sciendo

Understanding Digital Transformation Initiatives: Case Studies Analysis

Martina Tomičić Furjan, Katarina Tomičić-Pupek, Igor Pihir
University of Zagreb, Faculty of Organization and Informatics, Varaždin, Croatia

Abstract

Background: Complexity of the digital transformation (Digital Transformation) paradigm and its relation to the fourth technological revolution face companies with serious challenges when it comes to keeping up with the competition or becoming a leader in operating industries. **Objectives:** The goal of our research is to systematize, analyse and evaluate technological and business concepts of Digital Transformation, in order to identify and investigate Digital Transformation initiatives in Croatia. **Methods/Approach:** To accomplish this goal, we used a multiple-case study approach to gather data from experts who participated in successful Digital Transformation initiatives. **Results:** Questionnaires were developed and used to gather both, qualitative background and technology-business related data relevant for Digital Transformation initiatives' success, discussed in the last part of the paper. The limitation of this study is a relatively small number of case studies (6), as well as its local coverage, resulting therefore with conclusions, which will serve as a base for future studies. **Conclusions:** There are several background, business, and technology-related concepts or factors relevant to Digital Transformation initiatives: profile and involvement of external Digital Transformation experts; the transformation drivers and expectations. In achieving most significant business concepts for business transformation, no single one right combination of technological concepts could be explicitly determined.

Introduction

Digital transformation as a paradigm is widely recognized within the academic community and industry as a digital technology-based improvement of doing business. Although Digital Transformation initiatives vary from the use of digital technologies for improvement of one process, product or service to the change of the entire work logic and the way how organizations create value for their customers, they present the inevitable path for surviving onto today's market. Mazzone (2014) identifies this shift as "Digital or Death", while Kreutzer (2017) defines the term "Digital Darwinism", as an evolutional question of survival or extinction depending on company's ability to adapt itself to new digital environment.

While the benefits of Digital Transformation initiatives in organizations can be projected by using various simulation tools, high risks of technology implementation failure persist. Consequently, there are many studies focusing on the technology related issues (Gartner, 2019 or McKinsey, 2018). While those studies focus on maturity of the technology usage and their adoption in different industries, the main research goal of this paper is to systematize, analyse and evaluate technological and business concepts of Digital Transformation, in order to investigate the cases in Croatia and identify what kind of digital technology implementation is being done by successful companies.

An exploratory multiple case study-based approach (Yin, 2014) was applied, aimed to gather insights for answering the following research questions: (i) *(RQ1) What is the relevance of background factors describing the context of digital transformation initiatives?; (ii) (RQ2) How organizations perform digital transformation initiatives; which technologies have been found in real case studies in Croatia; which business-related concepts have been aimed?*

This study has also a more practical goal namely, to gather data for proposing Digital Transformation initiatives guidelines in relation to business related concepts and approaches for raising a digital maturity of organizations.

The structure of the paper is as follows. After the introduction, the theoretical background relevant to this study is presented. Next section deals with methodology in which the empirical research design and data collection are described. After methodology, case studies analysis and discussion present the main findings. Finally, the implications for further research and practice are systemized and the conclusions are given.

Literature Review

Overview of important digital transformation perspectives

Westerman et al. (2014) categorizes all digital initiatives by their role of implementing digital technologies for replacement, improvement and fundamentally redefinition or creation of a new process or product (substitution, extension and transformation). Digital Transformation changes all spheres of business - organizations, current or future business models, way of running business processes, ecosystems, services and products (Schallmo et al., 2017). Usage of emerging technologies is enabling major business improvements related to rationalization and innovation in business models (Brown et al., 2014), resulting with improved business performance (Čorejova et al., 2016).

Digital Transformation deals with changes that digital technologies bring on the operational level through improved products, organisational structures or workflow automation (Clohessy et al., 2017). Another aspect of DT, can be found in the social impact, through transformation of business models or their building elements

(Betchoo, 2016). The intention of enterprises, which want to digitally transform is to provide new value to the customers, where technologies are the means, key enablers or even part of the offering (Nandico, 2016). This implies "realignment of or new investment in technology and business models to more effectively engage digital customers at every touchpoint in the customer experience lifecycle" (Solis et al., 2014, 3). Digital Transformation frameworks, developed mostly by the academia or business support organizations from insights into business or research activities related to Digital Transformation, are supposed to help and guide organizations to digitally transform (like in Schalmo et al., 2017, Winter, 2011, Berghaus et al., 2016, Matt et al., 2015), whereby, when comparing different Digital Transformation frameworks, significant overlaps on factors of interest for successful digital business transformation were identified (Nwaiwu, 2018).

