DIGITAL TRANSFORMATION:

THE INFLUENCE OF CRITICAL SUCCESS FACTORS

ON THE MODERN WORKING ENVIRONMENT

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DECLARATION OF ORIGINALITY

I, Övül Elest Gün, certify that

- I am the sole author of this thesis and that I have fully acknowledged and documented in my thesis all sources of ideas and words, including digital resources, which have been produced or published by another person or institution;
- this thesis contains no material that has been submitted or accepted for a degree or diploma in any other educational institution;
- this is a true copy of the thesis approved by my advisor and thesis committee at Boğaziçi University, including final revisions required by them.

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Date June 24, 2019

ABSTRACT

Digital Transformation:

The Influence of Critical Success Factors on the Modern Working Environment

Digital transformation became a worldwide known terminology as a result of rising importance and constant improvement of digital technologies, leading to higher attention of researchers and business professionals. Various aspects of digital transformation are observed and analyzed such as cause and effect, the way of its appearance or its meaning for the economy. Organizational perspective of digital transformation is analyzed in this study, together with its relevance for business and human capital. Main objective of this study is to assess the critical success factors of digital transformation, and observe their effect leading to a shift on business and human capital in the organizations, as well as with the organizational growth performance. The observation of the effects of business process practices and intrapreneurship towards digital transformation has not yet been done in detail. Therefore, a new theoretical framework is constructed based on related literature review and qualitative interviews. The framework is validated by using collected quantitative data from working professionals. Constructed hypotheses for seven constructs are analyzed using structural equation modelling. Results of the study show that innovation activities and digital transformation driven strategy are positively related to the change on business process practices and the intrapreneurship initiation. It is also concluded that organizational growth is positively affected by changes on business process practices.

ÖZET

Dijital Dönüşüm:

Kritik Başarı Faktörlerinin Modern Çalışma Alanları Üzerine Etkisi

Dijital dönüşüm, dijital teknolojilerin yükselen önemi ve sürekli gelişimiyle birlikte, araştırmacıların ve iş profesyonellerinin de bu alanda dikkatlerinin artmasına yol açarak dünya çapında bilinen bir terminoloji haline geldi. Sebep ve sonuçları, oluşma şekli, veva ekonomi için anlamı gibi çeşitli yönleriyle dijital dönüşüm, günümüzde sıkça gözlemlenen ve araştırılan bir konudur. Dijital dönüşümün kurumsal perspektifi bu çalışmada, işletme ve insan sermayesi ile olan ilgisi ile birlikte incelenmiştir. Bu çalışmanın temel amacı, dijital dönüşümün kritik başarı faktörlerini değerlendirmek ve organizasyonel büyüme performansının yanı sıra kurumlarda işletme ve insan sermayesi üzerinde bir kaymaya yol açan etkilerini gözlemlemektir. İş süreci uygulamalarının ve kurum içi girisimciliğin dijital dönüşüm üzerindeki etkilerinin birlikte gözlemlenmesi henüz literetürde detaylı olarak çalışılmadığından, ilgili literatür taraması ve nitel görüşmelere dayanarak yeni bir teorik çerçeve oluşturulmustur. Çerçeve, kurum çalışanlarından toplanan nicel veriler kullanılarak doğrulanmıştır. Belirlenen yedi yapı arasındaki ilişki, çalışma için özel olarak hazırlanan anketten toplanan verinin yapısal eşitlik modellemesi kullanılarak analiz edilmesiyle değerlendirilmiştir. Çalışmanın sonuçları, inovasyon faaliyetlerinin ve dijital dönüşüm odaklı stratejinin, iş süreci uygulamalarındaki değişikliklerle ve kurum içi girişimcilik başlatımıyla pozitif ilişkili olduğunu göstermektedir. Ayrıca, kurumsal büyümenin iş süreci uygulamalarındaki değişikliklerden olumlu yönde etkilendiği sonucuna varılmıştır.

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ABBREVIATIONS

AGFI	Adjusted Goodness of Fit Index
AS	Assets
AVE	Average Variance Extracted
B2B	Business to Business
B2C	Business to Consumer
BMI	Business Model Innovation
BPP	Business Process Practices
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Composite Reliability
DF	Degrees of Freedom
DX	Digital Transformation Economy
EM	Expectation Maximization
ETS	Educational Testing Services
EFA	Exploratory Factor Analysis
ERP	Enterprise Resource Planning
GFI	Goodness of Fit Index
GOF	Goodness of Fit
IA	Innovation Activities
ICT	Information Communication Technologies
IDG	International Data Group
INTRA	Initiation of Intrapreneurship
IT	Information Technologies

IoT	Internet of Things
KMO	Kaiser – Meyer – Olkin Test
MCAR	Missing Completely at Random
MSV	Measured Shared Variance
NFI	Normed Fit Index
NNFI	Non-normed Fit Index
OG	Organization Growth
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
ST	Strategy
TLI	Tucker Lewis Indexs
WO	Workforce Characteristics

CHAPTER 1

INTRODUCTION

New technologies enable people to rethink their concepts towards everyday processes. Innovations, for example performed in information and communication sector, drive people to revise their demands due to changing focus in the business world. Kandiah and Gossain (1998) refer to the emergence of demand-oriented customer scenarios in information economy. They argue that empowering customer demand focus leads to change of dynamics in the marketplace. This situation directs each relevant organization to adapt to these new customer demands, by changing their current way of conducting business. Adaptation could vary such as producing new goods and services, creating new channels to reach the customers, or improving the current communication channels to meet new customer demands. Organizations develop new internal structures and business processes to satisfy the new needs of the customers, as well as to realize growth.

Organizations seek new opportunities to get their share from the changing dynamics of the global market economy. The global economy is more and more shaping and evolving according to digitalization concepts, since it represents a systematic transformation that will end in new structures and new approaches of operations (Kobrin, 1998). Therefore, creating or shifting to digital business processes is vital for organizations, to monetize their existing or new products and offerings in the new economy. The whole concept of changing business processes from analog goods and services to interconnected and digital approaches can be considered as digital transformation for all the organizations from various industries.

Empowering cloud, mobile, social and big data technologies on top of typical computers forms the ground of the transformation, and all these solutions are built around a layer called third platform (Gens, 2013). According to the white paper published by Gens (2016), worldwide Information Technology (IT) industry predictions primarily focus on third platform digital transformation, so called Digital Transformation Economy (DX). That means technology-centric transformation are changing business and society. In 2019, worldwide expenditures on DX will reach $2.1 trillion, performing at a compound annual growth rate of 16.8%. Additionally, 40% of Internet of Things (IoT) created data will be stored, processed, and analyzed by organizations. Even though this is the case, many industries are still acting cautiously to accelerate transforming their business models via these digital platforms due to probable difficulties they may face during adaptation process (Labaye and Remes, 2015).

According to a research conducted by International Data Group (IDG) in 2018, observing the current state of digital business transformation, 52% of the respondents answered that they think of digital business as empowering employee productivity via mobile tools, data access, and artificial intelligence-assisted processes (IDG, 2018). Further 49% answered that digital transformation has the capability to reach a higher business performance through availability and visibility of data. Based on the respondents' point of view towards digital business processes, the researcher also claims that 37% of the organizations already started their digital transformation journey and executing related strategies internally, while 7% state that integration of digital business has already been performed organization wide. About 45% of IT and business professionals claim that their organizations are in their pre-digital phase yet; either gathering information or developing the formula of

digitalization to apply it in the overall organization. It is necessary for organizations to understand what success factors are critical towards transforming their business first, before they define their strategy accordingly (Matt, Hess and Benlian, 2015).

This research is directed by asking several questions before proceeding to investigate the relevant literature.

- What a digital transformation is for the organizations?
- What are the driving motives of organizations to perform digital transformation?
- Which factors are considered to be critical to successfully conduct digital transformation in the organizations?
- Does digital transformation affect organization growth?

This study concerns about finding theoretically and practically supported answers for the research questions aforementioned. The aim of this study is to explain and evaluate the conditions in which the main critical success factors are leading to a successful digital transformation, while realizing organizational growth via assessing sales and profit performance. Critical success factors identified by the literature review and semi structured interviews are

- assets (IT investments),
- strategy,
- innovation activities and
- work-force characteristics, all together leading to an impact on the internal dynamics such as
- change of business process practices and
- initiation of intrapreneurship in an organization, and ultimately affecting
- organization growth.

A questionnaire is designed to derive relevant data of digitally transformed organizations and their employees, later structural equation modelling (SEM) is used to test the constructed hypotheses.

Originality of this study is to analyze the transformational change by observing its relevance to both business and human capital in the organizations, as well as designing a new appropriate theoretical framework around this scope.

The study is organized as five chapters. Chapter 1 is the introduction of the study, followed by Chapter 2, covering the comprehensive literature review about relevant subjects such as digital transformation, motives of the organizations to perform digital transformation, relevance of transformational change with business and human capital, and internal factors affecting digital transformation in working environments. Chapter 3 presents the new theoretical framework and the study hypotheses, also including the research methodology, together with the details of the study design. Chapter 4 explains the descriptive results of the conducted research, and outputs of Structural Equation Modelling (SEM) in detail. Ultimately, Chapter 5 presents the conclusion and a sophisticated discussion of the study.

CHAPTER 2

REVIEW OF LITERATURE

This chapter provides the details of digital transformation concept such as its various definitions, changes in organizations caused by digital transformation, their relevance to business and human capital perspectives, and the cause and effects of digital transformation on business performance.

2.1 Conceptual explanation of digital transformation

Digital transformation became a popular term in information systems and technologies literature since the innovation takes place in every-day life. According to a Google trend analysis, its importance has grown over the past five years. Hit ratio of the term was about 5% in 2014, while it reached its peak (100%) as of May 2019, and it had a constant climbing up behavior in years between (Google Trend, 2019).

It first emerged in the beginning of the 2000s, when Patel and McCarthy (2000) published a book featuring digital transformation around e-business concept where they discussed the adoption of e-business in Business-to-Business (B2B) and Business-to-Consumer (B2C) companies. They discussed the perception, application, and adoption challenge of e-business under digital transformation frame and gave a general guide to business owners, who seek efficient ways to pursue e-business within their organizations. Educational Testing Services (ETS) assembled an international panel and examined the growing influence of Information and Communication Technologies (ICT) that are existing and appearing (International ICT Literacy Panel, 2002). The focus of the ETS panel was to discuss what types of

business practices are necessary to become ICT literates. ETS developed a framework for ICT literacy under the scope of digital transformation. However, they did not specify the definition of digital transformation yet. Zhu et al. (2006) exemplified the concept of digital transformation, while analyzing the innovation diffusion of technology-enabled companies, particularly e-business firms. His research is shaped to understand the adoption consequences of digital transformation. Tilson et al. (2010) built a case for the central role of digital bases in shaping the future adoption of information technologies as a research commentary. They additionally regarded digitalization as the socio-technical process of applying digitalizing methods to broader social and organizational circumstances, which contribute to infrastructure of digital technologies. Digitalization efforts combined throughout the organization are paving a way for digital transformation in their context (Gimpel et al., 2015).

Westerman et al. (2014) defined digital transformation as the use of technology to thoroughly improve performance or access of organizations and emphasized the nine elements of redefining organizations' business processes such as customer understanding, top-line growth, customer touch-points, process digitalization, worker enablement, performance management, digitally-modified businesses, new digital businesses and digital globalization. Similarly, other researchers associated digital transformation as the use of new digital technologies such as embedded services, analytics, social media and mobile solutions; to enable major business developments in organizations that are ranging from creating new business models, enhancing customer understanding to streamlining operations (Fitzgerald et al., 2014).

Cherry (2016) approached digital transformation as the change of work in the millennium, denoting that shifting from solid to fluid workplaces (emerged as mobile working opportunities are enabled for workers, that is the availability of changing workspaces), and accessible bounds between the organizations enabled a digital model to emerge and reach a high value on the intellectual professionals capital.

Hinings, Gegenhuber, and Greenwood (2018) stated a comprehensive definition of digital transformation as it is composed of various digital innovations which are capable of modifying, threatening, substituting or complementing current rules of the game that are involved in organizations, areas, industries or ecosystems. Variations of such digital innovations may include providing actors, frameworks, notions, processes, and values. Organizations stimulate to revamp the internal dynamics such as actors, structures, values and practices through the transformation. Fast growing and radical changes, which are the essentials of digital innovation and transformation, will help organizations to carry out the transformation phase even further.

2.2 Transformational change and business relevance

Benner and Tushman (2015) referred to the impact of the innovation as the following (as cited in Nambisan et al., 2017).

> Because of the shift in the locus of innovation and because some of our core organizing axioms may be challenged or fundamentally changed by the digital revolution, the nature of innovation and organizational scholarship may be at a transition point (p. 2).

They also stated that information systems researchers found a great opportunity to conduct their studies in the scope of digital innovation. While Nambisan et al. (2017) used to deal with the digitalized processes' impacts within the organizations, recent studies (Bresnahan and Greenstein, 2014; Lyytinen et al., 2016; Nambisan, 2013;

Yoo et al., 2010; Sandhu and Gunasekaran, 2004) focus on the possible dilemmas that are created by digitalization in the organization, while developing, implementing and using digital innovation.

Business model improvements have been broadly discussed in scientific communities since the beginning of the 21st century (Chesbrough, 2010; Foss and Saebi, 2017; Bouwman, 2018). One new concept is the Business Model Innovation (BMI) as Wirtz et al. (2016) classified the concept of BMI under three research streams: corporate strategy, innovation and technology management, and entrepreneurship studied in the past decade. He did not only state the development of the concept in related fields, but also allocated a comprehensive research agenda for the BMI state. Design and the development of BMI took the lead by 24.8% among other research areas such as its definition and types, drivers and barriers (15.4%), frameworks (20.1%), implementation and operation (16.8%), and performance and controlling (9.4%). Thus, design and improvement of BMI are considered to be one of the important steps while performing a transitional change in the organizations.

Another powerful and comprehensive research on BMI was carried out by scholars is fifteen years of research agenda, which concentrates on a systematic review on BMI literature, criticizing the research efforts and provide suggestions for future research (Foss and Saebi, 2017). They concluded that innovation on business models and business models themselves are outstanding subjects in macro-management discussions, and are directly related to strategy field, but not have weak relationships towards any other management model. Research model proposed for scholars is constituted as follows; Antecedents being external (change in competition, technologies, network position, stakeholder demands) and internal (dynamic capabilities, change in strategy) are shaping BMI as in its novelty and

scope. Moderators, who are having an effect on the relation of antecedents and BMI, and effective on the outcomes, were stated as macro, firm, and micro-level variables. Macro-level variables were exemplified as competition law, regulations, informal social institutions, whereas firm-level variables covered organizational values, leadership features, power distribution, design, culture, and top management team. Micro-level variables comprised of managerial acknowledge loss-antipathy, open-mindedness, and adversity of changes. All these have direct outcomes in an organization, such as the increase of financial performance, cost elimination and the level of innovation.

Bouwman et al. (2018) investigated the impact of digitalization on business model improvements, particularly in small-medium enterprises. The main goal of the researchers was to observe how digital technologies, e.g. social media and big data specific, have forced small-medium enterprises to revise their existing business models, followed by the motivation of seeking the essential mediating factors of digital technologies on the level of innovation and performance of the companies. The proposed framework consisted of innovation activity, strategy, competitive intensity, and technology turbulence having a direct positive effect on business model experimentation. It was then followed by the hypothesis that experimentation of the business models has a direct positive effect on business model practices in the organization; also stating its positive effect on innovation and overall performance. The main contribution of the research study was a better understanding of BMI impact in the organizations under the implementation of social media and big data technologies.

Some other researchers discuss the effects of the transformation from both challenges and advantages view. Dealing with challenges such as reconstructing

business processes, organizational structure, or culture, as well as integrating technological solutions expeditiously and firmly are substantial activities in the organizations (Denner et al., 2018; Ashurst et al., 2008; Markus and Benjamin, 1997).

Studies also paid attention to business process improvement, which is another discussed terminology of the digital transformation in the literature (BarNir, 2013). Researchers referred that the main purpose of business process improvement is to make internal processes, which are procedures, behaviors, and related activities, more efficient, effective and adaptable (Bhatt, 2000; Harrington, 1991). Bhatt (2000) proposed a framework to observe the effect of data integration and communications network integration on business process improvement initiatives and customer focus. His moderating variables were the industry type, information intensity of the industry and the period since the initiation of the current program of business process improvement in the division. Results of his study showed that the essential impacts of data integration and communication network integration on process improvements, initiatives, and customer centralization were found to be significant, whereas moderating variables stated above did not have a significant impact. Thus, a high level of technological infrastructure is seen to be crucial for a successful business process improvement.

Reichstein et al. (2018) conducted one of the most recent studies regarding the digitalization on businesses. Six main drivers on the potential value of digitalization were determined in their conceptual framework such as efficiency, innovation, data security, mobility, new business models and human involvement. Their results showed that data security does not have a significant effect on the potential value of digitization, whereas efficiency significantly increases with

digitalization. New business models were found to be created through digitalization, following that the mobility is enabled by using digital technologies such as cloud and mobile computing. Researchers argued that the overall conclusions imply that digitalization technologies need to be integrated on business processes. Recent research activities show that BMI and business process improvements are of high relevance within the scope of digital transformation in an organization.

2.3 Transformational change and human-capital relevance

The human capital of organizations faces a transformative change via innovational and digital technologies implemented in the industries. Entrepreneurship was a well-known practice among professionals who work outside of an organization (Kent, Sexton & Vesper, 1982; Evans and Leighton, 1990; Timmons and Spinelli, 1994). Churchill (1992) described the concept of entrepreneurial activity with a strong relation to the innovational activities as follows.

> Increased consensus has been attained on the concept of entrepreneurship as the process of uncovering and developing an opportunity to create value through innovation and seizing that opportunity without regard to either resources or the location of the entrepreneur—in a new or existing company.

