate the formulation of the digital transformation strategy in order to build a successful transformation. This work will present this framework. The desired impact of the current study is the determination of a digital transformation strategy definition and a standard digital transformation framework for leading digital transformation in all organizations.

The general research question is: What are the common building blocks of digital transformation strategies regardless of the digital transformation context?

The specific questions are: What is the relationship between IT Governance and the Digital Transformation? How can IT Governance drive Digital Transformation? What are the common components of a Digital Transformation Strategy? How can IT Governance help us to define the common blocks of Digital Strategies?

What is the impact of the Management Strategy of the digital transformation blocks on the success of the digital transformation?

To answer the research questions, a literature review on digital strategies and IT governance was conducted. And a quantitative approach was adopted as a research methodology.

The paper is structured as follows: The next section presents the Literature Review, followed by Research Methodology, followed by Results, Discussion and Conclusion.

Literature Review

A systematic review of digital transformation literature was conducted, leading to a discussion of digital strategy definitions and components.

Digital Transformation Strategy Definition

To digitize and transform business models and provide new revenue and value creation opportunities, organizations must adopt new strategies based on digital technologies (Ross *et al.*, 2016).

Researches used several terms to present digital strategies and their concerns, such as Strategic Information Systems Planning (Kamariotou and Kitsios, 2019), Requirements Engineering for the Digital Transformation (Ebert and Duarte, 2016), Digital Transformation Strategies (Matt *et al.*, 2015), Synergy for Digital Transformation (Zinder and Yunatova, 2016), Digital Transformation Strategy making in pre-digital Organizations (Chanias *et al.*, 2018), Embracing Digital Technology (Fitzgerald *et al.*, 2013), Digital Transformation by SME entrepreneurs (Li *et al.*, 2017), Impediments in Healthcare Digital Transformation (Furda and Gregus, 2019), Digital Transformation in Service Management (Matzner *et al.*, 2018), Transformation of Business Models (Schallmo *et al.*, 2017). This raises ambiguity regarding digital strategy understanding.

There is no universal agreement on the approach that framing the digital transformation strategy. Moreover, there is no universal definition of the Digital Strategy (Dang and Vartiainen, 2019). There are several definitions of the digital transformation strategy in the literature; however, they are not numerous like digital transformation definitions.

Selected definitions are presented in Table 1. The most common concepts between these digital strategy definitions are IT/business alignment, value creation, use of information technologies, business processes improvement, offering competitive products or services.

A new definition of the digital transformation strategy that consider the previous digital strategy definitions common concepts and some new concepts will be proposed and confirmed in the Results section of the current paper.

Table 1: Digital transformation strategy definitions

Definition	Source
A digital strategy summarizes digital transformation processes, objectives, guidelines and controlling structures and acts as an interface to the coordination of the numerous digitization activities (Schallmo et al., 2018).	Fraunhofer IAO (2016); Schallmo et al. (2018)
A digital business strategy is defined as a pattern of deliberate competitive actions undertaken by a firm as it competes by offering digitally enabled products or services (Woodard et al., 2013).	Woodard et al. (2013)
A digital strategy is a wide plan, encompassing organizational characteristics, issues and specific digital technology-based goals (Braga Tadeu et al., 2018).	Braga Tadeu et al. (2018)
A digital business strategy is simply that of the organizational strategy formulated and executed by leveraging digital resources to create differential value (Bharadwaj et al., 2013).	Bharadwaj et al. (2013)
A digital strategy is defined as a business strategy, inspired by the capabilities of powerful, readily accessible technologies, intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions (Ross et al., 2016).	Ross et al. (2016)

Detailed Literature Review of Existing Digital Transformation Approaches and Frameworks

This section analyzes existing digital transformation strategies and frameworks. It illustrates their common elements, their strengths and their weaknesses. The principal purpose of this section is to identify the list of elements in common between all digital strategies.

Mitroulis and Kitsios (2019) propose a conceptual model of the digital transformation strategy. This model is composed of the following five dimensions: Use of technology, financial aspect, change in customer experience, changes in value creation and changes in structure (Mitroulis and Kitsios, 2019). These dimensions should be part of the general digital transformation approach because they must be highlighted by all organizations in their digital strategies.

Kamariotou and Kitsios (2016) present the main phases of Strategic Information Systems Planning. These phases are common between all digital strategies. Kamariotou and Kitsios (2016) propose a relevant framework that can drive the formulation of a digital strategy; however, this framework does not contain enough details to facilitate the formulation of a holistic digital transformation strategy.

Hess et al. (2016) provide 11 strategic questions and possible answers to guide organizations formulating a digital transformation strategy. These questions have been grouped along the following four digital strategy dimensions: Use of technologies, financial aspects, changes in value creation and structural changes. These dimensions are mentioned also in the research of Kamariotou and Kitsios (2016). The proposed 11 questions are covering the most relevant digital strategy concerns, but they lack the following blocks: Management strategy, reporting, IT investment decision and IT prioritization process.

The digital strategy should be derived from the business strategy and follow the same structure (Kittelberger and Allramseder, 2019). Kittelberger and Allramseder (2019) claim that the core elements of a

digital transformation are grouped into two groups. These include Use Cases (digitization of services, products, business models, value chain and customer interaction) and Enablers (human capital, data management, cybersecurity, technologies and partners) (Kittelberger and Allramseder, 2019). These groups and their elements should be highlighted in the general approach because they are common between digital strategies.

Graesser (2019) describes the core elements of digital strategy. It describes eCommerce, digitalization of insurance companies, digitalization of a digital enterprise, digitalization of small businesses. It provides components, concerns and concepts of these digital transformations but it does not provide a clear approach that can be considered as a reference for formulating a digital transformation strategy.