Digital transformation business related concepts

Business related concepts present ideas of business improvement. Their identification (and selection of best promising ones) should be the starting point in any organizational transformation, whereby an integrative strategy-oriented DT approach is recommended taking into account the rapid technology development and its impact on business improvements (Pejić Bach et al., 2017). Existing common trends in business improvement initiatives are as following: the development of new business models, the accomplishment of new alliances, forming of new ecosystems, creation of added value through new products or services, improvement of customer experience by managing customer journeys, and similar (Pihir et al., 2019). Business model canvas (Osterwalder et al., 2014), as a tool for strategic rethinking enables the innovation in business models, but also the management and improvement of canvas elements. New ecosystems and alliances in the organisational sense are businesses or companies which are interacting with the goal of contribution to the other complements (de Reuver et al. 2017), creating thereby shared economic value, i.e. exchange of physical goods, assets or services (Schwab, 2017), through one of the three ways to do this: „by reconceiving products and markets, redefining productivity in the value chain, and building supportive industry clusters at the company's locations" (Porter et al., 2011, 7). Added value for the customer can be identified in managing customer's experience and journey, respecting thereby the ten principles behind great customer journey (Watkinson, 2019), which include, among other, strong reflection to the customer's identity, satisfaction of the firm's higher objectives and setting and meeting customers' expectations. Digital twins represent real environments and serve as experimental scenarios (Boschert et al., 2016), which can ease the forecasting of the new way of doing business and help in developing predictions for better decision making.

Digital transformation technology related concepts

New digital technologies are mostly technologies associated with the Industry 4.0. This next generation of technologies formally referenced as information and communication technologies is relying on new features which allow new services and products promising previous satisfaction level with added value which can be delivered digitally (Spremić, 2017). Schwab (2017) describes digital technologies related to the fourth industrial revolution whereby the way in which the technologies are intertwined - combined or separately - can bring various potential options (Ivančić et al., 2019). Technologies associated to Industry 4.0 like implantable or wearable devices, Internet of things, Big data and Data analytics, Driverless cars, Robotics, 3D printers and more are listed in table 3. Gartner (2019) and McKinsey (2018), present

many studies for evaluating technologies and their application in organizations, while Loucks et al. (2016) positions industries into a Digital vortex, evaluating industries on their susceptibility to digital disruption.

Digital transformation drivers

"Driver" is by definition a trigger of events or endeavours (Oxford dictionary, 2019). Drivers of Digital Transformation are influent factors for digital innovations, which arise within the organization itself or from trends in the organizational environment, and can be categorized as the customer, technology or organizational development driven (Hrustek et al., 2019a). Customer driven Digital Transformation is initiated by customers' new needs or desires and companies innovate products or services, or redesign them, in order to create an added value for all participants (Lichtenthaler et al., 2017). Technology driven DT is focused on business challenges and benefits which arise from properties of technology (Lederer et al., 2017). These drivers include Social Media Influence, Mobility, Need for analytics, Cloud and Internet of Things (SMACI) concept of Digital Transformation, explained by Betchoo (2016), as well as other technological drivers, mentioned already in the previous section. Organisational development driven DT is initiated by ideas for organizational innovations, usually aimed to increase profit, reduce costs, achieve efficiency, or implement other customer-focused improvements (Čorejova et al., 2016).

Digital transformation related knowledge and competencies

Since Digital Transformation is a complex and interdisciplinary paradigm, organizations noticed a need for a new leadership role – the Chief Digital Officer (CDO), which not only needs to have knowledge and skills in Digital Transformation, but also has to be capable of leading all other employees toward it (Kutnjak et al., 2019a). Higher education institutions also recognized this need in creating educational contents, and fostering and transferring knowledge and skills, which are needed for implementation of Digital Transformation. Most leading Universities in Europe, as shown by Hrustek et al. (2019b), have recognized Digital Transformation as an emerging trend and are implementing Digital Transformation related concepts in their courses and study programmes curricula. The Skills Framework for the Information age - SFIA (2018) added to its previous edition skills most relevant for Digital Transformation, changing their existing skill groups.