Availability of improved technological solutions for everyone enabled entrepreneurs to build their own ventures. Innovative products and services created by entrepreneurs, and earnings generated, paved a way for the employees inside organizations to implement new innovative ways of thinking in their working environment. The industry wide change is leading to new scientific and practical approaches, such as intrapreneurship. Since the beginning of the 1980s, researchers and also practitioners kept their interest in the intrapreneurship approach (Antoncic and Hisrich, 2001; Benitez-Amado et. al., 2010). They defined intrapreneurship as a process that is performed inside an existing organization, which generates new

business endeavors, as well as other innovative actions and directions such as improvement of new products, technologies, management methods, strategies, and competitive positioning. They also mentioned four aspects of intrapreneurship, namely, innovativeness, self-renewal, proactiveness, and new business venturing.

Covin and Slevin (1991) stated corporate entrepreneurship as an element of strategic positioning that an organization represents with its risk-taking tendency, competitive aggressiveness, proactive actions, and constant and comprehensive product innovation abilities. Knight (1997) measured the company entrepreneurial orientation and cross-cultural reliability in his research. He found out that the organizations innovativeness is fed by the improvement and development of goods and services, as well as the methods and technologies in production. The self-renewal dimension was addressed by the scholars as the transformational changes such as renewal of main ideas built through the organizations (Guth and Ginsberg, 1990; Zahra, 1991). Zahra (1993) referred renewal of the ideas to the business approach, reorganizing functions and divisions, and overall changes implemented led by innovation in the companies.

The economists have recognized intrapreneurial practices as the triggering power for greater economic activity, stating that it is needed to create capital growth and new employment opportunities (Antoncic and Hisrich, 2003).

Intrapreneurship is considered as “a method of using the entrepreneurial spirit in large organizations” (Pinchot, 1985) by which employees take their own initiative in creating renewal and innovation for their company (Åmo and Kolvereid, 2005; Antoncic and Hisrich, 2001).

Antoncic and Hisrich (2003) later proposed additional variables to the main characteristics of intrapreneurship argued by the previous scholars and classified all

into eight dimensions such as new ventures, new businesses, product/service innovativeness, self-renewal, risk taking, proactiveness, and competitive aggressiveness. They stated that the managers can achieve compelling improvements in performance in their organizations by analyzing and promoting these dimensions.

DeVilliers and Foba (2007) approached the intrapreneurship concept by regarding the performance management model applied in the organizations. Performance management emerged as a continuous process to measure overall performance of an organization by identifying several type of performance metrics, leading to accomplish strategic objectives of the organization (Kagioglou et al., 2001; Berkeley, 2010). Referring to the proposed model of Antoncic and Hisrich (2003), De Villiers and Foba (2007) additionally identified enablers that create the intrapreneurship behavior in the organizations such as vision, mission, objectives, strategy, culture, structure, risk-taking, teamwork, autonomy, employee involvement, resources, processes, competitiveness, reward systems, innovativeness, proactiveness, and learning. The key result of the study was the creation of a scorecard to manage intrapreneurship within the organizations.

De Villiers and Foba (2007) mentioned a pearl of common wisdom such that digitalization caused by technological advances led to globalization in several industries. One important consequence of the globalization is that the organizations are challenged with the existing resources'-including human capital- constraints as the need for innovation, quality, and competencies are augmented for competitive advantage and to meet the customer demand. Researchers believe that it will lead to a change in the work method of professionals towards more feasible and innovative ways.

Another study regarding organizational performance and corporate entrepreneurship was conducted by Mokaya (2012) such that intrapreneurship is shaped by external, organizational, and individual characteristics, together leading to organizational performance that is measured by growth and profitability. His research concluded that the intrapreneurship practice brings in higher performance in the organizations that are engaged in, and related activities offer companies higher growth and profitability than the organizations that do not perform as such.

2.4 Effects of digital transformation on business performance

Internal dynamics in an organization include individual combinations of business models, processes, professionals, and resources (Kotarba, 2017). Transformational change on any of these will eventually affect the organizations' performance. To measure the performance of an organization, several scientific approaches exist.

There is an assumption such that the overall performance of the organizations increases as the business processes are digitalized; and it is also equally important for survival and growth (Ashurst et al., 2008; Kotarba, 2017). For measuring the performance of the digitalization, Kotarba (2017) used six dimensions and divided primary metrics accordingly. Those six dimensions are digital spending, digital asset stock, digital transactions, the interaction between organizations, customers and suppliers, and internal - external business processes. All together, these dimensions constitute the primary metrics of the industrial digitalization.

McKinsey Company (2015) considered the ICT sector as the most digitalized sector and indicated that business spending on software, computers and telecom equipment, as well as the stock of the ICT assets, are the main assessors of digitalization. Rai et al. (1997) stated that both IT capital stock and budgets represent combined spending on IT. He later claimed that IT capital, budget, client/server

expenditure, information systems personnel expenditure, hardware expenditure, software expenditure, and telecom expenditure have an effect on organization output as value and sales. He concluded that they all increase labor productivity, except software and telecom expenditure.

Emerging new technologies have made great impacts on organizational capabilities over the past few years (Rammler, 2017). However, using technological assets requires rapid organizational and operational changes in the organization while the IT investments still going on (Brynjolfsson and Hitt, 2003). Digital investments constitute the primary focus in the change of business process practices according to the research. Data analytics solutions, smart mobile devices, and collaboration platforms are considered as existing digital resources in the organizations. Westerman and Bonnet (2015) declared that these solutions enable to wire all processes within an organization. Hence, a transformational action performed within organizations, leading to successful organization growth.

Large organizations are encouraged to invest in third platform services (e.g. cloud solutions, big data analytics, mobility, and social business platforms) in order to meet the rapidly changing customer demands (Gens 2013). The author exemplified organizations in telecommunication sector, stating that customized package offerings enabled by the use of third platform services help to retain customers, as well as increase turnover.

Westerman and Bonnet (2015) studied critical success factors influencing business processes, as they referred to informatization concept, which is closely linked to the process automation in the industries. Together with the new analytical tools, the use of information technologies for the aim of helping or replacing human resources in the performance of business processes seen as the digitalization

strategies within organizations. They also stated that optimization and standardization of business processes are considered important changes through digital transformation in the organizations, claiming that digital technology helps to utilize standardization of processes, leading to increased agility. For instance, implementing an Enterprise Resource Planning (ERP) system for internal operational business processes enables standardization. It helps organizations to eliminate high maintenance costs, to lower processing time, also to prevent disorganized database infrastructure that may be caused by decentralized processes. All these lead to an increase in the organization performance.

Innovational activities such as marketing, product, and organizational innovations were assumed to reshape todays organizations in the context of digital transformation (Loebbecke and Picot, 2015). Facilitating digitalization and big data analytics helps organizations to innovate their business models and management approaches. Connectivity of different systems via IoT, cloud computing and other digital solutions enable organizations to find new ways of conducting their business (Kotarba, 2017). According to Bhatt (2000), several studies claim that as companies begin to be familiar with data integration methodologies, businesses will do a better match between the business and information systems planning. In this context, enabling connectivity of different systems via digital solutions are considered as organizational innovations performed in the companies. Creating and commercializing innovative products that results in better quality in comparison to the existing ones on the market are considered as product innovations as Iansiti (1995) suggested. Focus of today is on connectivity, data, related software, and platforms (McKinsey Company, 2015). Growing effect of these formations is bigger and faster than the typical hardware solutions due to their digital nature. Combining

all into the form of new products and services created a wholesome innovation cycle. Entering new businesses in new markets, finding new market niches, offering products and services with innovative marketing techniques are considered as marketing innovations (Antoncic, 2007). These techniques are often associated with commercializing the high-tech products in the market. As Mohr et al. (2010) suggested, there is a positive correlation between a firm's market orientation and its performance. They argued that organizations in high-tech industry need to be superior not only at creating new innovations, but also at commercializing these innovations. Millot (2009) listed multiple types of marketing innovations that may be performed on the product package or design, taste or aspect of the product, placement or selling outlets, and lastly, product pricing or promotion. Changes in these methods aim to reach the new customers, as well as improving the overall sales in the organization.

Trkman (2010) presented critical success factors affecting business processes inside the organizations under three main classifications, namely, contingency theory, dynamic capabilities, and task-technology fit theory. Contingency theory covers strategic alignment, level of IT investment, performance management, and the level of employee's specialization; whereas dynamic capabilities include organizational changes, assignment of process owners, implementation of proposed changes, and use of a continuous improvement system. Task-technology fit theory contains standardization of processes, informatization, automation, training and empowerment of employees. His findings supported that the application of these factors has a positive effect on the overall organization performance.

CHAPTER 3

METHODOLOGY

The main approach of this study is to measure the effects and level of digital transformation in comparison to the organizational growth. As stated previously in Chapter 2, one implication of digital transformation is that the organizations who digitally transform their way of conducting business, and initiate transformational changes for their human capital, will have more turnover and revenue. Distinguishing aspect of this study is to create and test a new holistic theoretical framework, shaped around the actions performed within an organization for the purpose of digital transformation.

This chapter provides all the details about the methodology of the study. It starts with the component details of the model, followed by the drawn theoretical framework and formulated hypotheses. Research methodology and study design include the questionnaire preparation, the structure of the questionnaire, the sample and data collection, and the explanation of structural equation modelling.

3.1 Content of the theoretical framework

In this section, details about the constructs and related sub-items will be described and validated by the results of the literature review in Chapter 2 and qualitative interviews. IT professionals (qualitative interviews) assessed each of the constructs in the theoretical framework, presented in Section 3.2, according to their content to see if they are applicable in real world. Six professionals are asked the following questions:

- Could you please describe your roles and responsibilities in the organization?
- How would you describe digital transformation in your organization?
- Do you think digital transformation is performed in your organization?
- Please state your opinion for the following items as if they are related to specified critical success factors for digital transformation in your organization.
- Please state your opinion for the following constructs as if they can be considered as critical success factors for digital transformation in your organization.

The interviewed IT professionals can be characterized as following:

- Interviewee 1: Senior Data Analyst, Female, working in Digital Services department
- Interviewee 2: Senior Lead Finance Specialist, Female, working in Digital Services department
- Interviewee 3: Strategies and Analytics Manager, Male, working in Digital Services department
- Interviewee 4: Senior Technical Product Manager, Male, working in IT department
- Interviewee 5: Business Model Transformation Program Manager, Male, working in IT department
- Interviewee 6: Senior Developer, Female, working in IT department

Three people are in business departments, while the other three are working in technical departments in the organization. These experts have been well-recognized by many business professionals based on their digital transformation

experience. Starting from the beginning of the transformation, they built an extensive business roadmap for all the departments in the company, and initiated, controlled, implemented all transformation journey throughout their organization. Managerial positions of the interviewees helped to identify the main orientation and motives of the top management for digital transformation. Outcome of strategic decisions coming from these superiors are realized via experienced team members. Thus, the professionals from these different layers in the organization shed light onto digital transformation practices in a strong manner. Main result of the sophisticated literature review and qualitative interviews have been the following seven constructs:

- assets (IT investments),
- strategy,
- innovation activities,
- work-force characteristics,
- change of business process practices,
- initiation of intrapreneurship,
- organization growth.

Relevant remarks are given in the following sub-sections.

3.1.1 Assets (IT investments)

Rai et al. (1997) argues that IT spending is depicted by IT capital stock and the budgets in the organization. These include hardware spending, as well as software and network spending, which are having an effect on organizational performance determined by its turnover. Kotarba (2017) considers assets as digital assets and classifies them under digital spending and digital asset stock. He states that the investment performed on software, hardware, and IT consulting are the performance metrics for an organization. Even though existing resources were proposed by the

literature to be part of *assets*, four out of six interview attendees guided the construct to include only investments, and thus existing resources item is omitted from regarding critical success factor.

Based on literature review and the conducted interviews, IT related investment (hardware, software, and third party investments) as *assets* have been analyzed to see if it causes any change on business process practices in the organizations, which in turn leads to an increase in organizational performance.

3.1.2 Innovation activities

According to Bouwman et al. (2018), innovation activity in an organization is defined as all the activities undertaken by an organization to add value to its products and services. Developing and marketing products that are more innovative and having superior quality, perform better sales in comparison to their competitors (Iansiti, 1995). Another factor is determined as the process innovation, which helps to achieve intrapreneurship culture in the organization, as well as improving the organizational efficiency and overall responsiveness (Damanpour and Gopalakrishnan, 2001). Based on all relevant remarks presented by the researchers, also presented in Section 2.4, innovation activities are determined to include organizational, marketing and product innovations realized by the organization. These three innovational activities are investigated as if they have any effect on business process practices change and the initiation of intrapreneurship in the organization. According to the results of semi-structured interviews, four out of six experts agreed with the main construct (innovation activities) and the relating sub-items and had no further remarks.

3.1.3 Strategy

As discussed in Section 2.3, strategy is originally designed to involve top management initiatives, employee involvement in decision-making, reorganization of the structure, low-cost orientation and competitive strategy of the organization. Results of the interviews directed the framework to exclude low-cost orientation and competitive strategy sub-items. As competitiveness in the market is a non-predictable or changeable factor towards organizations in general, the sub-item will not be included in the theoretical framework and not considered to be a part of strategy. However, it will be asked to the respondents as part of the survey, to state the level of competitiveness.

They also argued that lowering the costs might differ according to the department; therefore, it is not a commonly applicable strategy for the overall organization.

Auer Antoncic and Antoncic (2011) emphasize the importance of employee-satisfaction driven strategies to perform a successful organizational growth. Employee involvement in decision making, decreasing the number of procedures via automating the processes, as well as standardizing business procedures are relevant sub-items to realize organization growth. Therefore, final measurement sub-items for strategy changed to employee involvement in decision-making, reorganization of the company structure, automation, and standardization of processes in overall. Top management initiatives are extracted from the model, since the statement covers all strategic orientations that the organization can direct to. The effect of this critical success factor is analyzed for both business process practices change and the initiation of intrapreneurship in the organization.

3.1.4 Workforce characteristics

Workforce characteristics assesses the personality features of the human-capital in the organizations, such as competitiveness among the employees, proactiveness, risk taking, self-confidence, and motivation as argued by the researchers, presented in Section 2.3. This factor is placed in the literature as it is motivating mainly the intrapreneurship initiation (De Villiers and Foba, 2007; Auer Antoncic and Antoncic, 2011). Hence, it did not play a part on the change of business process practices. Two out of six interviewees had a remark such that workforce can be assessed further, meaning that other human related factors can be included such as rewards and providing time availability but since they are more related to organizational activities, rather than direct workforce activities, these sub-items are not included. Four out of six interviewees had no further remarks.

3.1.5 Change on business process practices

This internal dynamic is assessed by the critical success factors explained in the previous sections. Business process practices are affected by the dynamics of the assets (IT investments), innovation activities and strategy.

Three sub-items in particular are used to observe this change. These are

- IT investment on hardware, software and third parties,
- innovations performed in product, organization or marketing technique and
- competitive orientation of the organization according to the literature review stated in Sections 2.2 and 2.3.

Interviews showed that the aforementioned sub-items shape the main theoretical framework leading to a change on business process practices.

3.1.6 Intrapreneurship initiation

Intrapreneurship initiation discussion in literature is reviewed in Section 2.3. Existence of intrapreneurship in the organization, decision-making flexibility of the employees, innovational activities performed, and structure change in the organization form the construct assessment. Top management support and characteristics of the employees were the other drivers stated in theory. Interview attendees proposed to include these in the questionnaire to get an overall perspective towards intrapreneurship, but not to use in the theoretical framework, since the characteristics of the employees are the major assessment residing in workforce characteristics, and top management support is an overall effective sub-item, and might be relevant for all constructs stated in the theoretical framework. Intrapreneurship initiation is affected by all three critical success factors mentioned in the previous sections of this chapter (innovation activities, strategy, workforce characteristics), as well as business process practices and intrapreneurship initiation are affecting the growth of the organization.

3.1.7 Organization growth

Sections 2.2, 2.3, and 2.4 present the studies that focus on the organizational changes led by digital transformation and their ultimate effect to the improvement of the organization. This improvement is assessed as the growth, which is measured on sales and profit of the organizations (Cruz-Cázares, 2013) in this thesis. Organization growth, in the scope of digital transformation, is the outcome of the two internal dynamics, change on business process practices and intrapreneurship initiation. The sales and profit are evaluated as their past, current and expected values.

3.2 Theoretical framework and the hypotheses

Figure 1 depicts the new theoretical framework, including four critical success factors and their effects on the internal dynamics in the organization when digital transformation is performed. Proposed model indicates that each critical success factor is related to one or both of the internal dynamics, which are stated as change on business process practices and the initiation of intrapreneurship. The internal dynamics both affect organization growth in sales and profit.