Serrat (2015) presents the ambit of digital strategies as follows: Rethinking, designing, implementing and developing. This research has identified some questions that can lead organizations to formulate their digital transformation strategy. These questions can help to define the strategic vision and the action plan. Based on these questions, Serrat provides 12 steps of digital transformation. Serrat presents a relevant digital transformation approach. This approach contains the most relevant blocks of a digital strategy, it misses only the IT Reporting and some details of how to execute each step.

Ulas (2019) describes a toolbox containing the most relevant elements that can drive SME's digital transformation journey. The toolbox contains driving factors expediting digital transformation. It gives programs and software that can be used in SMEs' digital transformation. It provides eight dimensions of digitization that can be considered in the digital transformation journey. The toolbox provides 3 Digital transformation maturity levels (unaware, conceptual and defined). It identifies obstacles in adopting digital transformation and describes the most relevant blocks of the process of SME's digital transformation. However, Ulas (2019) does not provide a clear roadmap for formulating a digital strategy.

Dang and Vartiainen (2019) conduct a literature review on digital strategy. This work has several

contributions in the digital transformation strategy field; however, it does not give an approach to lead digital strategy formulation. Dang and Vartiainen (2019) describe the main aspects of digital strategy and how those aspects influence on digital strategy (Dang and Vartiainen, 2019).

Bumann and Peter (2019) define 3 phases of the digital transformation process. The first one is Digitization; it means the conversion from analogue to digital (e.g., digitization of data). The second phase is Digitalization, it means taking advantage of digital opportunities to create innovation. The last one is the Digital Transformation and it means designing new ways of doing things that generate new sources of value (Bumann and Peter, 2019). These 3 phases can be considered as 3 maturity levels of the digital transformation. Bumann and Peter (2019) propose some elements in common between digital strategies, but they are not addressing a holistic framework.

Savic (2019) illustrates a comparison between 3 digital transformation phases: Digitization, digitalization and digital transformation. These digital strategy phases are also presented in the previous research (Bumann and Peter, 2019).

Ross *et al*. (2016) offer recommendations for a successful digital transformation journey. A digital strategy should focus on either customer engagement or digitized solutions, acquiring new skills and capabilities, investing in an operational backbone, developing a digital services backbone and thinking services (Ross *et al*., 2016). These recommendations are applicable in all digital transformation contexts. For this reason, they should be highlighted in the general digital transformation approach that will be proposed in the Results section of the current paper.

Fuchs *et al*. (2019) discuss different digital strategy dimensions. These dimensions are grouped into 4 categories: Objectives && scopes, staffing && collaboration, funding, governance && structure. These categories are common between all digital strategies.

Kotarba (2018) describes how digital technologies can change business models. It presents the digital transformation of Client/Client segments, client relationships, value proposition, resources, channels, partnership, energy usage and financial aspects. Kotarba (2018) proposes several elements, concepts and concerns of digital strategies that can contribute to the building of the general approach.

Otsetova (2019) focuses on drivers, trends, opportunities, challenges and dimensions of the digital transformation of postal operators. These elements can be used to define the digital strategic vision. Otsetova (2019) illustrates 4 phases of the postal sector digitalization: Postal automation, revenue-generating digital services, core-enhancing digital postal services and digital transformation. It presents the impacts of the digital transformation on revenue, costs and customer experience. Otsetova (2019) identifies four main drivers of digital transformation in the postal sector, namely: Automation, digital customer access, connectivity and digital data.

Young and Rogers (2019) present 3 essential components of the digital transformation process: Ubiquitous data, connectivity and decision making (Young and Rogers, 2019). These components belong to the general digital transformation approach.

Leignel *et al*. (2019) describe the importance of evaluating digital transformation. They present an overview of a digital transformation maturity model. The proposed digital strategy maturity levels are: Non-existent, discovering, deploying, under control and optimized. It is a general maturity model that can be common between all digital strategies.

Singh and Hess (2017) present the scope of the digital transformation within six case organizations, namely: Retail, tourism, education, market research, financial services and publishing. They investigate the role of the Chief Digital Officers (CDO) in leading the digital transformation journey by describing the CDO role in these six case organizations.

Sebastian *et al*. (2017) provide examples of types of transformation strategies which include customer focus and innovation focus. The first one is concentrated on customers and their needs, whereas, the second one is based on the innovation of new digital products and services.

Westerman *et al*. (2014) are address nine digital transformation components. These are grouped into 3 areas: Digital transformation of customer experience, operational process and Business Model. These components can be used for defining the digital strategic vision.

Chanias *et al*. (2018) describe seven digital strategy phases within a financial solutions provider, namely: Recognizing the need for digital transformation, setting the stage, initially formulating the digital strategy, preparing for the digital strategy implementation, starting the digital strategy implementation, finding a working mode and enhancing the digital strategy (Chanias *et al*., 2018). These phases are not specific to financial services providers, there are common between all digital transformation contexts. However, Chanias *et al*. (2018) do not provide enough details about these phases.

Schallmo *et al*. (2017) clarify the digital transformation definition and introduce a digital transformation approach composed of the following phases: Digital reality, digital ambition, digital potential, digital fit and digital implementation (Schallmo *et al*., 2017). These phases do not address all digital strategy concerns; for example, they do not address IT budgeting. However, they are general digital transformation phases that can help organizations to define the digital strategic vision and evaluate digital strategic objectives.

Vial (2019) illustrates the building blocks of the digital transformation process, namely: Structural changes, negative impacts, disruptions, digital technologies adoption and change in value creation (Vial, 2019). These blocks must be highlighted in all digital strategies regardless of the context.

WHO and ITU (2012) provide an integrative guide for leading the digital transformation journey of the health system. This guide is composed of the following digital strategy blocks: Strategic vision definition, action plan elaboration and management strategy definition. These blocks can be used in all digital transformations' contexts.