Methodology

With the goal to explore Digital Transformation initiatives and regarding the complexity of such projects, research interest was focused on companies, which are implementing digital technology into their own business or into the business of their clients. After the brief Internet search of Digital Transformation initiatives in Croatia, it was clear that this kind of information was not possible to obtain from secondary sources. For that reason, we looked for companies, which are conducting such projects, taking into account the possibility to reach their key experts with in-depth knowledge in Digital Transformation related manners. To broader the reach and see a larger picture, we decided to use the exploratory multi-case studies methodology according to Yin (2014), with data collection proposed by Eisenhardt (1989), set as a combination of interviews and questionnaires most suitable for examining real-life initiatives, which enabled us to obtain data needed for the planned research. In that manner, experts were contacted and interviewed according to Opdenakker (2016) using face-to-face interviews, with the goal to identify and select Digital Transformation initiatives, which meet the criteria of (1) aiming multiple organizational

i.e. business improvements and (2) implementing technologies related to the 4th industrial revolution for achieving these improvements, derived from the theoretical background. On the selected cases, further research was made by a questionnaire, described in the next section.

Study design

This study comprises 6 Digital Transformation initiatives within Croatia gained by interviews and from questionnaire results, conducted after the confirmation that the project meets the improvement and technology-related criteria mentioned earlier for evaluating it as a Digital Transformation initiative. Experts were selected based on their experience, and from 10 interviews/experts only 6 cases were accepted as Digital Transformation initiative. Each interview lasted 30-60 minutes and the completion of the questionnaire followed a week after the initial interview, via e-mail. Collected data were coded using Word and Excel spreadsheets.

Research model, research Instrument and data collection

Based on the theoretical background the research model was developed combining background factors that shape the context of Digital Transformation initiatives, drivers of Digital Transformation (derived from Hrustek et al., 2019a) and related knowledge and competencies of Digital Transformation experts supporting or leading Digital Transformation initiative.

To answer the research questions, a set of semi-structured questions was developed in the form of a questionnaire. The questionnaire was sent to the expert after the initial interview, which determined if the Digital Transformation initiative is a valid Digital Transformation project. In view of the research objectives, projects related to Digital Transformation were selected for this study only if: a) objectives are related to at least 3 business concepts listed in Table 2, and b) digital technologies related to Industry 4.0. (from Table 3) have been applied. The experts were asked to fill the questionnaire for one valid Digital Transformation project. The questionnaire was structured in 4 parts: (i) Part 1- Background information about the Digital Transformation expert; (ii) Part 2- Digital Transformation initiative (project) information, which can be considered as a successful example of Digital Transformation; (iii) Part 3-Evaluation of business and technological concepts within the Digital Transformation initiative, and (iv) Part 4- Demographics of the organization where the project took place.

The interviews and data collection through the questionnaire took place in September and October 2019. Questionnaire parts 1, 2 and 4 included questions, which help explain the context of the Digital Transformation initiative. These parts of research elements in questionnaires and in the initial interviews, helped us to determine or confirm that the Digital Transformation initiative is valid case of Digital Transformation, gather qualitative data about the included experts and their knowledge, determine the internal organizational factors related to Digital Transformation, acquire demographic data about the organization in which Digital Transformation initiative is performed and answer thereby the first research question (RQ1). Table 1 lists background factors and domains of potential answers.

Table 1
Background Factors and Domains Describing the Context of Digital Transformation Initiatives

Code	Background information about the expert participating in the Digital Transformation initiative	Domains of possible options
BGR1	Main sources for acquiring knowledge on Digital Transformation	a) Through formal education; b) through non-formal lifelong learning programs; c) through his own experience on similar projects; d) something else.
BGR2	Core competencies' focus in Digital Transformation projects	a) focused on technological aspects; b) focused on business concepts; c) focused on both, technological and business concepts; d) something else
BGR3	Work experience in ICT or digital technology implementation projects	a) less than 5 years; b) 5 to 10 years; c) 10 to 20 years; d) more than 20 years.
Code	Digital Transformation initiative information	Domains of possible options
BGR4	Short description of the specific Digital Transformation initiative	Free entry
BGR5	Expert's role in the specific Digital Transformation initiative	a) a project manager / associate based on the function in the organization (CDO, CIO, CXO); b) a project manager / associate working as an external consultant; c) something else
BGR6	Specification of drivers which influenced the decision to start the Digital Transformation initiative	Free entry
BGR7	Most important results of the Digital Transformation initiative	Free entry
BGR8	Main or critical success factors (3-5) for the specific Digital Transformation initiative	Free entry
BGR9	Existing technologies or systems relevant to the Digital Transformation initiative (multiple choice allowed)	Enterprise Resource Planning Systems (ERP); Customer Relationship Management (CRM); Mobile technologies; Cloud technologies; Reference models; Supply Chain Management (SCM); Data Warehouse (DW); Business Process Management (BPM); Performance Management Systems (PMS); Something else
Code	Enterprise demographics	Domains of possible options
BGR10	Enterprise size	Micro (less than 50); Small (between 50-249); Mid-sized (between 250-1000); Large (more than 1000)
BGR11	Estimated sales income	Up to and including € 10 million; € 10 to € 50 million inclusive; more than € 50 million
BGR12	Operating industry	Entry according to NACE classification
BGR13	Ownership structure	State enterprise; Public administration; Domestic private enterprise; Foreign private enterprise