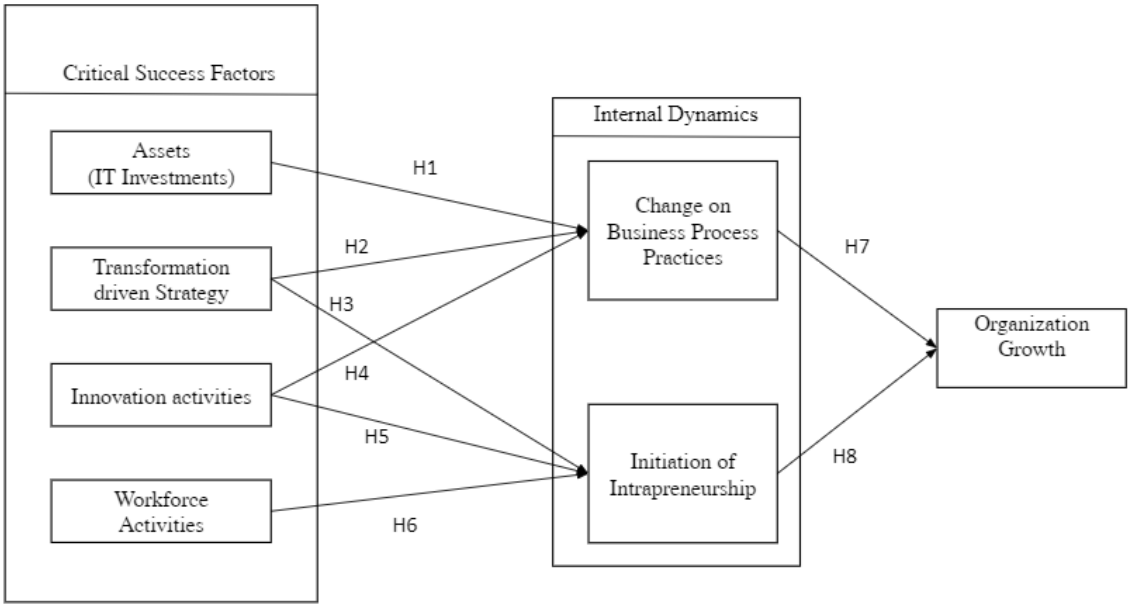

Fig. 1 Designed new theoretical framework

Hypotheses seen below are built upon the constructed theoretical framework.

Main study hypothesis:

Hypothesis 0 (H0): Organizations with a higher adaptation of critical success factors for digital transformation have a higher organization growth.

Sub-hypotheses shaped around the main study hypothesis are as follows.

Hypothesis 1 (H1): Higher assets (IT investment) has a greater effect on changing business process practices.

Hypothesis 2 (H2): Digital transformation driven strategy has a positive effect on change of business process practices.

Hypothesis 3 (H3): Digital transformation driven strategy has a positive effect to initiate intrapreneurship.

Hypothesis 4 (H4): Higher innovation activities have a positive effect on change of business process practices.

Hypothesis 5 (H5): Higher innovation activities have a positive effect to initiate Intrapreneurship.

Hypothesis 6 (H6): Positive workforce characteristics will increase the intrapreneurship initiation.

Hypothesis 7 (H7): Change on business process practices is positively related to organization growth.

Hypothesis 8 (H8): Initiation of intrapreneurship is positively related to organization growth.

3.3 Research methodology and the study design

In the previous sections, leading critical success factors for digital transformation in working environments have been assessed in detail, together with their impact on the internal dynamics and ultimately on the organization growth and new theoretical framework is drawn. This section includes the research methodology underlying the proposed model. A questionnaire is used to collect data as the quantitative method. Main goals of creating and conducting the questionnaire are

- to understand the internal dynamics and organizational effects of digital transformation,

- to examine the critical success factors leading organizations to a digital transformation and
- to measure the impact of the digital transformation by observing growth in sales and profit as the organization performance metrics.

Preparation of the questionnaire, structure of the questionnaire, sample and data collection method, and the elaboration of the structural equation modelling are presented in the following sub-sections.

3.3.1 Preparation of the questionnaire

The questionnaire is designed based on the literature review (explained in Chapter 2) and conducted qualitative interviews (explained in detail at Section 3.1). Business performance and digital transformation fields are examined in the literature; relevant scales are obtained to construct the questionnaire. Researchers implementing similar methodology in their studies are asked about their questionnaires via email; responses are derived, and their applicability is evaluated in the preparation of the questionnaire. Questions are stated in English and the entire questionnaire is provided in Appendix A. It is also translated into Turkish to assemble responses from Turkish organizations, and is provided in Appendix B. Both versions are published and kept available. Data is collected from the organizations in all countries, no limitation is applied.

3.3.2 Structure of the questionnaire

Starting page of the questionnaire consists of an introduction, giving short description for the aim of the study, providing data privacy statement and the average duration of completing the survey. Respondents are notified about the possibility of deriving questionnaire results, if they leave their email at the end of the survey.

There are nine main sections in the entire survey, the details of these sections can be provided as follows:

- the department information of the respondent,
- the industry of the organization that the respondent works in,
- age of the organization,
- number of the employees in the organization,
- departmental actions for IT related investments, assessed in eight statements,
- organizational actions assessing innovation activities, strategies, workforce, and business processes, evaluated in 16 statements,
- intrapreneurial actions within the organization, guided by an intrapreneurship definition, assessed in six statements,
- rating several characteristics of the employees, evaluated in five statements and
- assessing growth in sales and profit caused by digital transformation via six statements.

Departmental information is asked as a multiple-choice question. Answers include (a) IT, (b) human resources, (c) sales and marketing, (d) finance, (e) customer relations, (f) research and development, (g) other. “Other” option has a free-text feature, providing writing a department different from the existing ones.

Industry of the organization that the respondent currently working in is asked with multiple-choice options, such as (a) information technologies, (b) banking, (c) electronics, (d) e-trade, (e) education, (f) food/fast consumer goods, (g) finance, (h) textile, and (i) other. “Other” is provided with a free-text choice, allowing the respondent to write a different industry from the existing ones.

Age of the organization included five options as (a) 0-5, (b) 6-15, (c) 16-25, (d) 26-50, (e) more than 50 years. Number of the employees in the organization included following ranges; (a) 0-20, (b) 21-100, (c) 101-500, (d) 501-5000, (e) more than 5000. Size and organization age groups have been chosen accordingly to the expected sample and in reference to other research-area-related surveys, for an optimal distribution of the groups.

The following section assessed departmental actions for IT related investments as stated previously. Eight statements are asked in this section to assess the theoretical framework. Sub-items related to the investment into IT related, hardware, software and third parties, and the effect of the assets (IT investments) on the change of business process practices are the main concern of this section. Two statements in this section are used to understand the level of digital transformation in the organization. Among those, one asks for IT related hardware specific, to understand if the respondents see hardware investment as relevant for digital transformation in their organization. Five-point scale is used, from 1 to 5 as denoting 1-not effective at all, 2-minor effective, 3-somewhat effective, 4-effective, 5-very effective. The other informative statement asks the categories of IT related third party investments. Choices for the respondents varied as (a) applications, (b) database systems, (c) ERP solutions, (d) cloud solutions, (e) artificial intelligence, (f) other. Details are provided in Appendix A.

Next section evaluates all organizational actions performed under innovational activities, strategical decisions, as well as changes on business process practices. For all the statements, five-point Likert scale is used from 1 to 5 as 1-strongly disagree, 2-disagree, 3-undecided, 4-agree, 5-strongly agree.

Next section includes intrapreneurial activities-related statements and use the five-point Likert scale, as the same as in the previous section. The following section is asking about the characteristics of the employees in the organization. Five types of characteristics related to intrapreneurship are asked to degree, which are competitiveness, proactiveness, risk-taking, confidence, and motivation. Ravesteyn and Batenburg (2010) included the characteristics of the employees as the organizational values in a company while assessing the critical success factors of business process management systems implementation. These measures are taken and adapted to this research.

Last section evaluates the ultimate effect in the organization by asking the growth in sales and profit gained by the digital transformation. Six statements in total are placed in the section to measure the overall effect in a robust manner. These measures are also adapted from the study of Ravesteyn and Batenburg (2010).

3.3.3 The sample and data collection

Main target sample consists of the professionals who work either in an organization that is transformed digitally or transforming currently. Responses are derived from various industries and departments in all countries anonymously. Mainly the employees in ICT sector were an exact match for the goal of the questionnaire. Due to an extensive usage of information technologies in almost every industry, all sectors are included in the research.

Data is collected using an online survey platform, named Typeform (https://www.typeform.com). Questionnaire is first sent to the email addresses of about 450 professionals working in one of the leading telecommunication companies in Turkey. Then it is distributed on online platforms such as LinkedIn, Facebook, Twitter and WhatsApp groups. Also, professionals' private groups related to Digital

Transformation, Innovation, Turkish Telecom, Industry 4.0 are selected from LinkedIn and the questionnaire is posted in those groups. Users, who stated their profession under the scope of "digital transformation", have been found via relevant keyword search on github.com (open source software development platform) and the questionnaire was sent to their email. To increase the variety of the companies and the countries, link of the questionnaire is posted to surveyswap.io, where mutual support with surveys exists among related professionals. Total number of the respondents reached to 377. Ten respondents left essential questions blank, therefore final number of responses used in the study changed to 367.

3.3.4 Structural equation modeling

Theoretical framework is analyzed using structural equation modelling (SEM). It is based on covariance and variance-based methods, path analysis and confirmatory factor analysis (CFA), providing a very comprehensive analysis methodology to researchers where they can assess their model with multiple aspects. The aim of conducting SEM is to observe and explain the relationships between the constructs in the model, and then formulate the equational relations.

Developing the measurement model is essential before building the structural model. It is realized by conducting CFA. Hair et al. (2010) discuss the rule of thumbs while studying CFA, such as all observed variables should be loading on only one construct. Total number of items loading to a latent construct ideally should be equal or greater than three. These specifications are performed, and path diagram of the framework is expected to be drawn. To proceed to the structural model, first CFA model should be tested and validated. Measurement model validity requires following validity checks; adequate values of goodness of fit indices, convergent validity, discriminant validity, face and nomological validities.

Goodness of fit (GOF) indices are classified under four titles; basic GOF measures, absolute fit measures, incremental fit indices, and parsimony fit indices. Basic GOF has Chi-Square (X^2) and Degrees of Freedom (DF) measures. Their formula is stated below.

$$X^2 = (N - 1)\ (\text{Observed covariance matrix} - \text{SEM estimated covariance matrix})$$

$$DF = ½\ [(p)\ (p+1)] - k$$

Chi-Square denotes the difference between the observed and estimated covariance matrices, multiplied by the sample size (N) – 1. It is important to note that Chi-Square is sensitive towards the sample size. The larger the sample gets; the greater Chi-Square performs. Sample size is determined by the observed variables assessing the theoretical framework, and the number of total constructs proposed in the model.

DF is the amount of mathematical information possible to derive to estimate the parameters of the model, where p is the total number of observed variables (indicators) and k is the number of estimated parameters (Hair et al., 2010).

The sample will be analyzed according to its level of fitting towards the model and its hypothesis. Therefore, an absolute fit, an incremental fit and a parsimony fit will be used. Details about these fits are given in the following paragraphs.

Absolute fit measures include root mean square residual (RMR), root mean square error of approximation (RMSEA), and goodness-of-fit index (GFI). They assess if the measurement model fits the sample. The lower the RMR value, the better the measurement model gets. RMSEA indicates a good fit if it is between 0.05 and

0.80. GFI ranges in between 0 and 1, the acceptable fit being equal or greater than 0.90.

Incremental fit indices cover comparative fit index (CFI), normed fit index (NFI), and non-normed fit index (NNFI), also known as Tucker Lewis index (TLI) (Tucker and Lewis, 1973). They explain the wellness of the estimated model in comparison to the other alternative models. CFI values greater than 0.90 provide acceptable model fit. NFI and NNFI (Normed NFI) is in the range of 0 and 1. Values closer to 1 are considered as acceptable fits.

Parsimony fit indices include adjusted goodness of fit index (AGFI), where it changes as the complexity of the model changes. Hair et al. (2010) agree on an acceptable model fit if at least three or four of total indices are in acceptable values. After GOF indices are accepted, aforementioned validity checks are applied. Convergent validity is assessed by two measures, Construct Reliability (CR) and Average Variance Extracted (AVE).

Good fit for CR is 0.7 or higher but also values between 0.6 and 0.7 provide acceptable reliability values. Although coefficient alpha is a common reliability measure in statistics, CR is more commonly used in SEM. L_i represents the factor loadings of each item in the latent construct, whereas e_i is the error term.

$$CR = \frac{(\sum_{i=1}^{n} L_i)^2}{(\sum_{i=1}^{n} L_i)^2 + (\sum_{i=1}^{n} e_i)}$$

AVE is known as the average communality. It is computed for all latent constructs (summation of each construct's factor loading square dividing by n, where n is the number of the sub-items loaded to the construct, and L_i representing the standardized factor loading). Adequate convergence is realized when AVE is equal or greater than 0.50.

$$AVE = \frac{\sum_{i=1}^{n} L_i^2}{n}$$

Discriminant validity is a measure to which latent variable is discriminated from the other latent variables in a model. To perform this validity, comparison of shared variance and AVE is checked. Shared variance is the amount of a variance that a construct can explain in another construct. It is calculated as the square root of highest correlated coefficient between the unobserved variables. Fornell and Larcker (1985) noted that the assessment of discriminant validity is done via comparing the measured shared variance (MSV) between each pair of constructs to the each of the AVEs for these constructs.

Face and nomological validities are performed and thus explained in detail in Chapter 4 while conducting confirmatory factor analysis.

After implementing a successful measurement model, structural model is carried out. Hypotheses testing and structural relationships are assessed at this stage. Goodness of fit indices are also used in this phase to measure the validity of the structural model.

CHAPTER 4

ANALYSIS OF DATA AND INTERPRETATION OF RESULTS

This chapter presents the results of the proposed model, including data cleaning procedures, descriptive findings, exploratory factor analysis, confirmatory factor analysis, measurement validities, and finally the structural model analysis. SEM analysis including confirmatory factor analysis and structural model is performed using AMOS 24, while descriptive findings and exploratory factor analysis are carried out by SPSS 25. Details about each of the analyses are given in the following sections. Observed variables and their factors are presented in Appendix C.

4.1 Missing value analysis

There are descriptive questions at the beginning, followed by the assessment questions in the later sections in the questionnaire. Ten respondents left the majority of the questions consecutively blank, hence their cases are removed from the sample. For the rest of the sample, missing value analysis is performed because SEM requires no missing value in the measurement and the structural model validity analyses due to the necessity of deriving modification indices later in the results. Expectation maximization (EM) algorithm is used as the estimation technique. Table 1 shows the means, standard deviations, number of missing cases and regarding percentages of each sub-item. A full list, including explanation of the sub-items, can be found in Appendix C.

Table 1. Univariate Statistics of Missing Values

	Mean	Std. Deviation	Missing			Mean	Std. Deviation	Missing	
			Count	Percent				Count	Percent
AS1	3.12	0.877	10	2.7	OG1	4.03	0.991	2	0.5
AS2	2.99	1.073	6	1.6	OG2	4.14	0.899	3	0.8
AS3	3.05	1.124	12	3.3	OG3	4.12	0.922	3	0.8
BPP1	3.79	0.95	1	0.0	OG4	3.99	1.007	3	0.8
BPP2	4.07	0.889	2	0.5	OG5	3.88	0.992	2	0.5
BPP3	3.72	1.053	0	0.0	ST1	3.98	1.214	2	0.5
IA1	4.09	1.088	3	0.8	ST2	3.76	1.060	0	0.0
IA2	3.82	1.192	2	0.5	ST3	3.52	1.227	1	0.3
IA3	3.88	1.104	1	0.3	ST4	3.51	1.239	0	0.0
IA4	4.04	1.062	3	0.8	WO1	3.64	1.092	0	0.0
INTRA1	3.44	1.147	1	0.3	WO2	3.66	0.998	6	1.6
INTRA2	3.63	1.040	3	0.8	WO3	3.14	1.220	0	0.0
INTRA3	3.89	0.987	2	0.5	WO4	3.87	0.941	0	0.0
INTRA4	3.67	0.969	2	0.5	WO5	3.44	1.102	2	0.5

Table 2 demonstrates the significance level of the analysis, to understand if the missing values are distributed randomly and replacement can be applied to the dataset. The regarding test examines the missing data and observes if it is missing completely at random (MCAR) (Hair et al., 2010). It is a measure of non-significance level, indicating the observed pattern not differing than a random pattern in data. After the replacement of missing values with relevant means of each variables, final number of cases used in the study happened to be 367.

Table 2. EM Estimated Statistics of Missing Values

Little's MCAR test	Values
Chi-Square	1211.317
Degrees of Freedom	1177
Significance	0.238

4.2 Descriptive findings

This section includes several information about the professionals' organization as well as digital technology categories of the organizational investments. Details of the questionnaire can be found on Appendix A. Departments of the professionals and the sectors of the organizations are pivoted as sectors being rows, departments being columns in Table 3. Of the respondents, 51% stated that they work in the Information Technologies sector, providing the largest group among all sectors. Respondents with 14.2% specified their sector as "other". Among other sectors, answers were given such as "Healthcare" and "Automotive". Respondents from the education sector were the third biggest group, with 9%, followed by Electronics and Banking sector with 5.4% and 5.2%, respectively. Sales & Marketing with 28.6% was the most worked at department, followed by the IT department with 24.8%. Respondents with the percentage of 13.6% classified their departments as "Other". While the free text option was left empty in 315 cases, "Other" departments stated were "Strategy", "Audit" and "Network Technologies". Research & Development and Finance departments followed "Other" option with 12.3% and 10.1%, respectively.

Professionals working in Sales & Marketing departments in Information Technologies sector constitute the largest group of the sample, followed by IT

department employees in Information Technologies sector in the second place. Other details can be seen in the Table 3.

Table 3. Descriptive Data for Company Sector and Departments

	Customer Relations	Finance	Human Resources	IT	Other	Product Mgmt.	Research & Development	Sales & Marketing	Frequency	Percent
Banking		9	1	6	2			1	19	5.2%
Education	6	2	2	2	5		11	5	33	9%
Electronics	1	2		3	1		7	6	20	5.4%
Energy				5	1				6	1.6%
E-Trade		1		2	1		1	2	7	1.9%
Finance		8		2	1				11	3%
Food / Fast Consumer Goods	2		2		1			10	15	4.1%
Healthcare					4		6	3	13	3.5%
Information Technologies	2	11	4	57	13	16	17	67	187	51%
Other	2	4		14	21		2	9	52	14.2%
Textile	1						1	2	4	1.1%
Frequency	14	37	9	91	50	16	45	105	367	100%
Percent	3.8%	10.1%	2.5%	24.8%	13.6%	4.4%	12.3%	28.6%	100%	

Table 4 demonstrates the age of the organizations that the respondents are working in, and the overall number of employees in their respective organization. The biggest group of respondents stated that the age of their company is between 16 and 25 years (40.3%). There is an almost equal distribution among the organizations that are 6-15, and > 50 years old (15%, 14.7%). Overall with 91.3% organizations of the participating respondents are established companies in the market (more than 6 years of experience), and almost three quarters of the organizations (76.3%) are even established for more than 15 years.