Korachi and Bounabat (2019b) provide an approach for leading the digital transformation of cities into smart cities. This approach contains the following processes: Strategic vision definition, action plan elaboration and management strategy definition.

Solis (2019) presents the state of digital transformation in 2018-2019. This report is addressing the most relevant concerns (steering committee, key drivers, top challenges, annual budget, top-priority technology investments, investments in innovation, metrics) and stages of a digital strategy and it gives some statistics about them. These elements are ascribed to the following digital transformation dimensions: Strategic vision, action plan, steering committee, budgeting, organizational structure and strategic planning (Solis, 2019).

Kamariotou and Kitsios (2018) provide the most relevant variables of the Strategic Information Systems Planning (SISP) including strategic awareness, situation analysis, strategy conception, strategy formulation and strategy implementation. It is a relevant process, but it does not include IT Budgeting, IT Investment Decisions and IT Reporting.

Korachi and Bounabat (2019a) provide a digital transformation maturity model called MMDSA (Maturity Model for Digital Strategy Assessment). This maturity model is composed of 3 maturity levels: Top-Down Strategy (IT is used as a tool to support business process), Bottom-up Strategy (business processes can be changed to take advantage of ITs) and IT Governance (Definition of procedures that ensure the effective and efficient use of ITs to achieve business performance) (Korachi and Bounabat, 2019a). MMDSA is a general maturity model that can be used in all digital transformation contexts. MMDSA model will be used in this study to analyze and compare the above digital strategies.

Based on the analysis of the above strategies, it was concluded that some of them are context-specific, while others are presenting general digital strategy components and concepts. However, these strategies do not address a holistic approach. This research tries to take advantage of all these works to build a general digital transformation approach that assists leaders in formulating their digital transformation strategy.

IT Governance Driving Digital Transformation

This section tries to answer the following questions: What is the relationship between IT Governance and Digital Transformation? And How can IT Governance drive Digital Transformation?

One of the main focuses of an organization is to align its digital strategy with its business strategy to create value (Frank, 2014). IT governance offers practices, mainly frameworks and standards, to support the organization's business strategy regarding IT (Percheiro *et al.* 2017). IT governance is the organizational capacity exercised by organizations to control the formulation and implementation of IT strategy (De Haes and Grembergen, 2004). Different works have identified five dimensions of IT governance that need to be considered: Strategic alignment, resource management, risk management, performance measurement and value delivery (De Haes *et al.*, 2020; Luftman *et al.*, 2010). These dimensions represent digital transformation concerns as well. IT governance focus on achieving IT/business alignment. Alignment between IT and business is the main purpose of the digital transformation strategy as well. Organizations that achieving alignment between IT and business, have a high level of digital transformation maturity (Korachi and Bounabat, 2019a).

Different works illustrate that IT governance can drive digital transformation (Mario, 2017; De Haes *et al.*, 2020; Korachi and Bounabat, 2019c). From this point of view, it is supposed in this research that IT governance elements represent fundamental components of digital transformation. A general digital transformation approach was proposed in this work using IT governance elements. To evaluate this approach, a quantitative analysis was adopted and presented in the following section. The following hypothesis was defined:

Hypothesis 1: IT Governance can drive the Digital Transformation.
Hypothesis 2: Management Strategy has a positive influence on IT Governance and the success of the Digital Transformation

Research Methodology

To answer the research questions and test the hypothesis a quantitative approach (Newman *et al.*, 1998) was chosen as a methodology to use. A literature survey was conducted about how IT governance and management strategy can drive the digital transformation journey.

The review and analysis of literature result in almost two hundred articles about digital transformation maturity models and frameworks. Only those from peer-reviewed journals and conferences and where the

dimensions were validated though research were considered for further analysis. This results in a total of 50 articles. The models and frameworks vary in terms of origin, industry and sector of digital transformation.

The data gathered were subsequently analyzed using SEM modeling (Structural Equation Modeling), Partial Least Squares (PLS) Algorithm and SmartPLS3 software (Kwong-Kay, 2019; Bagozzi, 1981; Kwong-Kay, 2013). The choice of this method was inspired by similar studies in the same area (Galindo-Martín *et al.*, 2018; Sousa and Rocha, 2018; Al-Hajri *et al.*, 2018). SEM is based on two methods: PLS-based and covariance-based (Sousa and Rocha, 2018). To test the hypothetical relationship between the latent variables, PLS is adopted for various reasons: Second-generation multivariate techniques allow latent variables to be introduced with multiple indicators; they are more appropriate with small sample size; the models are complex, causal and require no multivariate normality, which is advantageous when resolving multicollinearity problems (Sousa and Rocha, 2018; Barclay *et al.*, 1995). The analysis was performed using SmartPLS3 software.

Table 2 illustrates latent variables of the studied SEM model and their indicators.