Source: Author's work

To answer the second research question (RQ2), according to theoretical background concepts researched previously in Pihir et al. (2019) and Tomičić-Pupek et al. (2019) concepts were tested and their relationship was examined. Two categories of business and technology concepts related to Digital Transformation initiatives were systemized. In Table 2 Business related concepts (coded as BRC) in Digital Transformation are given, followed by literature or sources reference. Table 3 provides the same for Technology related concepts (coded as TRC) in Digital Transformation.

Table 2
Business Related Concepts in Digital Transformation

Code	Business Related Concept	Example and Source
BRC1	Improvements, Increased Effectiveness/Efficiency	McKinsey 2018; Uhl et al., 2014
BRC2	Sharing economy	Schwab, 2017; Frenkena et al., 2017
BRC3	Green technologies and digital footprint	Murphy, 2018; Petrova et al., 2019
BRC4	New Business Models	Business Model Canvas Osterwalder 2014; Loonam et al., 2018
BRC5	New services, New products	Osterwalder 2014; Schalmo et al., 2017
BRC6	Customer experience, Journey	Watkinson, 2019; Vial, 2019
BRC7	New alliances/ Digital ecosystems	de Reuver et al. 2017; Vial, 2019
BRC8	Digital twins	Bolton et al., 2018; Boschert et. al., 2016; Petrova et al., 2019
BRC9	**Digital competencies, skills**	Kutnjak et. al., 2019a; Pejić Bach et. al., 2018

Source: Author's work

Table 3
Technology Related Concepts in Digital Transformation

Code	Technology Related Concept	Example and Source
TRC1	SMART/ Wearable (mobile) Digital Devices	Wearable Internet (Schwab, 2017); Mobile computing (Roedder et al., 2016.)
TRC2	Implantable devices	Implantable technologies (Schwab, 2017); Biochips (Gartner, 2019)
TRC3	Artificial intelligence and Knowledge Management	Artificial intelligence and decision making (Schwab, 2017); Edge and explainable artificial intelligence (Gartner, 2019)
TRC4	Internet of things	Internet of and for things (Schwab, 2017); Sensors (Roedder et al., 2016.)
TRC5	Bio Tech	Neurotechnologies (Schwab, 2017); Biotech artificial tissue (Gartner, 2019)
TRC6	Big data / Data analytics	Big data for decisions (Schwab, 2017); Big data (Roedder et al., 2016.); Machine Learning (Gartner, 2019)
TRC7	Autonomous systems	Driverless cars (Schwab, 2017); Autonomous driving (Gartner, 2019)
TRC8	Robotics	Robotics and services (Schwab, 2017); DigitalOPS (Gartner, 2019)
TRC9	Blockchain	Bitcoin and the blockchain (Schwab, 2017); Blockchain (Roedder et al., 2016.)
TRC10	Drones	Light cargo delivery drones, Flying autonomous vehicles (Gartner, 2019)

TRC11	Virtual / Augmented Reality and Gamification	Augmented Intelligence (Gartner, 2019); Gamification (Hosseini et al., 2020)
TRC12	3D / 4D printing	3D printing (Schwab, 2017); 3D nanoscale printing (Gartner, 2019)
TRC13	Social Media and Platforms	Chatbot Social Networks (McKinsey 2018); (Bhimania et al., 2019)
TRC14	**Cloud / Everything as a service**	Ubiquitous computing (Schwab, 2017); On demand computing (Roedder et al., 2016.); 5G (Gartner, 2019)

Source: Author's work

The literature sources presented in Tables 2 and 3 systemize the concepts explored in second research question (RQ2) about business and technology related concepts in Digital Transformation. These findings are used next, in order to create the study structure and content.