Table 4. Descriptive Data for Companies

Company Age		0-5	6-15	16-25	26-50	> 50
	Frequency	32	55	148	78	54
	Percent	8.7%	15%	40.3%	21.3%	14.7%
Number of Employees		0-20	21-100	101-500	501-5,000	> 5,000
	Frequency	45	45	32	102	143
	Percent	12.3%	12.3%	8.7%	27.8%	38.9%

Another descriptive data derived from the respondents is the investment categories of the digital technologies in the respondents' departments that lead to perform digital transformation. This was first discussed in Section 3.1.1 as Assets (IT investments).

Table 5 shows the frequency and the percentage values of the digital technology categories that the respondents stated as their department investments. "Other" stated categories include big data, call center, inventory management solutions, IT auditing, and reporting technologies. Excluding the "Other" category, most invested category among all is applications by 48.8% response rate, followed by database systems by 27.8% and ERP solutions by 24.5%.

Table 5. Investment Categories of Digital Technologies

Digital Technology Categories	Applications	Database Systems	ERP Solutions	Cloud Solutions	Artificial Intelligence	Other
	179 48.8%	102 27.8%	90 24.5%	77 21%	59 16.1%	160 43.6%

Respondents whose departments/organizations invested into hardware, software and third-party solutions were further asked about the time periods of these investments as shown in Table 6. The reason of asking for this information is to understand the transformation levels of the organizations. Respondents were given further sub sections of investments. As IT related hardware investments, the

examples servers, data centers and data warehouse components were given. As IT related software investments, the following subsections were stated as artificial intelligence, big data, and cloud solutions. As IT related third party investment were further considered: consulting, support, and similar external guides through the transformation of the organization.

IT related hardware investments are performed largely within the last 3 years of the companies with 56.4% response rate, whereas IT related software investments are seen as a continuous improvement since the past and current periods of investments are close to each other, as 39.5% and 34.6%, respectively. IT related third party investments represent a similar range as with IT related software, demonstrating close results between past and current periods. Among all three groups of IT related investments further investments are planned. Respondents stated that they are planning to invest into IT related hardware within the next three years (15%). A similar group size of respondents stated that they are also planning IT related third party investments (14.7%). The majority of the respondents departments/organizations are planning investments in IT related software (21.3%).

Table 6. Investment Periods of Companies

	Invested within last 3 years	Currently investing	Planning in 3 years	No investments	No knowledge
Hardware Investment	207	136	55	19	45
	56.4%	37.1%	15%	5.2%	12.3%
Software Investment	145	132	78	43	66
	39.5%	36%	21.3%	11.7%	18%
Third Party Investment	127	140	54	46	75
	34.6%	38.1%	14.7%	12.5%	20.4%

4.3 Exploratory factor analysis

Information technologies literature is extensively reviewed to understand the internal dynamics leading to a successful digital transformation, and constructs have been built based upon the theoretical models proposed by the scholars. Factors and their observed variables are included in Appendix C. As stated in Chapter 2, researchers oriented their studies either to understand the transformational change via business perspective or the human-capital perspective. In this thesis, by assessing both aspects in the organizations, a new theoretical framework is proposed. Therefore, to be sure which sub-items are placed under which construct, so that to have a more robust model fit in the following analysis steps of SEM, exploratory factor analysis is performed additionally.

To conduct the exploratory factor analysis, principal components is run as the extraction method with fixed seven number of factors due to the predetermined constructs by the literature review, and oblique Oblimin rotational method with Kaiser normalization is used since the factors are assumed to be correlated to each other. Rotated factor matrix converged in nine iterations is derived and interpreted by observing significant loadings, the possibility of naming the factors, and checking the sufficiency of the communalities.

Table 7 shows Kaiser-Meyer-Olkin (KMO) and Bartlett's test results. They help to determine whether the sample used for the model detection is suitable. KMO measure of sampling adequacy indicates the ratio of the variance in the variables, which might be the effect of the fundamental factors. High values near 1.0 signify the usability of factor analysis (IBM Knowledge Center, 2019).

Sampling adequacy value 0.911 indicates that the provided sample can be conveniently used for the factor analysis. Bartlett test resulted significant (0.000), meaning that the sample represents equal variances (Snedecor and Cochran, 1989).

Table 7. KMP and Bartlett's Test Results in EFA

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.911
Bartlett's Test of Sphericity	Approx. Chi-Square	5158.823
	Degrees of freedom	351
	Sig.	0.000

Seven constructs and their Explanatory Factor Analysis (EFA) results are demonstrated and discussed in Table 8. Total cumulative variance explained for all seven constructs is 68.05%. Assessment of the factor loadings are performed by comparing their value greater or smaller than 0.50, as indicating if at least 50% of the observations support the loading of the variable to the related factor.

Using EFA, the following results are observed:

- Assets (IT investments): This latent construct (unobserved variable) includes four observed variables, also known as indicators, as seen in Table 8. Each indicator is loaded to the assets construct with values above 0.50, providing a well fit to the latent construct.
- Strategy: This latent construct includes four observed variables. EFA proposed a different result for this construct. Variables BPP4 and BPP5 were originally designed to be the indicators for change on business process practices latent construct by the theoretical framework. Variables measure the automation and standardization of business processes respectively, as stated in Appendix C. After conducting EFA, mentioned variables are

loaded perfectly to the strategy construct, as 0.809 and 0.911, shown in Table 8. It led the research to review theories in the field again, and regarding support is found by Auer Antoncic and Antoncic (2011), stating that strategies performed such as decreasing the number of procedures and realizing autonomy in business under the scope of digital transformation, play an important role on organization growth. Therefore, regarding variables' labels (BPP4, BPP5) changed to ST3 and ST4, and are placed under this latent construct. Proposed model is revised based on this change.

- Innovation activities: Factor loadings of innovation activities latent construct depict a valid measure due to their values performing above 0.50. Four observed variables are loaded to the latent construct as seen in Table 8, with no other loadings to the rest of the constructs.
- Workforce characteristics: Table 8 shows the factor loadings WO1, WO2, WO3, WO4, and WO5. Indicator WO1 is loaded to more than one latent construct. Its value is less than 0.50, hence, it is suggested by EFA to eliminate the variable. It has been omitted from workforce characteristics as seen in final results of EFA, depicted in Table 9.

Table 8. Pattern Matrix Results of EFA

Observed variable	Assets	Innovation Activities	Strategy	Workforce Characteristics	Change on BPP*	Initiation of Intrapreneurship	Organization Growth
AS1	0.863						
AS2	0.802						
AS3	0.767						
IA1		0.757					
IA2		0.731					
IA3		0.533					
IA4		0.564					
ST1			0.628				
ST2			0.611				
BPP4			0.809				
BPP5			0.911				
WO1				0.321	0.621		
WO2				0.774			
WO3				0.737			
WO4				0.797			
WO5				0.692			
BPP1					0.511		
BPP2					0.722		
BPP3					0.655		
INT1						0.466	
INT2						0.748	
INT3						0.884	
INT4						0.731	
OG1							0.876
OG2							0.896
OG3							0.771
OG4							0.860
OG5							0.601

Note: * Change on business process practices

- Change on business process practices: It has three variables (BPP1, BPP2, and BPP3). As stated earlier in strategy section, automatization and standardization of business processes (former BPP4 and BPP5) were included in this latent construct, considering their change effect on business processes. EFA results and relevant studies (Auer Antoncic and Antoncic, 2011) changed these observed variables as they belong to strategy. Final model includes three observed variables as in Table 9, and they all have factor loadings above 0.50.
- Initiation of intrapreneurship: Latent construct has four observed variables, namely INT1, INT2, INT3, and INT4. Their factor loadings are found to be near or greater than 0.50 and providing a good support for the component.
- Organization growth: It is the final latent construct, assessing the growth in organizations by sales and profit performance. Details of OG1, OG2, OG3, OG4, and OG5 are found in Appendix C. All five variables have factor loadings above 0.50. After all revision, final pattern matrix is derived as in Table 9.

Table 9. Final Pattern Matrix Results of EFA

Observed variable	Assets	Innovation Activities	Strategy	Workforce Characteristics	Change on BPP*	Initiation of Intrapreneurship	Organization Growth
AS1	0.863						
AS2	0.802						
AS3	0.767						
IA1		0.757					
IA2		0.731					
IA3		0.533					
IA4		0.564					
ST1			0.628				
ST2			0.611				
ST3			0.809				
ST4			0.911				
WO2				0.782			
WO3				0.766			
WO4				0.831			
WO5				0.705			
BPP1					0.511		
BPP2					0.722		
BPP3					0.655		
INT1						0.466	
INT2						0.748	
INT3						0.884	
INT4						0.731	
OG1							0.876
OG2							0.896
OG3							0.771
OG4							0.860
OG5							0.601

Note: * Change on business process practices

4.4 Structural equation modeling findings

EFA results guided the research by providing the adequate number of factors and indicators (variables) needed to best represent data (Hair et al. 2010). The next step is

to test the preconceived theory by conducting the confirmatory factor analysis on the aforementioned seven latent constructs and their indicators. Deriving the measurement model and checking its validity is vital before proceeding to the structural model verification.

4.4.1 Confirmatory factor analysis

Following sub-sections show the results of the measurement model, including the goodness of fit indices check, followed by the factor loadings of each constructs in the model, and then confirming the model via convergent, discriminant, face and nomological validity measures.

4.4.1.1 GOF indices of the measurement model

GOF indices is the first validity check method for the measurement model. Before building the structural model, it is essential to apply the validation techniques to see if the proposed model is providing the relevant theoretical support and the statistical acceptance. Table 10 shows the GOF indices for the measurement model. At least three or four of the indices should be in acceptable range in order to show the goodness of the measurement model. Condition is satisfied according to the acceptable fit values. Acceptable values, together with the indices' measurement details are explained in Section 3.3.4.

Table 10. GOF Statistics for the Measurement Model

	Chi-Square (CMIN)	714.84
	Degrees of Freedom	303
	CMIN/DF	2.359
Absolute Fit Measures	RMR	0.061
	RMSEA	0.061
	GFI	0.87
Incremental Fit Indices	CFI	0.917
	NFI	0.87
	NNFI	0.904
Parsimony Fit Indices	AGFI	0.836

4.4.1.2 Factor loadings of the measurement model

Six elements are specified in Table 11; as the latent constructs, measured variables, factor loadings on particular constructs (loading estimates), the relationship among the constructs, error variance estimates for each indicator, and the p-values of sub-items. In CFA, all the constructs are assumed to be exogenous.

Standardized loading estimates are shown in "Loading Estimate" column in Table 11. They should be 0.50 or higher in theory, therefore all observed variables are in line with the rule. Additionally, in SEM analysis, building a congeneric measurement model is essential, meaning that no covariance between or within construct error variances should exist. This condition is also ensured in the model. No covariance is drawn between any error variances. Figure 2 demonstrates CFA model drawn for the study.

Table 11. CFA Results for the Measurement Model

Unobserved variable	Observed variable	Loading estimate	Factor loading squared	Error variance estimate	p-Value
Assets (IT Investment)	AS1	0.75	0.56	0.25	***
	AS2	0.81	0.66	0.19	***
	AS3	0.61	0.37	0.39	-*
Strategy	ST1	0.72	0.51	0.28	***
	ST2	0.78	0.61	0.22	-*
	ST3	0.81	0.66	0.19	***
	ST4	0.70	0.49	0.30	***
Innovation Activities	IA1	0.81	0.66	0.19	***
	IA2	0.79	0.62	0.21	***
	IA3	0.82	0.67	0.18	***
	IA4	0.82	0.67	0.18	-*
Workforce Characteristics	WO2	0.75	0.56	0.25	***
	WO3	0.71	0.50	0.29	-*
	WO4	0.66	0.43	0.34	***
	WO5	0.72	0.52	0.28	***
Change on Business Process Practices	BPP1	0.52	0.27	0.48	***
	BPP2	0.67	0.45	0.33	***
	BPP3	0.64	0.41	0.36	-*
Initiation of Intrapreneurship	INTRA1	0.71	0.50	0.29	***
	INTRA2	0.82	0.67	0.18	***
	INTRA3	0.74	0.55	0.26	***
	INTRA4	0.57	0.32	0.43	-*
Organization Growth	OG1	0.87	0.76	0.13	***
	OG2	0.88	0.77	0.12	***
	OG3	0.77	0.59	0.23	-*
	OG4	0.83	0.69	0.17	***
	OG5	0.63	0.40	0.37	***

Note: *** = the regression weight for unobserved variables in the prediction of observed variables are significantly different from zero at the 0.001 level (two-tailed).

*= values are not estimated since they are fixed to 1.0 in the analysis.

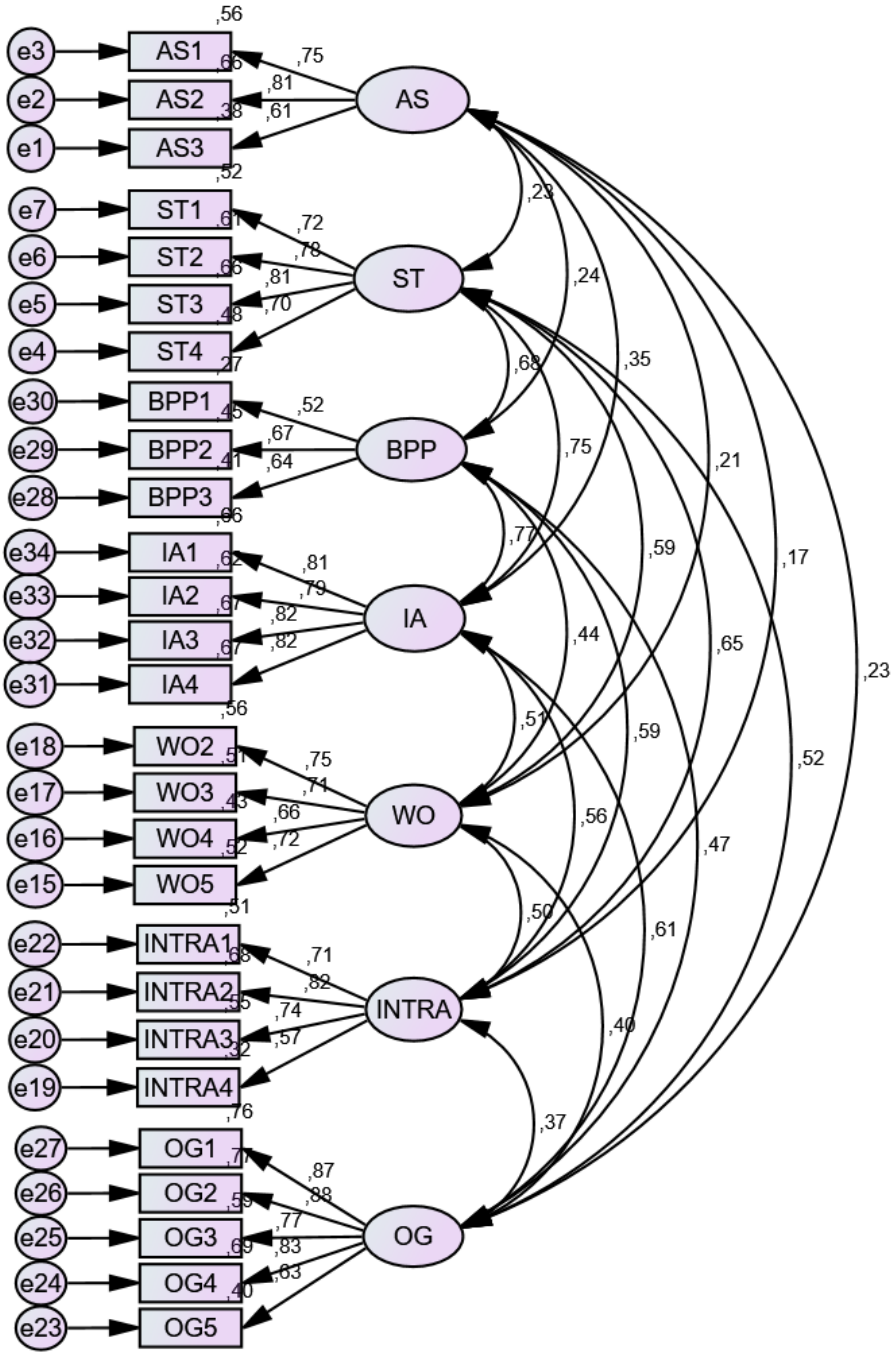

Fig. 2. CFA measurement model

To test the construct validity of the measurement model, there are various measures required to check such as convergent validity, discriminant validity, face and nomological validity. Details about these validity measures are provided in Section 3.3.4. Next subsections include the results in detail.

4.4.1.3 Convergent validity

The convergent validity is tested by calculating CR and AVE values for each latent construct (Formulas are given in Section 3.3.4). Table 12 indicates each of unobserved variables' calculated CR and AVE values in detail. Hair et al. (2010) state that CR values being 0.7 or higher suggests a good reliability, also between 0.6 and 0.7 is acceptable if other indicators' construct validities in the model are good. For AVE a value of 0.5 or higher, on average, is offering an adequate convergence for the structure. If it is less than 0.5, then the theory indicates that more error than variance exists in the items established for the latent construct. Change on business process practices AVE (0.38) may be increased by eliminating one item whose factor loading is lower but it would lead to having a model that contains one latent construct whose total number of items is less than three. In order to provide a congeneric and reflective measurement model (meaning that all constructs have at least three indicators with greater than or equal to two constructs) item deletion is not performed. Since the other AVE values of other latent constructs also suggest good values, it is kept as it is in the final measurement model.