Table 2: Latent variables and indicators

Latent variables	Indicators	Indicators Definition (Korachi and Bounabat, 2019c)
Digital Transformation Strategy (DTS)	DS Maturity Level (DS ML)	Maturity Level (Korachi and Bounabat, 2019a)
IT Governance (ITGOV)	Business Strategic Planning (BSP)	Strategic Vision Definition and Action Plan Elaboration
	IT Organizational Structure (ITOS)	Determination of the Organizational Structure of the IT department
	Steering Committee (SC)	Determination of Departments represented in the digital transformation steering committee
	IT Prioritization Process (ITPP)	Definition of the process of how to select information technology projects and determine their priorities
	IT Investment Decisions (ITID)	Identification of people responsible to make IT Investment Decisions and Definition of the process of the identification of IT Investment Decisions
	IT Strategic Planning (ITSP)	Identification of the Automation Process, Rationalization Process, Re-engineering Process and Paradigm Shift Process
	IT Reaction Capacity (ITRC)	Definition of a strategy to improve alignment between Information Technology and Business
	IT Budgeting (ITB)	Identification of people responsible to manage financial aspects of IT projects and identification of financial strategy of IT projects
	IT Reporting (ITR)	Identification of people responsible for IT Reporting, Design of IT reporting system and database, Identification of IT Reporting tools
Management Strategy (MS)	Key Performance Indicators (KPIS)	Definition of the appropriate KPIs
	MS Maturity Level (MSML)	Evaluate the Maturity Level of the Digital Transformation
	Dashboard (DASH)	Representation of KPIs in a Dashboard
	Control Evolution (CE)	Control the Digital Transformation Evolution

The latent variables of the proposed model are Digital Transformation Strategy, IT Governance and Management Strategy. This work measures latent variables using different indicators and adopting the SEM approach. The definitions of the latent variables' indicators are presented in Table 2. These indicators are supposed as building blocks of the digital transformation strategy. The purpose of this study is to analyze the impact of these blocks on the digital strategy and to check if there are other new blocks that can be ascribed to the proposed digital transformation approach.

Results

Data Analysis and Preparation

To test the above hypothesis, an analysis and comparison of the cited digital strategies were conducted and presented in Table 3. The comparison is done based on the identification of the maturity level of these strategies using the Maturity Model for Digital Strategy Assessment (MMDSA) (Korachi and Bounabat, 2019a). MMDSA is composed of 3 maturity levels: Top-Down Strategy, Bottom-up Strategy and IT Governance.

The analysis of the cited digital transformation strategies and frameworks has identified new digital transformation elements (the number of new blocks is presented in Table 3) that can be added to the proposed approach, namely: Strategic awareness (Kamariotou and Kitsios 2016; 2018; 2019), digital transformation phases (Schallmo *et al.* 2017; Chanias *et al.* 2018; Vial 2019), preparing for strategy implementation (Chanias *et al.* 2018), strategy implementation (Chanias *et al.* 2018) and finding a working mode (Chanias *et al.* 2018). Whereas the other elements of the analyzed strategies are ascribed to the following blocks (Table 2): Business Strategic Planning, IT Organizational Structure, Steering committee, IT Reporting, IT Strategic Planning, IT Budgeting, IT Investment Decisions, IT Reaction Capacity, IT Prioritization Process and Management Strategy (Korachi and Bounabat, 2019c).

Table 3: Summary and comparison of existing approaches in digital strategy

| No.	Title and source	Maturity Level (MMDSA ML)	Business Strategic Planning (BSP)	IT Organizational Structure (ITOS)	Steering Committee (SC)	IT Prioritization Process (ITPP)	IT Investment Decisions (ITID)	IT Strategic Planning (ITSP)	IT Budgeting (ITB)	IT Reporting (ITR)	IT Reaction Capacity (ITRC)	Key Performance Indicators (KPIS)	MS Maturity Level (MSML)	Dashboard (DASH)	Control Evolution (CE)	Number of New Blocks
1	Digital Transformation Strategy: A Literature Review (Mitroulis and Kitsios 2019)	2	♦	♦				♦	♦							0
2	Strategic Information Systems Planning: Implementing a Digital Strategy (Kamariotou and Kitsios, 2016; 2019)	2	♦		♦			♦					♦		♦	♦	1
3	Options for Formulating a Digital Transformation Strategy (Hess *et al.*, 2016)	2	♦	♦	♦			♦	♦							0
4	The Digital Strategy: The Guide to Systematic Digitization of the Company (Kittelberger and Allramseder, 2019)	2	♦										♦			0
5	Digital Strategies (Graesser, 2019)	2	♦					♦								0
6	Planning and Driving a Digital Strategy (Serrat, 2015)	3	♦	♦	♦	♦	♦	♦	♦		♦	♦		♦	♦	1
7	Digital Transformation Process and SMEs (Ulas, 2019)	3	♦	♦	♦	♦	♦	♦	♦							0
8	Digital strategy patterns in information systems research (Dang and Vartiainen, 2019)	2	♦	♦												0
9	Action Fields of Digital Transformation – A Review and Comparative Analysis (Bumann and Peter, 2019)	2	♦	♦	♦		♦	♦	♦	♦						0
10	From Digitization, through Digitalization, to Digital Transformation (Savic, 2019)	1	♦					♦								0
		2	♦					♦	♦							0
		2	♦					♦								0
11	Designing and Executing Digital Strategies (Ross *et al.*, 2016)	2	♦	♦				♦								0
12	Characterizing Approaches to Digital Transformation (Fuchs *et al.*, 2019)	3	♦	♦	♦		♦		♦	♦	♦					0
13	Digital Transformation of Business Models (Kotarba, 2018)	3	♦	♦			♦	♦	♦							0
14	Digital Transformation of Postal Operators (Otsetova, 2019)	2	♦					♦					♦			0
15	A Review of Digital Transformation in Mining (Young and Rogers 2019)	1	♦					♦					♦			0
16	Digital Transformation (Leignel *et al.*, 2019)	2	♦	♦	♦			♦				♦				0
17	How chief digital officers promote the digital transformation of their companies (Singh and Hess 2017)	2	♦					♦					♦	♦		0
		1	♦													0
18	How big old companies navigate digital transformation (Sebastian *et al.*, 2017)	2	♦					♦								0
19	The Nine Elements of Digital Transformation (Westerman *et al.*, 2014)	2	♦					♦								0
20	Digital transformation strategy making in pre-digital organizations (Chanias *et al.*, 2018)	2	♦					♦					♦	♦	♦	4
21	Digital transformation of business models (Schallmo *et al.*, 2017)	2	♦										♦	♦	♦	1
22	Understanding digital transformation (Vial 2019)	2	♦	♦	♦			♦								1
23	National eHealth Strategy Toolkit (WHO and ITU 2012)	3	♦	♦		♦	♦	♦			♦	♦		♦	♦	0
24	Integrated Methodological Framework for Smart City Development (Korachi and Bounabat 2019b)	2	♦										♦	♦	♦	0
25	Towards a Maturity Model for Digital Strategy Assessment (Korachi and Bounabat 2019a)	3	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	0
26	The state of digital transformation (Solis 2019)	2	♦	♦	♦	♦			♦			♦	♦			0
27	Strategic Information Systems Planning (Kamariotou and Kitsios 2018)	3	♦		♦	♦		♦				♦	♦		♦	1