Results - Case Studies: Analysis and Discussion

The findings from our case studies are presented and discussed in this section regarding the first research question (RQ1) about background factors describing the context of the Digital Transformation initiatives. Table 4 shows details about case studies' background factors except for background factors BGR4, 6, 7 and 8, which could have been entered in the free-form, and which are explained afterwards in the textual case descriptions.

Organization A

The Digital Transformation initiative was primarily focused on replacing part of the existing applications, which have reached "End of Life" maturity phase, but it also included optimizing End-to-End processes by introducing modern technological concepts, as well as structured monitoring of complying with industry standards recommendations. The project ultimately resulted with (1) the simplification of the concept of services for end-users, with (2) the simplification of services for internal users and with (3) improvement of IT tools needed for running operational activities at a desired organizational performance level (e.g. Robotics process automation-RPA, Continuous Integration/Continuous Delivery). Success factors of the initiative were addressing project sponsorship, sufficient financial means, outsourcing with necessary know-how that was not available internally, employees' motivation all of which was driven by the internal assessment of needs for organizational innovation in form of assuring proper cost and time efficient IT support in long-term.

Organization B

The Digital Transformation initiative was aimed to introducing warehouse process robotization and it was driven by digital technologies and organizational goals of workload optimization, raising competitiveness and response to increase of demand. It included the use of autonomous robotic industrial vehicles that can operate based on tasks given by employees or from WMS (warehouse management system) in three shifts, in order to more efficient locate, pick up and enable delivery of products. Crucial element that influenced the success of the initiative were related to business and management support, employee competencies and their openness to new technologies, the effectiveness of Digital Transformation customer success team, a clear definition of use-cases in which technology is applied, and perhaps most of all,

the flexibility of new technology. At this type of transformation significant factor can also be found in new technologies acceptance readiness of employees who do not have time, competencies, motivation or fear of being replaced to adjust to technological change, whose interruptive behaviour can disrupt internal processes.

Table 4
Case Studies Background Factors Describing the Context of Digital Transformation Initiatives

Code	Organization					
	A	**B**	**C**	**D**	**E**	**F**
BGR1	through formal education, non-formal lifelong learning programs and own experience on similar projects	through formal education and hands-on experience on similar projects; robotic process improvements	through formal education and experience on similar projects	through knowledge acquired by tracking and setting digital business transformation trends	through formal education and experience on similar projects	through work experience on similar projects
BGR2	focused on both, technological and business concepts	focused on both, technological and business concepts	focused on business concepts	business-improvements, in which technology acts as an enabler	focused on both, technological and business concepts	focused on business concepts
BGR3	5 to 10 years	Less than 5 years	5 to 10 years	5 to 10 years	more than 10 years	10 to 20 years
BGR5	a project manager / based on the function in the organization (CDO, CIO, CXO)	external mobile robot software integration team leader	external member of the project delivery team	external consultant in the design phase of the Digital Transformation	external consultant on the project	external delivery team member
BGR9	ERP, CRM, Mobile and Cloud tech., SCM, DW, BPM, PMS	ERP, CRM, Mobile tech., Reference Models, SCM, DW, BPM, PMS	DW, internal custom made solutions	Mobile and Cloud tech., BPM, Central dispatch system	ERP, Mobile tech., SCM	ERP, Cloud tech.
BRC10	Large	Large	Mid-sized	Small	Mid-sized	Mid-sized
BRC11	more than € 50 million	more than € 50 million	10 million to € 50 million	up to 10 million €	10 million to € 50 million	up to 10 million €
BRC12	J: Information and communication	H: Transportation and storage	O: Public administration and defence; social security	H: Transportation and storage	K: Financial and insurance activities	O: Public administration and defence; social security
BRC13	foreign privately owned	domestic privately owned	public administration	domestic privately owned	domestic privately owned	public administration

Source: Author's work

Organization C

The results of the Digital Transformation initiative in Organization C were new IT services which are addressing crime prevention in a public sector organization. New services developed within the project are aiming more efficient protection of Croatian citizens in general. The success of the project depended on the availability of financial means,

internal support within the organization C and legal frame regulating the scope of the project. The main driving element of this project was the need for compliance with standards within the operating industry.