Table 12. Calculated CR, AVE and MSV Values of Latent Constructs

Unobserved Variable	CR	AVE	MSV
Assets (IT investments)	0.77	0.53	0.13
Strategy	0.84	0.57	0.56
Innovation activities	0.88	0.65	0.59
Workforce characteristics	0.80	0.50	0.35
Change on business process practices	0.64	0.38	0.59
Intrapreneurship initiation	0.81	0.51	0.42
Organization growth	0.90	0.64	0.38

4.4.1.4 Discriminant validity

To provide an adequate discriminant validity, MSV < AVE condition can be checked if it holds for each latent construct in the model, as explained in Section 3.3.4. All values hold the aforementioned condition, except change on business process practices (MSV = 0.59 > AVE = 0.38 as in Table 12). However, Hair et al. (2010) provides an additional suggestion. They recommend merging highly correlated latent constructs' items into one construct, and then compare this new model fit with the previous version. Since innovation activities and change on business process practices are highly correlated to each other with correlation coefficient 0.77, their indicator sub-items are merged into one and compared with the main model. Table 13 shows the model fit values. Since the previous model fit slightly performs better than the merged one, discriminant validity can be confirmed.

Table 13. Model Fit Comparison between Different Models

	Previous Model Fit	Merged Model Fit
Chi-Square	714	755
Degrees of Freedom	303	309
p-value	0.001	0.000
CFI	0.917	0.889

4.4.1.5 Face and nomological validities

Nomological validity can be simply ensured by the theoretical applicability of the proposed model by examining the correlations between the constructs (Hair et al., 2010).

Face validity is also ensured by asking multi-item reflective scales to measure each construct. Definitions of conceptual terms fit well with the item terminologies, therefore providing the study to contain face validity. Going through all the resources and stating their relevance in Chapter 2, theoretical framework is constructed based upon well-proven academic resources residing in the areas of digital transformation, business process management, performance management, and intrapreneurship.

4.4.2 Structural model and its validity

Validity check is enabled by deriving the structural model fit and compare it to the CFA model fit, provided in the previous section. Difference is shown as very minor between the two models. RMR and RMSEA still indicate a good value, while CFI did not dramatically change and thus, produced a similar well fit. Acceptable value ranges are given in Section 3.3.4; based on the values represented in Table 14, goodness of fit indices indicate that the structural model is acceptable.

Table 14. Model Fit Comparison between Structural and CFA Model

		CFA Model	Structural Model
	Chi-Square (CMIN)	714.84	744.26
	Degrees of Freedom	303	310
	CMIN/DF	2.359	2.401
Absolute Fit Measures	RMR	0.061	0.063
	RMSEA	0.061	0.062
	GFI	0.87	0.86
Incremental Fit Measures	CFI	0.917	0.912
	NFI	0.87	0.86
	NNFI	0.904	0.901
Parsimony Fit Indices	AGFI	0.836	0.834

Figure 3 represents the final structural model, together with the standardized path estimates of regarding relationships. Covariances between the exogenous variables are drawn for the purpose of the analysis. All details about the observed variables and their factors are presented in Appendix C. Assets, strategy, innovation activities and the workforce characteristics are exogenous variables, whereas the change of business process practices, initiation of intrapreneurship and the organization growth are endogenous variables of the structural model.

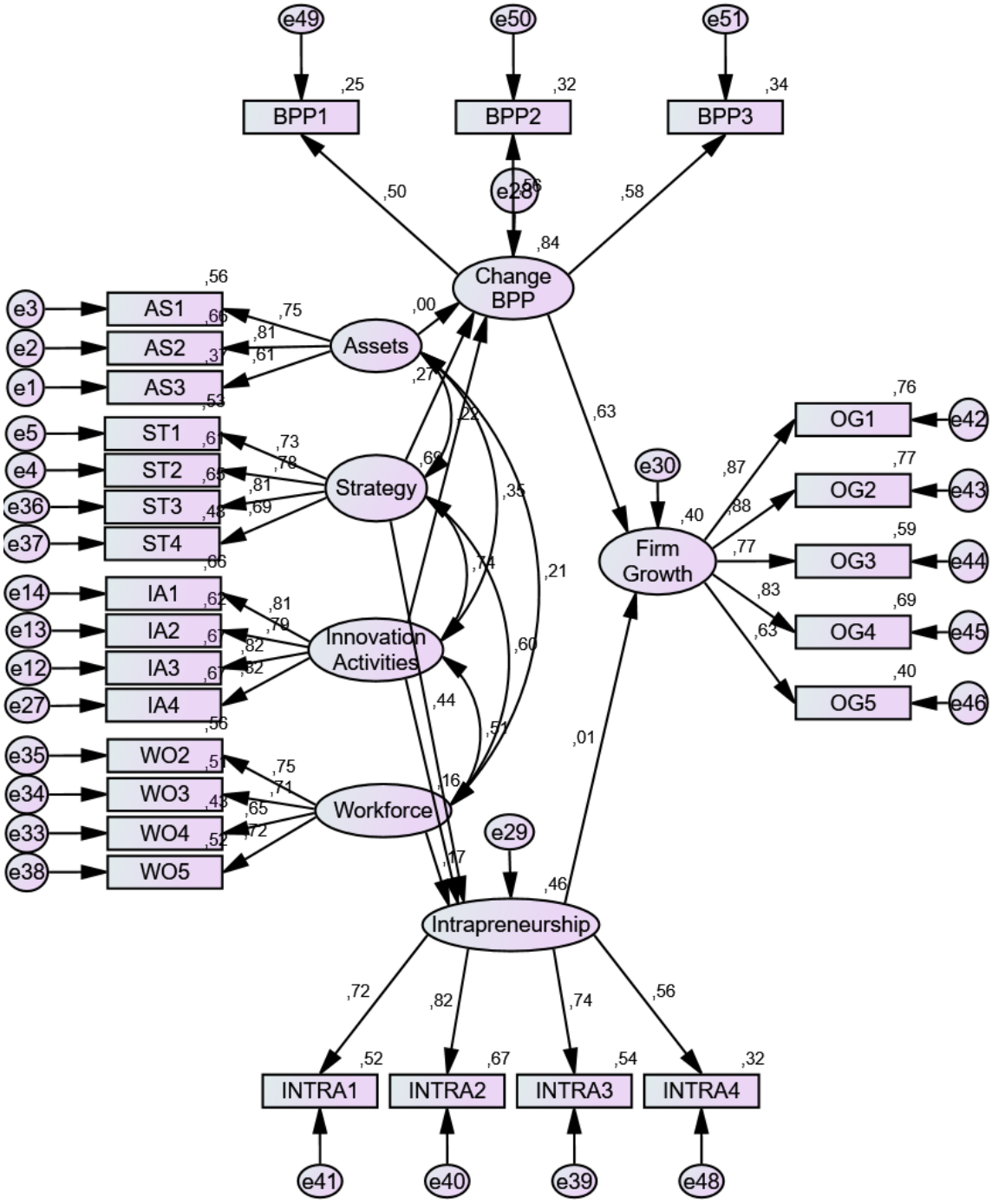

Fig. 3. Final structural model and path estimates

Covariances between the exogenous variables are given in Table 15. P-values prove the relations to be significant. They are all smaller than 0.05 and provide acceptable fit.

Table 15. Covariances of the Exogenous Variables

			Estimate	p-Value
Assets (IT Investments)	and	Strategy	0.131	0.001
Assets (IT Investments)	and	Workforce Characteristics	0.077	0.003
Assets (IT Investments)	and	Innovation Activities	0.194	0.001
Strategy	and	Workforce Characteristics	0.347	0.001
Strategy	and	Innovation Activities	0.636	0.001
Innovation Activities	and	Workforce Characteristics	0.279	0.001

Loading estimates of the items related to the exogenous and endogenous variables for the structural model are given in the following tables. Estimate values are close to the factor loadings of the measurement model.

Table 16 provides loading estimates for exogenous variables. For exogenous assets (IT investments) variable, AS3 (third party investments) is relatively contributing less than AS1 and AS2 (0.75 and 0.81, respectively). Strategy factor is loaded by four items, where ST2 and ST3 (reorganization strategy and automatization strategy) perform better loadings than ST1 and ST4 (employee involvement in decision-making and standardization of processes as strategies, respectively). Innovation activities factor is loaded with the items whose values contribute about the same to the factor. WO4 (risk taking) contributes less than the other items to workforce characteristics by 0.65. Others have similar contributions to the exogenous factor.

Table 16. Loading Estimates of Exogenous Variables

Exogenous Variable	Variable Item	Loading estimate
Assets (IT Investments)	AS1	0.75
	AS2	0.81
	AS3	0.61
Strategy	ST1	0.73
	ST2	0.78
	ST3	0.81
	ST4	0.69
Innovation Activities	IA1	0.81
	IA2	0.79
	IA3	0.82
	IA4	0.82
Workforce Characteristics	WO2	0.75
	WO3	0.71
	WO4	0.65
	WO5	0.72

Table 17 indicates that BPP1, BPP2, and BPP3 are in the limit of acceptable factor loading value, which is 0.50. Nevertheless, they contribute to change on business process practices construct in a convenient way.

Intrapreneurship initiation is explained the best by the items INTRA1, INTRA2, and INTRA3, and still significantly contributed by INTRA4 (0.56).

Organization growth has quite strong loading estimates contributed by OG1, OG2, and OG4 which assess growth in sales (0.87 and 0.88), and growth in profit (0.83). OG5 (profitability comparison) provide less than the other items to organization growth.

Table 17. Loading Estimates of Endogenous Variables

Endogenous Variable	Variable Item	Loading estimate
Change on Business Process Practices	BPP1	0.50
	BPP2	0.56
	BPP3	0.58
Initiation of Intrapreneurship	INTRA1	0.72
	INTRA2	0.82
	INTRA3	0.74
	INTRA4	0.56
Organization Growth	OG1	0.87
	OG2	0.88
	OG3	0.77
	OG4	0.83
	OG5	0.63

SEM provides direct and indirect effects for the relationships in the structural model. Indirect effects of exogenous variables over endogenous variables is possible and can be derived by choosing "direct, indirect and total effects" from the analysis properties on AMOS. Table 18 demonstrates indirect effects.

Table 18. Indirect Effects of Exogenous Variables on Endogenous Variables

	Workforce Characteristics	Innovation Activities	Strategy	Assets
Intrapreneurship initiation	-	-	-	-
Change on BPP	-	-	-	-
Organization growth	0.003	0.421	0.159	0.003

Innovation activities represented as an exogenous variable has only indirect effect on organization growth by 0.421, followed by strategy has indirect effect only on organization growth with 0.159. Assets (IT investments) and workforce characteristics share the same effectiveness value, as 0.003 on the organization growth endogenous variable.

Table 19 shows the total (sum of direct and indirect) effects. Workforce characteristics has neither direct nor indirect effect on change on BPP. Innovation

activities have direct effect on intrapreneurship initiation and change on BPP, on the other hand, it is indirectly influencing organization growth. Strategy has direct impact on Intrapreneurship initiation and change on BPP only. Assets (IT investments) has a minor direct effect on change on BPP.

Table 19. Total Effects of Exogenous and Endogenous Variables

	Intrapreneurship initiation	Change on BPP	Organization growth
Workforce characteristics	0.196	-	0.003
Innovation activities	0.126	0.263	0.421
Strategy	0.334	0.096	0.159
Assets	-	0.002	0.003
Intrapreneurship Initiation	-	-	-
Change on BPP	-	-	-
Organization Growth	0.015	1.595	-

Last combination of relationships can be identified either between exogenous variables or between endogenous variables. Since Hypothesis 5 and 6 evaluated the direct effect of two endogenous variables on the other endogenous one, total effect is given in Table 19. Direct effect of change on BPP is seen as 1.595. Intrapreneurship initiation has insignificant total effect as 0.015, thus, it is not placed in the structural equation.

The next step for examining the model is to check standardized residuals. Hair et al. (2010) specify that large standardized residuals may lead to improve and redesign the model. Residuals larger than |2.5| are listed in Table 20. Here, no pattern is observed such that each item of a construct having significant residual with the items of another construct. Only INTRA1 is seen as common item that is having residuals with IA1, OG5, WO5, and ST2, where all these items belong to different constructs in the model. Therefore, no significant value is diagnosed that might lead the research to redesign the structural model.

Table 20. Standardized Residuals of Indicator Variables

Standardized Residuals (All Residuals greater than |2.5|)			
Largest Negative Standardized Residuals			
AS1	and	BPP2	-2.68
OG2	and	BPP2	-2.55
Largest Positive Standardized Residuals			
INTRA1	and	OG5	3.81
IA1	and	INTRA1	3.33
WO5	and	INTRA1	3.13
ST2	and	INTRA1	3.06
AS3	and	OG4	2.77
IA3	and	OG5	2.76
IA2	and	OG5	2.73
BPP2	and	BPP3	2.69
INTRA3	and	INTRA4	2.56
WO5	and	ST2	2.55

Modification indices is the last validity check method. Covariance and regression weights did not estimate any other structural relationship between endogenous and (or) exogenous variables. Proposed modification indices are seen in Appendix D. Overall, validity of the structural model is examined by three methods and resulted in an acceptable model fit to formulate the structural equations.

4.4.3 Hypotheses testing

Defining and analyzing the relationships among latent constructs are performed in the structural model and the design is given in Figure 4. Hypotheses, together with their abbreviations are found in Section 3.2.

Structural model has been tested with the same running method of CFA, and the results are derived. Regression weights and the p-values of all the hypotheses are included in Table 21.

Table 21. Regression Weights and p-Values of the Variables

	Estimate	p-Value	Result
H1	0.002	0.954	Rejected
H2	0.096	0.003	Supported
H3	0.334	0.001	Supported
H4	0.263	0.001	Supported
H5	0.126	0.073	Supported at 0.073 sig. level
H6	0.196	0.021	Supported
H7	1.595	0.001	Supported
H8	0.015	0.851	Rejected

Table 21 shows p-values which determines that the result is significant if the regarding value is less than 0.05. Accordingly, H1 is rejected (0.954 > 0.05) and H5 is at the limit with its significance value (0.073 is slightly greater than 0.05). H1 referred to higher IT investments having a larger effect on business process practices change, while H5 stated that higher innovation activities having a positive effect to initiate intrapreneurship in an organization. Another rejected hypothesis H8 was the positive relatedness of intrapreneurship initiation to organization growth. Since redesign of the structural model is not required, formulating the structural equations is proceeded.

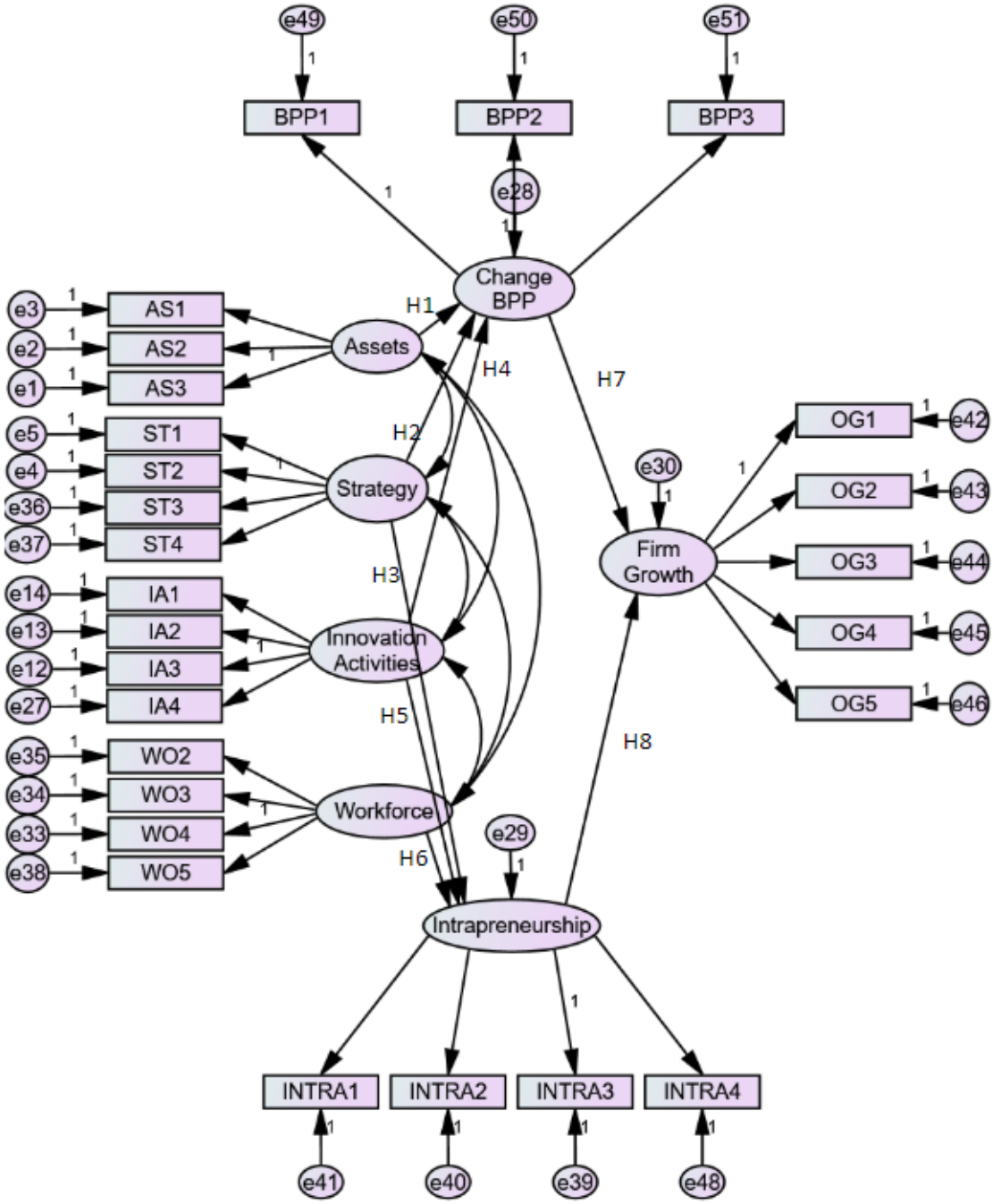

Fig. 4. Structural model and the hypotheses

Table 22. Structural Equations for the Model

Organization growth = 1.595*Change on BPP
Change on BPP = 0.096*Strategy + 0.263*Innovation activities
Intrapreneurship initiation = 0.334*Strategy + 0.126*Innovation activities + 0.196*Workforce characteristics

Equations in Table 22 demonstrate that assets (IT investments) does not have any effect on any of the endogenous variables. One other inference is that none of the variables are having a negative relationship with other variables.