Figure 1 and 2 present statistics about the digital strategies presented in Table 3. Figure 1 illustrates that the maturity level of most of the cited strategies is level 2, which means most organizations choose to create value using IT with the least possible effort. These kinds of organizations are not managing all the transformation concerns, and this can threaten the digital transformation success. There are only 10% of digital strategies with maturity level 1 and 23% of digital strategies with maturity level 3.
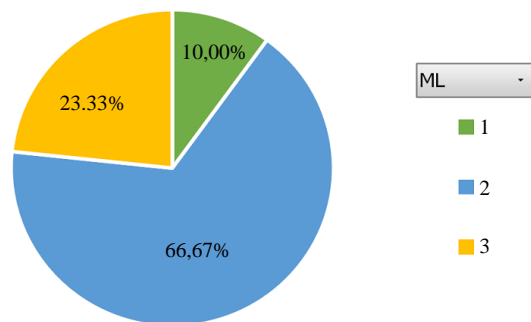
Fig. 1: Percentage of digital strategies per maturity level
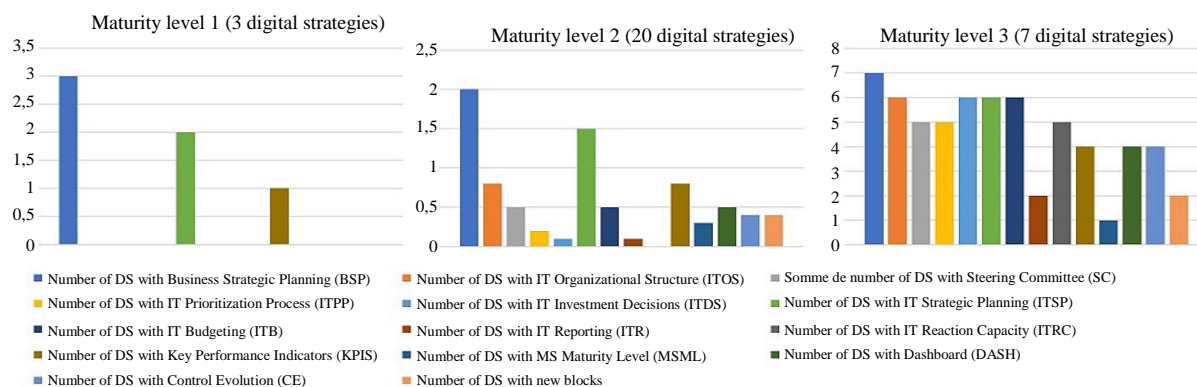
Fig. 2: Summary and comparison of digital strategy building blocks

Organizations with maturity level 1 use information technologies as a tool to support business processes. Organizations with maturity level 2 take advantage of information technologies to improve business processes, Organizations with maturity level 3 define processes that ensure the effective and efficient use of information technologies in enabling the organization to achieve its goals and business performance (Korachi and Bounabat, 2019a). The third maturity level reflects the described condition in which the IT and business become one (Korachi and Bounabat, 2019a).

Figure 2 shows the presence of indicators according to the maturity level of the digital strategy (indicators definitions is presented in Table 2). Digital strategies with maturity level 1 are composed of 3 components: BSP, ITSP and KPIS. Digital strategies with maturity level 2 are richer and they are composed of the following blocks: BSP, ITOS, SC, ITPP, ITID, ITSP, ITB, ITR, KPIS, MSML, DASH, CE and some new concepts (strategic awareness, digital transformation phases, preparing for strategy implementation, starting strategy implementation and finding a working mode).

Figure 2 presents that Business Strategic Planning is a mandatory block in all strategies regardless of their maturity levels. To build a digital strategy with maturity level 3, this strategy should consider all the digital strategy concerns. For this reason, the most of digital strategies with the maturity level 3 consider all the indicators presented in Table 2, namely: BSP, ITOS, SC, ITPP, ITID, ITSP, ITB, ITR, ITRC, KPIS, MSML, DASH, CE and some new concepts (strategic awareness and strategy implementation). Figure 2 illustrates that the IT Reaction Capacity (ITRC) is present only in strategies with maturity level 3, which means that ITRC is an important element in the governance of digital transformation (ML3).

SEM Model Validity Analysis

The model validity should be analyzed before estimating the SEM model. The model validity is performed using convergent validity, discriminant validity, face validity and nomological validity (Al-Hajri *et al*., 2018). Model Validity Measurements are presented in Table 4, Table 5 and Table 6.

Convergent validity is the extent to which a measure relates to other measures of the same phenomenon (Hair *et al*., 2017). Convergent validity can be assessed using Factor Loadings, Average Variance Extracted (AVE) and Cronbach Alpha (Hair *et al*., 2010).