Organization growth is positively related to the change of business process practices factor.

Change on business process practices are positively related to strategy, and innovation activities factors.

Intrapreneurship initiation is positively related to strategy, innovation activities and workforce characteristics as the equation states.

CHAPTER 5

CONCLUSION, LIMITATIONS AND FURTHER REMARKS

The following sections provide a detailed conclusion, as well as explaining several limitations of the study, and finally presenting further remarks and research opportunities.

5.1 Conclusion

Digital transformation is an extensively broad subject for both academic world and business industries. Implementation way of digital transformation varies as areas show variation. In this study, assessing the organizational performance through digital transformation is performed by analyzing the critical success factors leading to a transformational change first, and then their potential impacts are measured onto internal dynamics existing in the organizations. Regarding literature is extensively reviewed in the areas of business performance, intrapreneurship, digital transformation, innovation, digitalization, and business process management. Semi structured interviews are conducted, and underlying critical success factors, together with their touch point internal dynamics are determined as follows; assets (IT investments), strategy, innovation activities, workforce characteristics as critical success factors, together leading to change of business process practices, and the initiation of intrapreneurship as internal dynamics. It constitutes the new theoretical framework of this thesis. Hypotheses are formulated around the framework as the next step. In order to measure the study model, quantitative analysis is performed by creating and conducting a questionnaire. It is published and distributed in various online platforms. Collected data consisted of the answers of the employees from all

over the world, whose organizations are either digitally transformed already, or currently are in the process. SEM technique is applied on data, which includes 367 number of responses in total, to test measurement and structural model validity of the framework developed. Starting from the descriptive findings of the research, all analysis results and important implications will be given in the following.

Descriptive findings of the study show, that mid-range established, and large organizations are highly interested in implementing digital transformation internally. Largest group of the answered questionnaire is the professionals working in Sales and Marketing departments of IT sector, where the second largest group is found to be IT department professionals in IT sector. It is important to note that IT industry constitute the primary industry in terms of performing digital transformation. It is the only sector that stated the investment will be performed for all three categories in the following three years. Considering IT related digital technology investments engaged in the organizations, as Applications by 48.4% response rate, followed by Database Systems by 27.6%, show that firms conducting digital transformation are shifting to a data driven world. Structure among the variables for all the constructs are explored with EFA before testing the measurement and structural model validity. Results show that the sample can be conveniently used for the analysis, and giving further remarks on strategy, workforce characteristics and change on business process practices constructs for their specific items. Measurement model built on supported theories is tested via CFA to validate the preconceived theory. Results exhibit that loading estimates of all constructs performed higher than 0.50, providing sufficient value for further analysis. Validity of the measurement model is evaluated by convergent, discriminant, face, nomological validity standards and GOF indices and all are found to be relevant.

Assessment of the structural model is performed by the first validity check, which is carried out by comparing measurement model and structural model GOF indices. Comparison yielded acceptable results, verifying the availability for the further analysis. Standardized residuals and modification indices also produced no requirements for significant changes in the model; hence, final structural model is drawn without any change. The main study hypothesis was that organizations with a higher adaptation of critical success factors for digital transformation have a higher organization growth. It can be stated at this point, that there is a significant correlation with a higher adaptation of critical success factors towards digital transformation. And therefore, a higher level of digital transformation also leads to a higher organization growth. So, while other studies showed that either a business or a human capital perspective has an influence, the results of this thesis support, that a combination of both at the same time, even further accelerate the organization success. The second sub hypothesis was stating that, digital transformation driven strategy has a positive effect on change of business process practices. While this hypothesis could be supported, it also has a high impact on the top management of organizations. Meaning that a successful digital transformation will need a comprehensive strategy at first. The third sub hypothesis stated that, digital transformation driven strategy has a positive effect to initiate intrapreneurship. This hypothesis has been supported, indicating that a fruitful environment enhanced by top management strategy will result in a higher integration of the employees, which will result in a higher level of digital transformation. The fourth sub hypothesis stated that, higher innovation activities have a positive effect on change of business process practices. Whereas this hypothesis is mostly common sense, it could have also been supported under the scope of digital transformation. The fifth sub

hypothesis stated, that higher innovation activities have a positive effect to initiate intrapreneurship. Like the fourth hypothesis, this statement was common knowledge under the business perspective, but has yet further supported under the scope of digital transformation. The sixth sub hypothesis stated that, positive workforce characteristics will increase the intrapreneurship initiation. This is a very important conclusion, as it could affect the human resource orientation of the companies that are willing to proceed to digital transformation. Positive staff characteristics will increase the intrapreneurship of an organization. This is especially important for organizations which have constantly changing products and services and are dependent on new innovations. The seventh sub hypothesis stated that, change on business process practices is positively related to organization growth. As this is more of general business principles, it is important to see the constructs that are positively feeding BPP, as they are also having a significant impact on organization growth. These are primarily the strategy and the innovation activities within the organization. On the other hand, results rejected the first and eighth hypotheses that stated the positive effect of higher assets on changing business process practices in an organization, and the positive relevance of intrapreneurship initiation to organization growth, respectively.

In conclusion, critical success factors leading to a change in internal dynamics are assessed in the scope of digital transformation, together with their impact on the organization performance. The underlying motives for performing digital transformation are determined by this study, and the specification of critical success factors among various others is supported by both theoretical studies and business practices. Main inference about this study is that when innovational activities are performed together with a strong transformation driven strategy

decisions, it creates a positive impact on the change of business process practices, and leads to an increase in growth and sales in the organizations. Also, the characteristics of the employees in an organization plays a vital role to initiate intrapreneurship in the organizations. In overall, higher adaptation of success factors critical for digital transformation will result having a better economic growth performance.

5.2 Limitations of the study

Studying digital transformation subject throughout this study has given several implications and suggestions. Decisions about the overall structure is given according to the literature review, also to the knowledge and perspective of the attendees of the semi structured interviews. The new theoretical framework designed is limited by its content due to the comparison challenge of the proposed model to the other existing models in the literature. Also, the nature of the digital transformation is quite holistic, and it is composed of interrelation of several factors that serve to the same purpose. Hence, the study is challenged by relating the sub-items to each seven constructs separately in the theoretical framework. Since the effect of digital transformation under its relevance to business and human capital has not yet broadly discussed and analyzed by the researchers, validation of the theoretical framework could only be performed by the results from the quantitative analysis of the collected sample, yet it has been the best effort for the scope of this thesis, since it is well supported by the existing literature and views of experts working in the specific area. Exploratory factor analysis is performed additional to the confirmatory factor analysis and structural equation model. The reason of conducting dimension reduction methodology was to check if the sub-items are loaded to different constructs. Since the designed theoretical framework is new and

comparable studies do not appear explicitly in the literature, exploring the factors yielded helpful results while finalizing the model.

Rejected hypotheses were the positive effect of assets to the change in business process practices, and the positive effect of intrapreneurship initiation to organization growth. Section 2.4 gives a comprehensive summary about the IT investments performed, and their relevance to the business process practices change (Brynjolfsson and Hitt, 2003; Westerman and Bonnet, 2015). Trkman (2010) guides the top management for a successful business process management by asserting that conducting a sufficient level of IT investment will result in an effective altering of business processes. Section 2.3 provides a discussion of intrapreneurial activities performed in the organizations that lead to business performance improvements, as well as the growth in sales and profit (Antoncic and Hisrich, 2000; Auer Antoncic and Antoncic, 2011, Mokaya, 2012). The positive effect of intrapreneurship on the company profit is also exemplified in the study of Rule and Irwin (1988), as rewarding the intrapreneurs, via sharing the increased profit among the contributors. Alpkan et al. (2010) support the argument by stating that innovative performance is increased by intrapreneurship creation in human capital, adding that the changed human capital is a representative of the firm profitability at the organizational level. Literature review of regarding hypotheses present effective supportive arguments. Differences between theories and the findings of this study will be discussed from different perspectives in later paragraphs.

The sample of this thesis is limited to the professionals working in the organizations that are either transformed digitally or transforming currently. Even though no limitation is applied in terms of the countries and the industry of the

organizations, the collected data was populously from the organizations of the IT sector in Turkey. Additionally, the questionnaire is shared internally in a telecommunication company, therefore the responses derived are mainly from one ICT company. Results of the hypotheses could be oriented around the perspective of this specific sample. Broadening the variety of the organizations may change the supported and rejected arguments of the study.

Also, sample size was another limitation. Total number of the observed variables and the constructs in this study indicate to have a larger sample. Commonly 5 to 15 respondents per item are considered to be sufficient. Yet, 367 responses derived from the professionals served the overall purpose. With 12-13 respondents this thesis has a strong value. However, increasing it by around 20% would strengthen the current derived results of the study. In the questionnaire, grouping range of the company age and number of employees are designed as the best effort in terms of the expectations from the sample. By the dynamic changing nature of the subject (digital transformation), different grouping range can be performed in the future, and derived different remarks about the phase of the digital transformation based on the age and size of the organization.

5.3 Further remarks

There are several further research opportunities and future directions for this study. First, to assess the validity of new theoretical framework even further, additional interviews with academic experts and researchers in similar areas might be conducted. It would enable to redesign the existing constructs and (or) extend the number of constructs to assess a broader effect of digital transformation within the organizations. Other future work would be to redesign the structure of the questionnaire, revise the misunderstood statements, and conduct it again to get new

result which support the findings of this thesis. Increasing the variety of the organizations and reaching more countries, analyzing the sectoral and cultural differences while performing digital transformation would be a valuable direction for the researchers.

APPENDIX A

QUESTIONNAIRE

Welcome Dear Attendee,

This survey has been prepared by Övül Elest Gün, under the supervision of Assoc. Prof. Dr. Sona Mardikyan for the aim of a M.A. study at Boğaziçi University (Management Information Systems).

Aim of this study is to observe and analyze the impact of digital transformation centered critical success factors on the organizations' modern working environment. We would like to get answers from you, considering the organization you work in, regarding its scope.

All your answers will be kept confidential; personal or company specific information will not be requested.

It takes less than 10 minutes to complete the entire survey.

You can edit your answers any time until the survey is closed.

If you would like to be notified about the final results of the study, please fill in your e-mail at the end of the survey.

Please contact elestgun@gmail.com if you have any questions.

Part A – Company Age, Size, Department Info

1. Your Department*	□ IT □ Human Resources □ Sales & Marketing □ Finance □ Customer Relations □ Research & Development □ Other (Please specify)
2. Industry of your organization*	□ Information Technologies □ Banking □ Electronics □ E-Trade □ Education □ Food / Fast Consumer Goods □ Finance □ Textile □ Other(Please specify)
3. Age of your organization*	Checkbox (one forced answer) □ 0-5; □ 6-15 □ 16-25 □26-50; □ +50
4. Number of employees in your organization*	Checkbox (one forced answer) □ 0-20; □ 21-100 □ 101-500 □501-5000; □ +5000

Part B. IT Investment

5. Please answer the following statements according to your department's actions.

Question	Answers
Hardware	
Investment into IT related - Hardware (e.g. Servers, Data Center, Data Warehouse components)	Checkbox (multiple answers allowed) □ Invested - within last 3 years □ Investing - currently □ Planning - following 3 years □ No investments □ No knowledge
Effect of the investment performed/planned for IT Related-Hardware on your	Checkbox (one forced answer) □ Very effective □ Effective

department's digital transformation	□ Somewhat effective □ Little effective □ Not effective at all
Effect of the investment performed/planned for IT Related-Hardware on your daily business processes	Checkbox (one forced answer) □ Very effective □ Effective □ Somewhat effective □ Little effective □ Not effective at all
If Hardware investments had been performed, then it would change your daily business processes	Checkbox (one forced answer) □ Strongly agree □ Agree □ Undecided □ Disagree □ Strongly disagree
Software	
Investment into IT related - Software (e.g. AI, Big Data, Cloud Solutions)	Checkbox (multiple answers allowed) □ Invested - within last 3 years □ Investing - currently □ Planning - following 3 years □ No investments □ No knowledge
Effect of the investment performed/planned for IT Related - Software on your daily business processes	Checkbox (one forced answer) □ Very effective □ Effective □ Somewhat effective □ Little effective □ Not effective at all
If Software investments had been performed, then it would change your daily business processes	Checkbox (one forced answer) □ Strongly agree □ Agree □ Undecided □ Disagree □ Strongly disagree
Third Parties	
Investment into IT related - 3rd Party Services (e.g. Consulting, support)	Checkbox (multiple answers allowed) □ Invested - within last 3 years □ Investing - currently □ Planning - following 3 years □ No investments □ No knowledge
Categories of invested/planned IT Related	Checkbox (multiple answers allowed) □ Applications

3rd parties (consulting, support, etc.)	□ Database Systems □ ERP Solutions □ Cloud Solutions □ Artificial Intelligence □ Other (please specify)
Effect of the investment performed/planned for IT Related - 3rd parties on your daily business processes	Checkbox (one forced answer) □ Very effective □ Effective □ Somewhat effective □ Little effective □ Not effective at all
If 3rd party investments had been performed, then it would change your daily business processes	Checkbox (one forced answer) □ Strongly agree □ Agree □ Undecided □ Disagree □ Strongly disagree

Part C. Innovation, Workforce, Strategy

6. Please answer the following statements according to your organization's actions.

Questions	Answers
My organization is empowering innovation	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization enables connectivity of different systems via digital solutions (IoT, Big Data, Cloud Computing, etc.)	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization develops innovative marketing strategies to offer their products and services	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization empowers new products and services	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree

If organizational, marketing or product innovations are performed, it changes daily business processes	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization is facing a high competitiveness in the national market	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Competitive strategy followed by my organization is changing my daily business processes	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My executives support necessary changes for the success of my daily business processes	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization is emphasizing on employee involvement in decision making	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization is frequently reorganizing departments and functions	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization is empowering the automation of daily business processes	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization is empowering the standardization of daily business processes	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Routine tasks are complicated and difficult to perform in my department	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Business complexity requires transforming daily business processes	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree

There is a collaboration between departments within my organization	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
My organization is offering time to employees for self-improvement and producing innovation	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree

Part D. Direct Intrapreneurship Questions

7. Please answer the following statements according to the intrapreneurship definition below.

Intrapreneurship is a method of using the entrepreneurial spirit in an organization by which employees take their own initiative in creating renewal and innovation for their organization.

According to the definition, do you find intrapreneurship within your organization?	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
If organizational, marketing or product innovations are performed, it creates intrapreneurship within the organization	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Employee involvement in decision making has a positive effect to create intrapreneurship within the organization	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Reorganizing the departments and functions are important to initiate intrapreneurship within the organization	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Top management support is necessary to initiate intrapreneurship within the organization	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree

Characteristics of the employees are important to initiate intrapreneurship within the organization	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree

8. Please rate the characteristics of the employees in your department.

Noncompetitive	1	2	3	4	5	Competitive
Reactive	1	2	3	4	5	Proactive
Non risk taker	1	2	3	4	5	Risk taker
Diffident	1	2	3	4	5	Confident
Unmotivated	1	2	3	4	5	Motivated

Part E - Organization Growth, Profit and Sales

9. Please answer the following statements under the digitalization scope of your organization.

In the last year, my organization's total sales increased compared to the previous year	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Total sales of my organization increased in the last 3 years	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Total sales are projected to grow in the next 3 years	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Average annual profits increased in the last 3 years	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided

	□ Disagree; □ Strongly Disagree
Rate the profitability of your organization in comparison to your competitors in similar age and size	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree
Rate the profitability of your organization in comparison to all the competitors in the market	Checkbox (5-Likert Scale) □ Strongly agree; □ Agree □ Undecided □ Disagree; □ Strongly Disagree

10. Would you like to be notified about the results?

Type your email here _____

APPENDIX B

QUESTIONNAIRE (TURKISH)

Sayın Katılımcı, öncelikle hoşgeldiniz.

Bu anket Boğaziçi Üniversitesi Yönetim Bilişim Sistemleri Yüksek Lisans Programı öğrencisi Övül Elest Gün'ün Doç Dr. Sona Mardikyan danışmanlığında gerçekleştirdiği tez çalışması kapsamında hazırlanmıştır.

Amacı dijital dönüşüm odaklı kritik başarı faktörlerinin kurumların modern çalışma alanı üzerine etkisini gözlemlemek ve karşılaştırmalı analizini yapmak olan bu araştırmada sizden çalıştığınız kurum kapsamında yanıtlar almak istiyoruz.

Bu araştırma bilimsel nitelik taşıdığından verdiğiniz bütün yanıtlar gizli tutulacak ve kişisel bilgileriniz istenmeyecektir.

Bütün soruların cevaplanması yaklaşık 10 dk sürmektedir.

Sonuçlar hakkında bilgi sahibi olmak isterseniz çalışma tamamlandığında sizinle iletişime geçebilmemiz için lütfen en sonda yer alan iletişim kutucuğuna e-posta adresinizi yazın.

Sorularınız olması durumunda iletişim için elestgun@gmail.com adresine e-posta gönderin.

Katkılarınız için şimdiden çok teşekkür ederiz.