Table 4: Convergent validity

Constructs	Cronbach Alpha	Composite Reliability	AVE	R Square
Digital Transformation Strategy	1.000	1.000	1.000	0.204
IT Governance	0.928	0.936	0.625	0.300
Management Strategy	0.837	0.900	0.703	

Table 5: Discriminant validity: Cross loadings

	Digital transformation strategy	IT Governance	Management strategy
BSP	0.351	**0.955**	0.656
CE	0.199	0.427	**0.887**
DASH	0.199	0.427	**0.887**
ITB	0.331	**0.850**	0.174
ITID	0.396	**0.776**	-0.025
ITOS	0.331	**0.850**	0.174
ITPP	0.313	**0.733**	0.722
ITR	0.271	**0.611**	0.026
ITRC	0.498	**0.581**	0.318
ITSP	0.279	**0.745**	0.602
KPIS	0.146	0.541	**0.982**
ML	**1.000**	0.452	0.192
MSML	0.098	0.404	**0.522**
SC	0.426	**0.928**	0.316

Table 6: Latent variable correlation matrix

	Digital Transformation Strategy	IT Governance	Management Strategy
Digital Transformation Strategy	**1.000**		
IT Governance	0.452	**0.790**	
Management Strategy	0.192	0.548	**0.838**

Table 4 illustrates the SEM Model Convergent Validity. Cronbach's alpha and Composite Reliability (CR) values must be above 0.70 (Galindo-Martín *et al*., 2018). Cronbach's alpha values are located between 0.837 and 1 (Table 4). The CR values are from 0.900 to 1.000 (Table 4). Cronbach's alpha and CR values are exceeding the recommended construct reliability thresholds (Hair *et al*., 2017), which indicate a high internal consistency. The Average Variance Extracted (AVE) assesses convergent validity with a minimum acceptable value of 0.50 (Galindo-Martín *et al*., 2018). The AVE ranged from 0.625 to 1 (Table 4). The convergent validity of the model is good because the AVE is exceeding 0,5 (AVE Threshold) (Fornell and Larcker, 1981). All the factor loadings are exceeding 0.5 (bold values in Table 5), thus meeting convergent validity requirements (Al-Hajri *et al*., 2018).

Discriminant validity is demonstrated by evidence that constructs should not be highly related to each other, variables should relate more strongly to their factor than to another factor (Hubley, 2014). Table 5 shows that indicators are highly related to their constructs than any other constructs, thus indicating discriminant validity (Fornell and Larcker, 1981). Discriminant validity is also assessed using the construct variable correlation matrix (Table 6). The square root of the AVE (bold values in Table 6) of each construct exceeds the correlation of the construct with any other constructs in the model, which demonstrated discriminant validity (Fornell and Larcker, 1981).

SEM Model Results Analysis

To test the research hypotheses, the path analysis was applied to the SEM model. Table 7 illustrates the total effects between latent variables and Figure 3 shows the result of the path analysis. Figure 3 shows the total effects between latent variables and illustrates the influence of indicators on their latent variables. For example the influence of BSP indicator (0.955) on IT governance and digital transformation strategy is greater than ITB indicator influence (0.850), because the definition of the strategic vision impacts the definition of the other strategy blocks.

Table 7: Total effects between latent variables

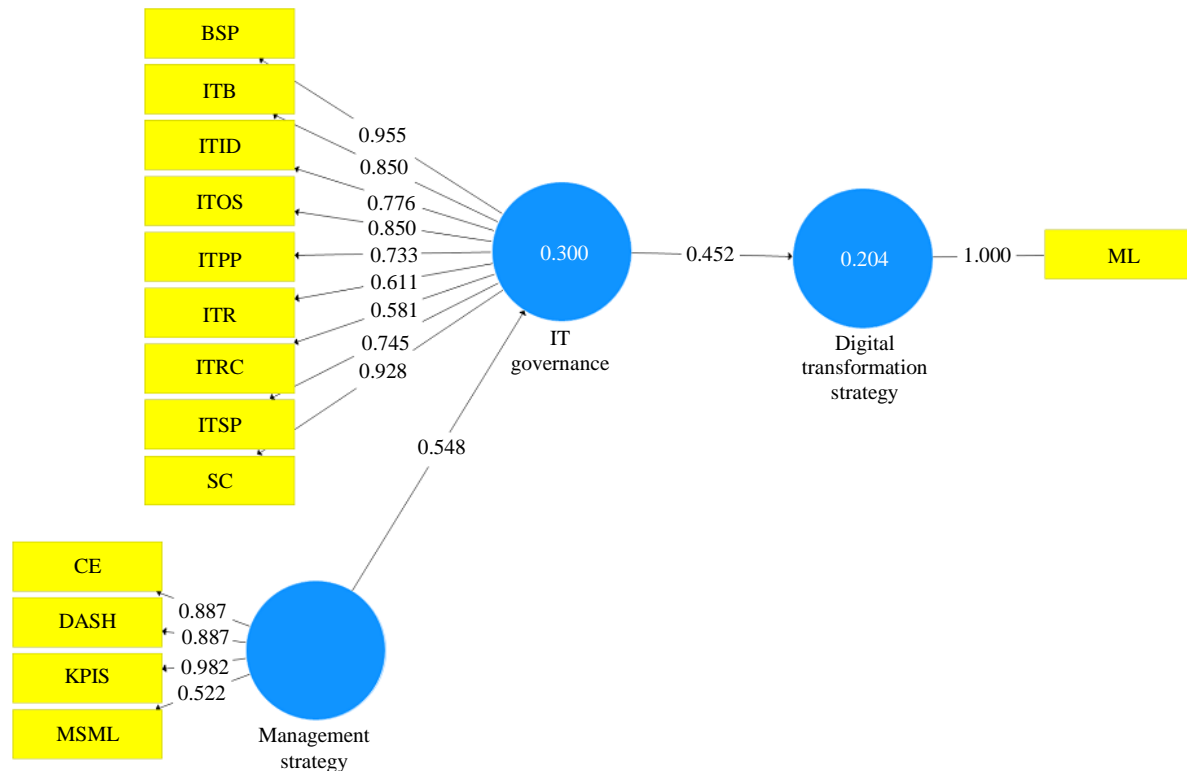|	Digital Transformation Strategy	IT Governance	Management Strategy
Digital Transformation Strategy			
IT Governance	0.452		
Management Strategy	0.247	0.548	