A Bölümü - Organizasyon ve Çalışan Bilgileri

1. Çalıştığınız departman*	□ IT □ İnsan Kaynakları □ Satış & Pazarlama □ Finans □ Müşteri İlişkileri □ AR & GE □ Diğer (Lütfen belirtin)
2. Çalıştığınız kurumun sektörü*	□ Bilgi ve İletişim Teknolojileri □ Bankacılık □ Elektrik & Elektronik □ E-Ticaret □ Gıda & Hızlı Tüketim Ürünleri □ Finans □ Tekstil □ Eğitim □ Diğer (Lütfen belirtin)
3. Çalıştığınız kurumun yaşı*	Checkbox (5-Likert Scale) □ 0-5; □ 6-15 □ 16-25 □26-50; □ +50
4. Kurumdaki çalışan sayısı*	Checkbox (5-Likert Scale) □ 0-20; □ 21-100 □ 101-500 □501-5000; □ +5000

B Bölümü – IT Altyapısı

5. Lütfen aşağıdaki ifadeleri ve soruları sizin veya departmanınızın aldığı/planladığı aksiyonlara göre cevaplandırın.

Soru	Cevaplar
DONANIM	
Departmanınızda IT ilişkili Donanım için yapılan yatırım (Sunucu, Veri Merkezi, Veri Deposu bileşenleri vb.)	Checkbox (multiple answer) □ yapıldı - son 3 yıl içinde □ yapılıyor - şu anda □ planlanıyor -önümüzdeki 3 yıl içinde □ yapılmıyor □ bilgim yok
Yatırımların Dijital Dönüşüme Etkisi	

IT ilişkili donanım için yapılan/planlanan yatırımın departmanınızın dijital dönüşümüne etkisi	Checkbox (5-Likert Scale) □ Çok etkili □ Etkili □ Biraz etkili □ Etkili değil □ Hiç etkili değil
Günlük iş süreçlerine etki	
Departmanınızda yapılan/planlanan donanım yatırımlarının günlük iş süreçlerinize etkisi	Checkbox (5-Likert Scale) □ Çok etkili □ Etkili □ Biraz etkili □ Etkili değil □ Hiç etkili değil
Donanım için yatırım yapılsaydı bu günlük iş süreçlerini değiştirirdi	Checkbox (5-Likert Scale) □ Kesinlikle katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle katılmıyorum
YAZILIM	
Departmanınızda IT ilişkili yazılım için yatırım (örn. Büyük Veri, Yapay Zeka, Bulut Çözümleri vb.)	Checkbox (multiple answer) □ yapıldı - son 3 yıl içinde □ yapılıyor - şu anda □ planlanıyor - sonraki 3 yıl içinde □ yapılmıyor □ bilgim yok
Günlük iş süreçlerine etki	
Departmanınızdaki yazılım yatırımlarının günlük iş süreçlerine etkisi	Checkbox (5-Likert Scale) □ Çok etkili □ Etkili □ Biraz etkili □ Etkili değil □ Hiç etkili değil
Yazılım için yatırım yapılsaydı bu günlük iş süreçlerini değiştirirdi	Checkbox (5-Likert Scale) □ Kesinlikle katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle katılmıyorum
DIŞ KAYNAK	
Departmanınızda IT ilişkili dış kaynak yatırımı (danışmanlık, destek vb.)	Checkbox (5-Likert Scale) □ yapıldı - son 3 yıl içinde □ yapılıyor - şu anda □ planlanıyor - sonraki 3 yıl içinde □ yapılmıyor □ bilgim yok

Yatırım yapılan IT ilişkili dış kaynakların bulunduğu kategoriler (danışmanlık/destek vb.)	Checkbox (multiple answer) □ Uygulamalar □ Veritabanı □ ERP çözümleri □ Bulut Çözümleri □ Yapay Zeka □ Diğer - lütfen belirtin
Günlük iş süreçlerine etki	
Departmanınızdaki dış kaynak yatırmlarının günlük iş süreçleriniz üzerinde gerçekleşen/beklenen etkisi	Checkbox (5-Likert Scale) □ Çok etkili □ Etkili □ Biraz etkili □ Etkili değil □ Hiç etkili değil
Dış kaynak için yatırım yapılsaydı bu günlük iş süreçlerini değiştirirdi	Checkbox (5-Likert Scale) □ Kesinlikle katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle katılmıyorum

C Bölümü – İnovasyon, İşgücü, Strateji

6. Lütfen aşağıdaki ifadeleri veya soruları çalıştığınız kurumun aksiyonlarına göre cevaplandırın.

Soru	Cevaplar
Şirketim inovasyonu teşvik eder	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim farklı sistemlerin birbiri ile konuşmasına (IoT, Büyük Veri, Bulut Bilişim vb. dijital çözümler aracılığıyla) olanak sağlar	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim ürün ve hizmetlerini sunarken yenilikçi pazarlama stratejileri geliştirir	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım

	□ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim yeni ürün ve servisler yaratır	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Organizasyon, pazarlama ya da üründe inovasyon yapılırsa bu günlük iş süreçlerini değiştirir	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim ulusal pazarda yüksek bir rekabet ile karşı karşıyadır	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim tarafından takip edilen rekabet stratejisi günlük iş süreçlerini değiştirir	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Yöneticilerim günlük iş süreçlerinin verimi için gerekli değişiklikleri destekler/takip eder	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim karar verme süreçlerine çalışanları dahil etmeye önem verir	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim sıklıkla departman, bölüm ve birimleri yeniden organize eder	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketim günlük iş süreçlerinin otomatize edilmesini teşvik eder	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum

Şirketim günlük iş süreçlerinin standardize edilmesini teşvik eder	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Departmanımdaki rutin görevler karmaşık ve gerçekleştirmesi zordur	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
İş karmaşıklığı günlük iş süreçlerinin dijitalleştirilmesini gerektirir	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketimde farklı departmanlar arasında işbirliği vardır	Checkbox (5-Likert Scale) □ Kesinlikle katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle katılmıyorum
Şirketim çalışanlarına kendini geliştirme ve yenilik üretme imkanı sunar	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum

D Bölümü - Direkt Kurum İçi Girişimcilik Soruları

7. Lütfen gelecek soruları aşağıdaki tanıma göre cevaplandırın.

Çalışanların şirketleri için yenileme ve yenilik yaratma konusunda kendi inisiyatiflerini almalarını sağlayarak kurum içinde girişim ruhu kullanma metodudur.

Yukarıdaki tanıma göre, şirketinizde kurum içi Girişimcilik var mı?	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Organizasyonda, üründe veya pazarlamada yapılan	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım

inovasyonlar şirket içi Girişimciliğin oluşmasını sağlar	□ Katılmıyorum; □ Kesinlikle Katılmıyorum
Karar verme sürecine çalışanın dahil olması, kurum içinde Girişimcilik oluşturma konusunda olumlu bir etkiye sahiptir.	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Fonksiyon ve departmanların yeniden düzenlenmesi, kurum içinde Girişimciliği başlatmak için önemlidir.	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Kurum içinde Girişimcilik başlatmak için üst düzey yönetimin desteği gereklidir	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Çalışanların karakteristik özellikleri kurum içi Girişimciliği yaratmada etkilidir	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum

8. Lütfen kendi bölümünüzdeki çalışanların karakteristik özelliklerinin derecesini değerlendirin.

Rekabetçi olmayan	1	2	3	4	5	Rekabetçi
Reaktif	1	2	3	4	5	Proaktif
Risk almayan	1	2	3	4	5	Risk alan
Kendine güvenmeyen	1	2	3	4	5	Kendine güvenen
Motive olmayan	1	2	3	4	5	Motive

E Bölümü - Kurum Büyümesi - Satış, Karlılık

9. Lütfen aşağıdaki soruları kurumunuzun dijitalleşmesi kapsamında değerlendirerek cevaplayın.

Soru	Cevaplar
Son yılda şirketimin toplam satışı önceki yıla göre büyüdü	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Son 3 yılda şirketimin toplam satışı artış gösterdi	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Önümüzdeki 3 yılda toplam satışta büyüme öngörülüyor	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Son üç yılda elde edilen ortalama yıllık kar artış gösterdi	Checkbox (5-Likert Scale) □ Kesinlikle Katılıyorum; □ Katılıyorum □ Kararsızım □ Katılmıyorum; □ Kesinlikle Katılmıyorum
Şirketinize benzer büyüklükte ve yaşta rakipler ile karşılaştırıldığında, şirketinizin karlılığı …	Checkbox (5-Likert Scale) □ çok daha fazla □ biraz fazla □ aşağı yukarı aynı □ biraz az □ çok daha az
Pazardaki tüm rakipler ile karşılaştırıldığında, şirketinizin karlılığı …	Checkbox (5-Likert Scale) □ çok daha fazla □ biraz fazla □ aşağı yukarı aynı □ biraz az □ çok daha az

10. Çıkacak sonuçlar hakkında bilgi sahibi olmak ister misiniz?
E-postanızı buraya yazın _____

APPENDIX C

FACTORS AND OBSERVED VARIABLES

Factors	Relevant References	Observed Variables	Detail
Assets (IT investments)	Rai et al., 1997; Brynjolfsson and Hitt, 20013; McKinsey & Company, 2015	AS1	Investment into IT related Hardware has been performed in my department
		AS2	Investment into IT related Software has been performed in my department
		AS3	Investment into IT related 3rd Parties has been performed in my department
Innovation activities	Bouwman et al., 2018; Reichstein et al., 2018; Antoncic, 2007; Loebbecke and Picot, 2015	IA1	My organization is empowering innovation
		IA2	My organization enables connectivity of different systems via digital solutions
		IA3	My organization develops innovative marketing techniques to offer their products and services
		IA4	My organization empowers new products and services
Transformation driven Strategy	Bouwman et al., 2018; Foss and Saebi, 2017; De Villiers and Foba, 2007	ST1	My organization is emphasizing on employee involvement in decision making
		ST2	My organization is frequently reorganizing departments and functions
		ST3	My organization is empowering the automation of daily business processes
		ST4	My organization is empowering the standardization of daily business processes
Workforce characteristics	Antoncic and Hisrich, 2001, 2003; Benitez-Amado et al., 2010; Covin and Slevin, 1991	WO1	Competitiveness exists among the employees in my department
		WO2	Proactiveness exists in employees at my department
		WO3	Risk taking exists in employees at my department
		WO4	Self-confidence exists in employees at my department
		WO5	Motivation exists in employees at my department

Change of business process practices	Reichstein et al., 2018, BarNir et al., 2003; Denner et al., 2018	BPP1	If IT related Hardware, Software, and 3rd Party investments performed, it changes daily business processes
		BPP2	If organizational, marketing and/or product innovations performed, it changes daily business processes
		BPP3	Competitive orientation of my organization changes daily business processes
Intrapreneurship initiation	De Villiers and Foba, 2007; Amo and Kolvereid, 2005; Berkeley, 2010; Zahra, 1991	INT1	There is intrapreneurship in my organization
		INT2	Organizational, marketing and/or product innovations initiates intrapreneurship within the organization
		INT3	Employee involvement in decision making has a positive effect to initiate intrapreneurship within the organization
		INT4	Reorganizing departments and functions are important to initiate intrapreneurship within the organization
Organization Growth	Ashurst et al., 2008; Kotarba, 2017; Trkman, 2010	OG1	My organization's total sales increased in the last year in comparison to the previous year
		OG2	Total sales of my organization increased in the last 3 years
		OG3	Total sales are projected to grow in the next 3 years
		OG4	Average annual profit increased in the last 3 years
		OG5	Profitability of my organization is larger in comparison to my competitors in similar age and size

APPENDIX D

MODIFICATION INDICES OF STRUCTURAL MODEL

(All <--> symbols refer to a relationship between the variables, therefore they do not have space in between the characters.)

Modification Indices

Covariance

			M.I.	Par Change
e30	<-->	e28	6.701	-0.027
e50	<-->	Assets	5.689	-0.062
e50	<-->	e30	10.678	-0.096
e50	<-->	e51	20.775	0.16
e49	<-->	e30	4.342	-0.049
e49	<-->	e50	4.271	0.049
e48	<-->	Workforce	5.623	-0.06
e48	<-->	e28	15.859	0.051
e48	<-->	e30	4.97	0.072
e48	<-->	e51	6.523	0.098
e48	<-->	e50	6.413	0.083
e46	<-->	e30	6.968	-0.08
e46	<-->	e49	4.354	0.051
e45	<-->	Workforce	6.696	0.048
e45	<-->	Strategy	5.186	-0.055
e45	<-->	Assets	5.52	0.049
e45	<-->	e29	9.938	-0.065
e44	<-->	e45	7.304	0.053
e43	<-->	e50	5.644	-0.047
e43	<-->	e46	4.17	-0.041
e43	<-->	e44	4.332	-0.033
e42	<-->	Assets	7.666	-0.053
e42	<-->	e49	4.567	-0.037
e42	<-->	e46	7.267	-0.061
e42	<-->	e44	4.435	-0.038
e42	<-->	e43	19.418	0.061
e41	<-->	Workforce	9.132	0.079
e41	<-->	Innovation Activities	8.186	0.089

e41	<-->	e29	19.729	-0.124
e41	<-->	e28	7.26	-0.036
e41	<-->	e50	11.528	-0.116
e41	<-->	e48	8.869	-0.11
e41	<-->	e46	8.93	0.105
e40	<-->	e50	7.893	0.08
e40	<-->	e45	4.101	-0.046
e39	<-->	Innovation Activities	11.153	-0.089
e39	<-->	e29	5.671	0.057
e39	<-->	e48	31.74	0.178
e39	<-->	e43	7.636	0.053
e39	<-->	e41	14.95	-0.125
e39	<-->	e40	5.187	0.06
e38	<-->	Strategy	6.165	0.083
e38	<-->	e51	5.253	-0.091
e38	<-->	e43	4.252	-0.046
e37	<-->	e41	4.777	-0.077
e36	<-->	Workforce	6.585	-0.057
e36	<-->	e29	4.882	-0.054
e36	<-->	e37	46.384	0.203
e35	<-->	e49	5.358	0.054
e35	<-->	e48	6.285	-0.08
e34	<-->	Innovation Activities	4.665	0.073
e34	<-->	Assets	6.114	-0.079
e34	<-->	e41	4.683	0.091
e34	<-->	e40	5.806	-0.085
e33	<-->	e36	4.147	-0.059
e27	<-->	e49	5.104	-0.048
e27	<-->	e40	6.846	-0.067
e27	<-->	e33	4.591	-0.058
e14	<-->	e51	6.207	-0.08
e14	<-->	e41	8.859	0.093
e13	<-->	Assets	7.018	0.072
e13	<-->	e30	4.063	-0.062
e13	<-->	e49	4.724	0.054
e13	<-->	e46	10.27	0.104
e13	<-->	e34	6.478	-0.099
e13	<-->	e33	4.134	0.064
e13	<-->	e14	9.362	0.086
e12	<-->	e30	4.757	0.06
e12	<-->	e39	6.782	-0.07

e12	<-->	e34	13.363	0.125
e5	<-->	e30	6.703	-0.079
e5	<-->	e51	8.839	0.108
e5	<-->	e45	4.314	-0.052
e5	<-->	e36	9.337	-0.09
e5	<-->	e14	4.658	-0.061
e4	<-->	Workforce	11.36	0.086
e4	<-->	e41	8.865	0.113
e4	<-->	e38	11.247	0.126
e4	<-->	e37	10.419	-0.111
e4	<-->	e5	10.248	0.109
e3	<-->	e39	4.547	0.053
e2	<-->	e35	6.406	0.071
e2	<-->	e13	10.025	0.095
e1	<-->	e28	4.219	0.027
e1	<-->	e30	4.246	0.068
e1	<-->	e45	6.239	0.067
e1	<-->	e14	8.538	-0.089
e1	<-->	e12	4.845	0.068

Variances:

	M.I.	Par Change

Regression Weights

			M.I.	Par Change
BPP3	<---	BPP2	13.245	0.192
BPP3	<---	INTRA4	6.013	0.118
BPP2	<---	Assets	5.078	-0.163
BPP2	<---	Organization Growth	5.449	-0.112
BPP2	<---	BPP3	11.69	0.134
BPP2	<---	INTRA4	5.992	0.101
BPP2	<---	OG3	8.296	-0.124
BPP2	<---	OG2	8.625	-0.13
BPP2	<---	AS1	6.784	-0.123
BPP1	<---	OG1	4.601	-0.068
INTRA4	<---	Organization Growth	4.76	0.115
INTRA4	<---	BPP3	6.314	0.103

INTRA4	<---	BPP2	6.353	0.123
INTRA4	<---	OG4	5.458	0.101
INTRA4	<---	OG2	4.233	0.1
INTRA4	<---	OG1	5.063	0.099
INTRA4	<---	INTRA3	12.118	0.153
INTRA4	<---	WO2	7.07	-0.117
OG5	<---	Innovation Activities	10.265	0.154
OG5	<---	Strategy	7.817	0.127
OG5	<---	Intrapreneurship	8.383	0.178
OG5	<---	Change BPP	9.561	0.408
OG5	<---	BPP3	7.14	0.104
OG5	<---	BPP1	10.104	0.193
OG5	<---	INTRA1	14.521	0.137
OG5	<---	INTRA2	6.868	0.103
OG5	<---	ST3	5.909	0.09
OG5	<---	IA1	4.579	0.081
OG5	<---	IA2	17.759	0.146
OG5	<---	IA3	7.651	0.103
OG5	<---	ST1	8.104	0.11
OG4	<---	Assets	5.354	0.135
OG4	<---	Intrapreneurship	5.117	-0.109
OG4	<---	INTRA2	7.113	-0.082
OG4	<---	INTRA3	5.757	-0.078
OG4	<---	AS2	4.176	0.067
OG4	<---	AS3	9.727	0.1
OG3	<---	BPP3	4.101	0.063
OG3	<---	ST3	4.886	0.066
OG2	<---	BPP3	4.304	-0.052
OG2	<---	BPP2	7.439	-0.081
OG2	<---	WO5	4.452	-0.05
OG1	<---	Assets	8.459	-0.155
OG1	<---	BPP1	4.622	-0.093
OG1	<---	OG5	4.192	-0.061
OG1	<---	AS1	5.307	-0.08
OG1	<---	AS2	7.231	-0.081
OG1	<---	AS3	4.836	-0.064