Fig. 3: SEM model

By looking at Fig. 3 and Table 7 we can make the following observations:

- The model illustrates that IT Governance has a strong influence on Digital Transformation (0.452).
- All IT Governance elements have a strong impact on Digital Transformation (The cross-loading measurement between IT Governance and its indicators are ranging from 0.581 to 0.955).
- Management Strategy of IT Governance elements has a strong effect on IT Governance (0.548) and has an important influence on the Digital Transformation (0.548*0452 = 247) in this model.
- According to the analysis of the SEM model, IT Governance and Strategic Management drive digital transformation strategy. Based on this result, it has been deduced that IT Governance indicators represent fundamental components of the digital strategy
- The following building blocks: Business Strategic Planning, IT Strategic Planning, IT Reporting, IT Budgeting, IT Investment Decisions, IT Organizational Structure, Steering committee, IT Prioritization Process and IT Reaction Capacity

(Korachi and Bounabat 2019c) have a strong impact on the digital transformation strategy.

In addition to the digital strategy building blocks presented in Fig. 3 and Table 2, the following new concepts will be added to the proposed digital strategy approach:

- **Strategic Awareness**: Definition of key planning issues, determination of planning objectives and the planning teams (Kamariotou and Kitsios, 2018)
- **Digital Strategy Phases** and **Digital Strategy Implementation** (Chanias *et al*., 2018): Based on these two new concepts and the literature analysis, it has been concluded that the common phases of a digital strategy are Digital Strategy Formulation, Digital Transformation Implementation and Digital Transformation Management (Fig. 4).

Figure 4 presents the digital transformation cycle and phases. This cycle allows continual improvement of the digital transformation strategy. Figure 5 and Figure 6 present the proposed Digital transformation strategy approach and its building blocks and processes.
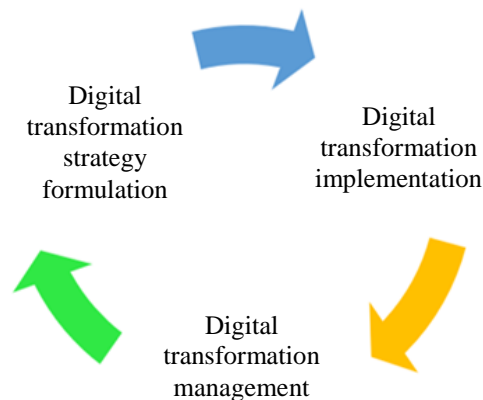
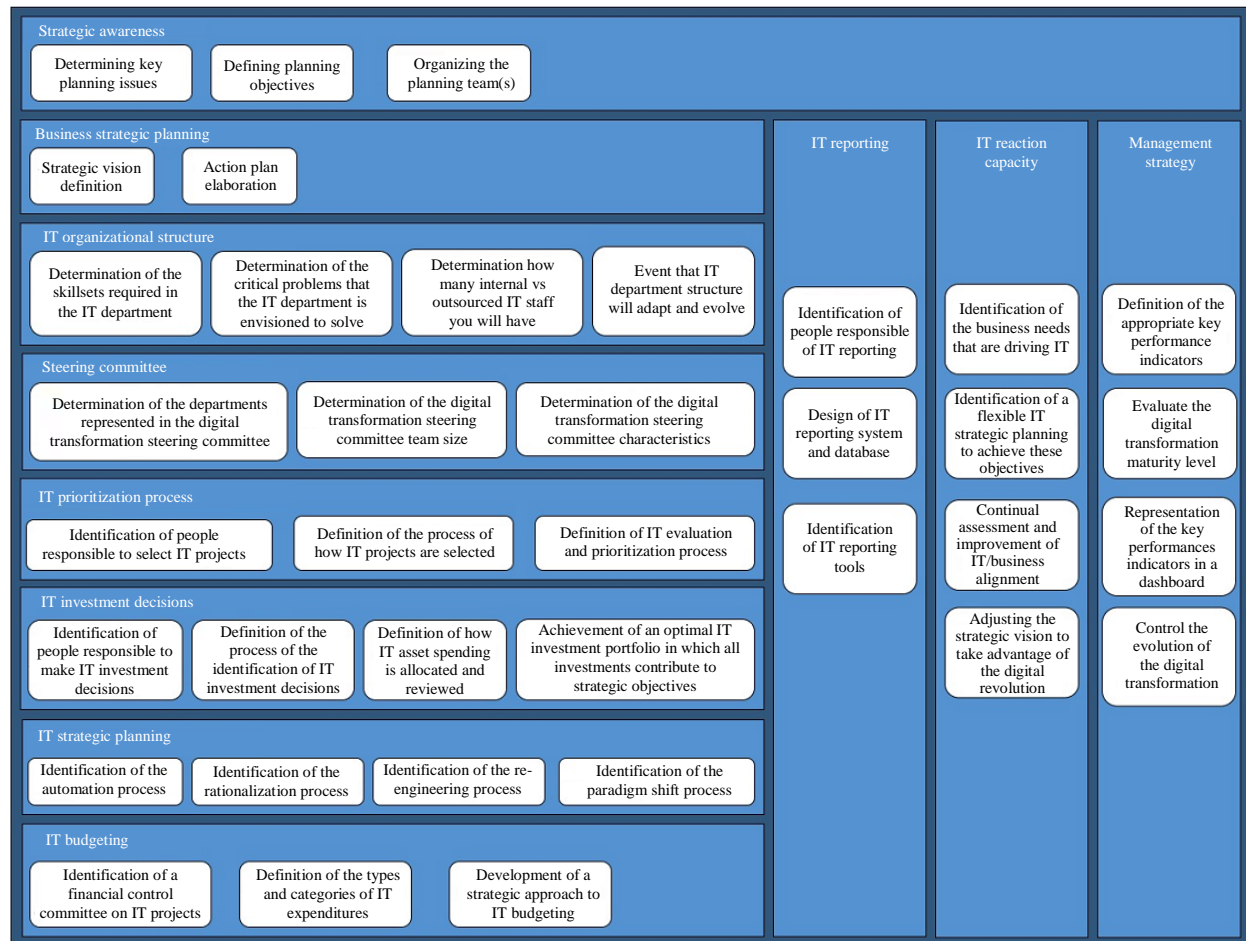**Fig. 4:** Digital transformation phases
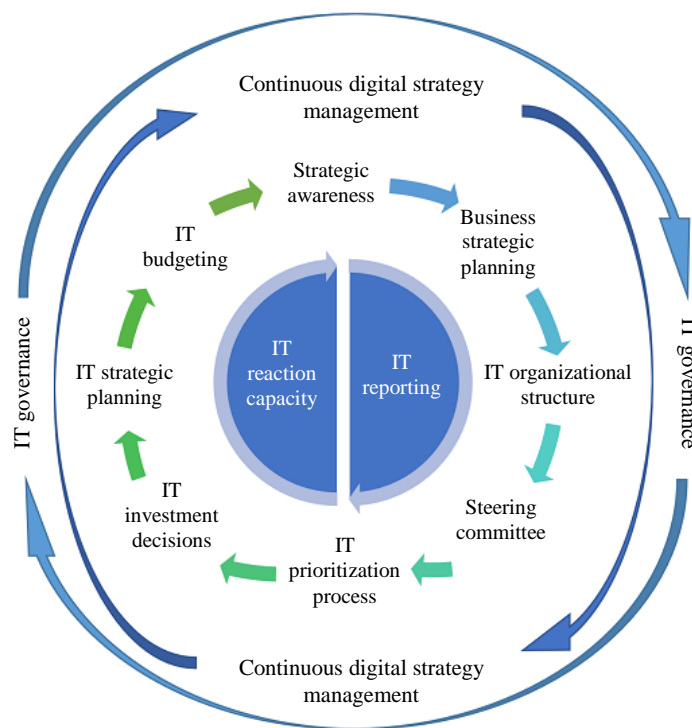
Fig. 5: Digital transformation strategy approach

According to the analysis of the literature and the SEM model, the common essential elements of digital transformation strategy are Strategic Awareness, Business Strategic Planning, IT Organizational Structure, Steering committee, IT Prioritization Process, IT Investment Decisions, IT Strategic Planning, IT Budgeting, IT Reporting, IT Reaction Capacity and Management Strategy. These elements are structured and presented in Fig. 5 as cycle. The point of start of this cycle is the strategic awareness. Organizations should start their digital transformation journey by the definition of key planning issues, determination of planning objectives and the identification planning teams.

Figure 6 illustrates more details about the proposed digital strategy approach. It shows the principal process of each block. These details can help for indicating and explaining to leaders and managers how implementing the identified digital strategy building blocks within their organizations to formulate a holistic digital transformation strategy. Further research should identify more details and common components that can be ascribed to the principal building blocks.

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Fig. 6: Digital transformation strategy building blocks

Based on the literature review and SEM model analysis, the present research proposes the following digital strategy definition:

The digital transformation strategy is a set of processes, activities, goals and metrics that should be attentive to the main principles of IT governance, to set up and evolve the structures that will be able to steer the digital transformation activities within the framework of the organization's vision and strategy.

Discussion

Several works address digital strategies. They identify and discuss their concerns and roadmaps. However, they do not address an integrative digital transformation approach. This work analyzes existing digital strategies and takes advantage of their differences, weaknesses and strengths to build the proposed general digital transformation approach. It proposes a clear digital transformation strategy definition and a holistic digital transformation strategy framework. The current study outcomes aim to reduce the ambiguity regarding digital transformation strategy definitions and approaches and to provide organizations with a standard digital transformation framework that can be instantiated by managers to build a digital strategy approach specific to the studied context.

Conclusion

This paper proposes a digital transformation strategy definition and a standard digital transformation approach. The proposed approach is a general holistic approach for leading the digital transformation strategy formulation within organizations and reducing the ambiguity and misunderstanding regarding digital transformation strategies.

To demonstrate findings, a Structural Equation Modeling (SEM) analysis was adopted. The analysis of

the SEM model has identified two results. First, IT Governance and Management Strategy drive digital transformation. Second, the digital transformation strategy common blocks are Strategic Awareness, Business Strategic Planning, IT Organizational Structure, Steering committee, IT Prioritization Process, IT Investment Decisions, IT Strategic Planning, IT Budgeting, IT Reporting, IT Reaction Capacity and Management Strategy.

This research is limited by the number of analyzed strategies. Further research can address more strategies to strongly confirm the proposed hypotheses and to see if they will find new common elements of digital strategies. Future works should identify and concretize common elements and aspects that can be ascribed to the proposed digital strategy building blocks and their processes.

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Author's Contributions

Zineb Korachi: She proposed the approach. She designed the research plan, organized the study and wrote the manuscript.

Bouchaib Bounabat: He organized the study. He coordinated and validated the research.

Ethics

The authors confirm that this manuscript has no ethical issues involved.

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