INTRA1	<---	Workforce	21.494	0.377
INTRA1	<---	Innovation Activities	19.255	0.232
INTRA1	<---	Strategy	12.386	0.177
INTRA1	<---	Change BPP	12.981	0.523
INTRA1	<---	Organization Growth	6.009	0.134
INTRA1	<---	INTRA4	5.716	-0.112
INTRA1	<---	OG5	13.967	0.171
INTRA1	<---	OG2	5.072	0.114
INTRA1	<---	INTRA3	5.861	-0.111
INTRA1	<---	WO5	15.733	0.162
INTRA1	<---	ST3	7.496	0.112
INTRA1	<---	WO2	14.722	0.176
INTRA1	<---	WO3	19.152	0.163
INTRA1	<---	WO4	5.221	0.11
INTRA1	<---	IA4	15.336	0.167
INTRA1	<---	IA1	24.595	0.207
INTRA1	<---	IA2	12.566	0.135
INTRA1	<---	IA3	14.94	0.159
INTRA1	<---	ST1	7.141	0.113
INTRA1	<---	ST2	18.067	0.157
INTRA2	<---	OG4	6.616	-0.097
INTRA2	<---	OG2	4.499	-0.089
INTRA2	<---	WO3	6.061	-0.076
INTRA2	<---	IA4	4.643	-0.076
INTRA3	<---	Innovation Activities	10.39	-0.146
INTRA3	<---	Change BPP	7.207	-0.333
INTRA3	<---	INTRA4	20.489	0.181
INTRA3	<---	OG5	5.689	-0.093
INTRA3	<---	OG4	4.763	-0.084
INTRA3	<---	OG3	4.799	-0.092
INTRA3	<---	INTRA1	6.237	-0.085
INTRA3	<---	ST3	4.566	-0.075
INTRA3	<---	IA4	5.325	-0.084

INTRA3	<---	IA1	8.645	-0.105
INTRA3	<---	IA2	9.859	-0.102
INTRA3	<---	IA3	14.888	-0.136
WO5	<---	INTRA1	4.522	0.083
WO5	<---	ST2	8.415	0.106
ST4	<---	INTRA1	5.924	-0.088
ST4	<---	ST3	12.86	0.134
ST3	<---	OG3	4.031	0.084
ST3	<---	ST4	22.225	0.177
ST3	<---	WO2	4.295	-0.081
ST3	<---	WO4	6.197	-0.103
WO2	<---	BPP1	4.393	0.12
WO2	<---	INTRA4	4.28	-0.083
WO2	<---	AS2	4.07	0.08
WO3	<---	IA3	7.332	0.121
WO3	<---	AS2	4.44	-0.106
WO4	<---	ST3	8.55	-0.092
WO4	<---	IA4	6.685	-0.097
IA1	<---	BPP3	4.458	-0.073
IA1	<---	INTRA1	6.757	0.083
IA1	<---	AS3	7.161	-0.097
IA2	<---	Assets	5.906	0.184
IA2	<---	OG1	4.255	-0.087
IA2	<---	WO3	4.758	-0.075
IA2	<---	AS2	10.224	0.136
IA3	<---	OG4	4.347	0.077
IA3	<---	OG3	5.411	0.093
IA3	<---	WO3	12.458	0.107
ST1	<---	BPP3	5.989	0.095
ST1	<---	OG4	5.713	-0.098
ST2	<---	Workforce	5.699	0.19
ST2	<---	INTRA1	8.536	0.114
ST2	<---	WO5	13.415	0.147
ST2	<---	ST4	4.957	-0.096
ST2	<---	WO2	4.089	0.091
ST2	<---	ST1	4.33	0.087
AS1	<---	Workforce	5.317	-0.14
AS1	<---	Innovation Activities	5.746	-0.095

AS1	<---	Change BPP	4.611	-0.233
AS1	<---	BPP2	6.944	-0.1
AS1	<---	WO5	6.894	-0.08
AS1	<---	WO2	4.418	-0.072
AS1	<---	IA4	5.343	-0.073
AS1	<---	IA3	7.259	-0.083
AS2	<---	Workforce	4.975	0.153
AS2	<---	Innovation Activities	4.568	0.096
AS2	<---	WO5	4.773	0.075
AS2	<---	WO2	8.954	0.116
AS2	<---	IA1	5.239	0.081
AS2	<---	IA2	11.508	0.109
AS2	<---	ST1	4.54	0.076
AS3	<---	OG4	6.864	0.116

REFERENCES

Alpkan, L., Bulut, C., Gunday, G., Ulusoy, G., & Kilic, K. (2010). Organizational support for intrapreneurship and its interaction with human capital to enhance innovative performance. *Management Decision*, *48*(5), 732-755.

Åmo, B. W., & Kolvereid, L. (2005). Organizational strategy, individual personality and innovation behavior. *Journal of Enterprising Culture*, *13*(01), 7-19.

Antoncic, B. (2007). Intrapreneurship: a comparative structural equation modeling study. *Industrial Management & Data Systems*, *107*(3), 309-325.

Antoncic, B., & Hisrich, R. D. (2000). Intrapreneurship modeling in transition economies: A comparison of Slovenia and the United States. *Journal of Developmental Entrepreneurship*, *5*(1), 21.

Antoncic, B., & Hisrich, R. D. (2001). Intrapreneurship: Construct refinement and cross-cultural validation. *Journal of Business Venturing*, *16*(5), 495-527.

Antoncic, B., & Hisrich, R. D. (2003). Clarifying the intrapreneurship concept. *Journal of Small Business and Enterprise Development*, *10*(1), 7-24.

Ashurst, C., Doherty, N. F., & Peppard, J. (2008). Improving the impact of IT development projects: the benefits realization capability model. *European Journal of Information Systems*, *17*(4), 352-370.

Auer Antoncic, J., & Antoncic, B. (2011). Employee satisfaction, intrapreneurship and firm growth: A model. *Industrial Management & Data Systems*, *111*(4), 589-607.

BarNir, A., Gallaugher, J. M., & Auger, P. (2003). Business process digitization, strategy, and the impact of firm age and size: the case of the magazine publishing industry. *Journal of Business Venturing*, *18*(6), 789-814.

Benitez-Amado, J., Llorens-Montes, F. J., & Nieves Perez-Arostegui, M. (2010). Information technology-enabled intrapreneurship culture and firm performance. *Industrial Management & Data Systems*, *110*(4), 550-566.

Benner, M. J., & Tushman, M. L. (2015). Reflections on the 2013 Decade Award - "Exploitation, exploration, and process management: The productivity dilemma revisited" ten years later. *Academy of Management Review, 40*(4), 497-514.

Berkeley, U. C. (2010). *Guide to Managing Human Resources.* Berkeley, CA: University of California.

Bhatt, G. D. (2000). An empirical examination of the effects of information systems integration on business process improvement. *International Journal of Operations & Production Management, 20*(11), 1331-1359.

Bouwman, H., Nikou, S., Molina-Castillo, F. J., & de Reuver, M. (2018). The impact of digitalization on business models. *Digital Policy, Regulation and Governance, 20*(2), 105-124.

Bresnahan, T., & Greenstein, S. (2014). Mobile computing: The next platform rivalry. *American Economic Review, 104*(5), 475-80.

Brynjolfsson, E., & Hitt, L. M. (2003). Computing productivity: Firm-level evidence. *Review of economics and statistics, 85*(4), 793-808.

Cherry, M. A. (2015). Beyond misclassification: The digital transformation of work. *Comparative Labor Law & Policy Journal, 37*, 577.

Chesbrough, H. (2010). Business model innovation: opportunities and barriers. *Long Range Planning, 43*(2-3), 354-363.

Churchill, N. C. (1992). Research issues in entrepreneurship. Sexton, D.L. and Kasarda, J.D.(Eds). *The State of the Art of Entrepreneurship* (pp 579-596). Boston, MA:PWS-Kent Publishers.

Covin, J. G., & Slevin, D. P. (1991). A conceptual model of entrepreneurship as firm behavior. *Entrepreneurship Theory and Practice, 16*(1), 7-26.

Cruz-Cázares, C., Bayona-Sáez, C., & García-Marco, T. (2013). You can't manage right what you can't measure well: Technological innovation efficiency. *Research Policy, 42*(6-7), 1239-1250.

Damanpour, F., & Gopalakrishnan, S. (2001). The dynamics of the adoption of product and process innovations in organizations. *Journal of management studies*, *38*(1), 45-65.

De Meyer, A. C. L., Loch, C. H., & Pich, M. T. (2002). Managing project uncertainty: from variation to chaos. *MIT Sloan Management Review*, *43*(2), 60.

De Villiers, D., & Foba, T. W. (2007). The integration of intrapreneurship into a performance management model. *SA Journal of Human Resource Management*, *5*(2), 1-8.

Denner, M. S., Püschel, L. C., & Röglinger, M. (2018). How to exploit the digitalization potential of business processes. *Business & Information Systems Engineering*, *60*(4), 331-349.

Evans, D., Leighton, S., & Linda, S. (1990). Some empirical aspects of entrepreneurship. *The economics of small firms* (pp 79-99). Dordrecht, NL:Springer.

Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2014). Embracing digital technology: A new strategic imperative. *MIT sloan management review*, *55*(2), 1.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), 39-50.

Foss, N. J., & Saebi, T. (2017). Fifteen years of research on business model innovation: how far have we come, and where should we go?. *Journal of Management*, *43*(1), 200-227.

Gens, F. (2013). The 3rd platform: Enabling digital transformation. USA: IDC, 209. Retrieved from http://www.etransformation.fr/wp-content/uploads/2014/10/IDC-3rd-Platform-Enabling-Digital-Transformation.pdf

Gens, F. (2016). IDC FutureScape: Worldwide IT Industry 2017 Predictions. USA: IDC. Retrieved from https://www.nextview.nl/wp-content/uploads/2018/05/IDC-FutureScape-Worldwide-Cloud-2017-Predictions-1.pdf

Gimpel, H., & Röglinger, M. (2015). Digital transformation: Changes and Chances – Insights based on an empirical study. *Project Group Business and Information Systems Engineering (BISE) of the Fraunhofer Institute for Applied Information Technology FIT*. Retrieved from https://www.fim-rc.de/wp-content/uploads/Fraunhofer-Studie_Digitale-Transformation.pdf

Google Trends (2019, May 13). Searchword: Digital Transformation. Retrieved from https://trends.google.com/trends/explore?date=today%205-y&q=Digital%20Transformation

Guth, W. D., & Ginsberg, A. (1990). Guest editors' introduction: Corporate entrepreneurship. *Strategic management journal, Special Issue: Corporate Entrepreneurship 11*, 5-15.

Hair, J., Black, W., Babin, B., & Anderson, R. (2010). *Multivariate Data Analysis (7th ed.).* Upper Saddle River, NJ: Prentice-Hall, Inc.

Harrington, H. J. (1991*). Business process improvement: The breakthrough strategy for total quality, productivity, and competitiveness.* McGraw Hill Professional.

Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization, 28*(1), 52-61.

Iansiti, M. (1995). Shooting the rapids: Managing product development in turbulent environments. *California Management Review, 38*(1), 37-58.

IBM Knowledge Center. (2019). Using Factor Analysis for Structure Detection - KMO and Bartlett's Test. Retrieved from https://www.ibm.com/support/knowledgecenter/SSLVMB_26.0.0/statistics_casestudies_project_ddita/spss/tutorials/fac_telco_kmo_01.html

IDG International Data Group. (2018). State of Digital Business Transformation. Retrieved from https://cdn2.hubspot.net/hubfs/1624046/Digital%20Business%20Executive%20Summary_FINAL.pdf

International ICT Literacy Panel (2002). Digital transformation: A framework for ICT literacy. *Educational Testing Service*. Retrieved from https://www.ets.org/Media/Research/pdf/ICTREPORT.pdf

Kagioglou, M., Cooper, R., & Aouad, G. (2001). Performance management in construction: a conceptual framework. *Construction management and economics*, *19*(1), 85-95.

Kandiah, G., & Gossain, S. (1998). Reinventing value: The new business ecosystem. *Strategy & leadership*, *26*(5), 28-33.

Kent, C. A., Sexton, D. L., & Vesper, K. H. (1982). Encyclopedia of entrepreneurship. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*.

Knight, G. A. (1997). Cross-cultural reliability and validity of a scale to measure firm entrepreneurial orientation. *Journal of Business Venturing*, *12*(3), 213-225.

Kobrin, S. J. (1998). Back to the future: Neomedievalism and the postmodern digital world economy. *Journal of International Affairs*, *51*(2), 361-386.

Kotarba, M. (2017). Measuring digitalization–key metrics. *Foundations of Management*, *9*(1), 123-138.

Labaye, E., & Remes, J. (2015). Digital technologies and the global economy's productivity imperative. *Digiworld Economic Journal*, *100*, 47.

Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *The Journal of Strategic Information Systems*, *24*(3), 149-157.

Lyytinen, K., Yoo, Y., & Boland Jr, R. J. (2016). Digital product innovation within four classes of innovation networks. *Information Systems Journal*, *26*(1), 47-75.

Markus, M. L., & Benjamin, R. I. (1997). The magic bullet theory in IT-enabled transformation. *Sloan Management Review*, *38*, 55-68.

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering*, *57*(5), 339-343.

McKinsey & Company (2015). Digital America: A tale of the haves and have-mores. Retrieved from https://www.mckinsey.com/~/media/McKinsey/Industries/High%20Tech/Our%20Insights/Digital%20America%20A%20tale%20of%20the%20haves%20and%20have%20mores/Digital%20America%20Full%20Report%20December%202015.ashx

Millot, V. (2009). *Trademarks as an indicator of product and marketing innovations.* OECD Science, Technology and Industry Working Papers, No. 06, OECD Publishing, Paris.

Mohr, J. J., Sengupta, S., & Slater, S. F. (2010). *Marketing of high-technology products and innovations.* Upper Saddle River, NJ: Prentice-Hall.

Mokaya, S. O. (2012). Corporate entrepreneurship and organizational performance, Theoretical perspectives approaches and outcomes. *International Journal of Arts and Commerce, 1*(4), 133-143.

Nambisan, S. (2013). Information technology and product/service innovation: A brief assessment and some suggestions for future research. *Journal of the Association for Information Systems, 14*(4), 1.

Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management: Reinventing innovation management research in a digital world. *MIS Quarterly, 41*(1), 223-238.

Patel, K., & McCarthy, M. P. (2000). *Digital transformation: the essentials of e-business leadership.* New York: McGrew-Hill.

Pinchot III, G. (1985). *Intrapreneuring: Why you don't have to leave the corporation to become an entrepreneur.* Urbana-Champaign: University of Illinois Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.

Rai, A., Patnayakuni, R., & Patnayakuni, N. (1997). Technology investment and business performance. *Communications of the ACM, 40*(7), 89-97.

Rammler, S. (2017). Digital Fuel for the Mobility Revolution: The Opportunities and Risks of Applying Digital Technologies to the Mobility Sector. Osburg, T., & Lohrmann, C. (Eds). In *Sustainability in a Digital World* (pp. 159-171). London: Springer.

Ravesteyn, P., & Batenburg, R. (2010). Surveying the critical success factors of BPM-systems implementation. *Business Process Management Journal, 16*(3), 492-507.

Reichstein, C., Härting, R. C., & Neumaier, P. (2018, June). *Understanding the Potential Value of Digitization for Business–Quantitative Research Results of European Experts.* KES International Symposium on Agent and Multi-Agent Systems: Technologies and Applications, 297-298.

Rule, E. G., & Irwin, D. W. (1988). Fostering intrapreneurship: The new competitive edge. *Journal of Business Strategy, 9*(3), 44-47.

Sandhu, M. A., & Gunasekaran, A. (2004). Business process development in project-based industry: A case study. *Business Process Management Journal, 10*(6), 673-690.

Snedecor, G. W., & Cochran, W. G. (1989). *Statistical methods.*Ames, IA: Iowa State University Press.

Tilson, D., Lyytinen, K., & Sørensen, C. (2010). Research commentary—Digital infrastructures: The missing IS research agenda. *Information Systems Research, 21*(4), 748-759.

Timmons, J. A., & Spinelli, S. (1994). *New venture creation: Entrepreneurship for the 21st century* (Vol. 4). Burr Ridge, IL: Irwin.

Trkman, P. (2010). The critical success factors of business process management. *International Journal of Information Management, 30*(2), 125-134.

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*(1), 1-10.

Westerman, G., & Bonnet, D. (2015). Revamping your business through digital transformation. *MIT Sloan Management Review, 56*(3), 10.

Westerman, G., Bonnet, D., & McAfee, A. (2014). The nine elements of digital transformation. *MIT Sloan Management Review, 55*(3), 1-6.

Wirtz, B., Göttel, V., & Daiser, P. (2016). Business model innovation: development, concept and future research directions. *Journal of Business Models, 4*(1).

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary—the new organizing logic of digital innovation: an agenda for information systems research. *Information Systems Research, 21*(4), 724-735.

Zhu, K., Dong, S., Xu, S. X., & Kraemer, K. L. (2006). Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. *European Journal of Information Systems, 15*(6), 601-616.

Zahra, S. A. (1991). Predictors and financial outcomes of corporate entrepreneurship: An exploratory study. *Journal of Business Venturing, 6*(4), 259-285.

Zahra, S. A. (1993). Environment, corporate entrepreneurship, and financial performance: A taxonomic approach. *Journal of Business Venturing, 8*(4), 319-340.