Organization D

The external environment triggered the Digital Transformation initiative in the fourth case. Organization D is operating in the on-demand transportation niche. Disruptive competitors forced organization D to rethink and reinvent its business model in order to support on-demand services with digital technologies. The critical success factor was again the availability of financial means, but the organization realized that in order to survive in their volatile self-regulating market, a fundamental transformation has no alternative. The main driving aspects were recognized in the customer perspective, namely in the decrease of demand, in disruptive competition, which was taking over clients, and in an outdated business model.

Organization E

Organization E started its Digital Transformation initiative in order to achieve two initiative's goals: (1) introducing smart mobile payment and (2) developing new services for card payments. The driving force in this case was customer orientation and the results of the Digital Transformation project were customer base expansion and indirectly more income from payment transactions. In this project, the vision and support of the management played a significant role, as well as employee competencies and project management efficiency.

Organization F

The project in organization F enabled the transition to a Digital Transformation of design completion, submitting and validating a client documentation for issuing certificates in a public sector by implementing a workflow management for a complex business process and standardizing procedures and rules. As a direct result the process duration was reduced, unified control assurance of the issuing process was introduced and cost reduction for all process actors was potentiated. During the implementation, several main influence factors were identified, such as top management involvement, focus on achieving planned results, competencies of project team members, availability of financial means and technologies. The initiative was driven by the aim of raising efficiency in the operating business model and based on customer expectations.

Discussion

Background Factors of Digital Transformation Initiatives

In order to answer the first research question regarding the relevance of background factors shaping the context of the Digital Transformation initiatives and for the transformation success, retrieved data from three parts from the questionnaire were analysed: Part 1: Background information about the Digital Transformation expert; Part 2 – Digital Transformation initiative (project) information which can be considered as a successful example of Digital Transformation and Part 4 - Demographics of the organization where the project took place.

The focus on either only business or both (technology and business) is distributed evenly among the experts, while their professional experience is mostly around the 5 to 10 years. The results of our multiple case study are aligned with existing reported research (Pejić Bach et al., 2018, Kutnjak et al., 2019a).

Concerning information about Digital Transformation initiatives, leading success factors according to our case studies have been found in financial means, management support and employee competencies. Most drivers (in accordance with Lederer et al., 2017, Lichtenthaler et al., 2017; Čorejová et al., 2016) stated by Digital Transformation experts can be categorized within (1) organizational, (2) customer and (3) technology driven initiatives, whereby the respective order corresponds to the frequency of driver appearances.

The aimed results of Digital Transformation initiatives show mainly business-related goals of process improvement, introducing new products or services, reacting to disruptive competition (organizational), ensuring proper technology support for realizing new business models (technological) and finally goals related to the customer value (customer orientation). It is not surprising that business orientation is in analysed cases the driving force, due to the significant business focus of participating examinees in this study. This can be seen as a limitation of our research, and therefore more detailed analysis would be appropriate in further exploitation of our research instrument.

Demographics of the organization where the Digital Transformation project took place showed that Digital Transformation is a new paradigm for all sized organizations (2 large, 3 mid-sized and 1 SME organizations), with budgets mostly in the range of 10 to 50 million Euros per year. Three organizations were domestic privately-owned companies, two were public institutions, and one was an international private owned company in terms of organizational ownership.

The operating industries which indicate the scope of Digital Transformation initiatives are H: Transportation and Storage (2 cases), O: Public administration and defence; compulsory social security industry (2 cases), K: Financial and insurance activities and the J: Information and Communication. Industry-appearances is aligned with previous research studies (Kutnjak et al, 2019b; Bosilj Vukšić et al. 2018.).

The analysis of the acquired answers also shows the following background information describing the context of Digital Transformation initiatives (RQ1)**:**

o All participants rely strongly on their 5-10 years of experience in previous and similar projects, and 4 out of 6 recognize their formal education as an important contributor to their competencies

o All participants are focused on business concepts, and 3 out of 6 focus also on technology concepts; this goes in line with the opinion that Digital Transformation is enabled by technology rather than driven only by technology and that Digital Transformation initiatives in our study are more oriented on transforming the organization and its business performance than on technology.

o 5 out of 6 participants were involved in the Digital Transformation initiative as an external project member, which indicates that in our study organizations strongly rely on the resources outside the company. Only in one case the participant was acting as an internal project team member based on the function in the organization.

o Digital Transformation initiatives are leaned on or built around legacy systems like existing ERP or CRM and BPM systems and are not exclusive to the type of ownership, size or operating industry in our study.

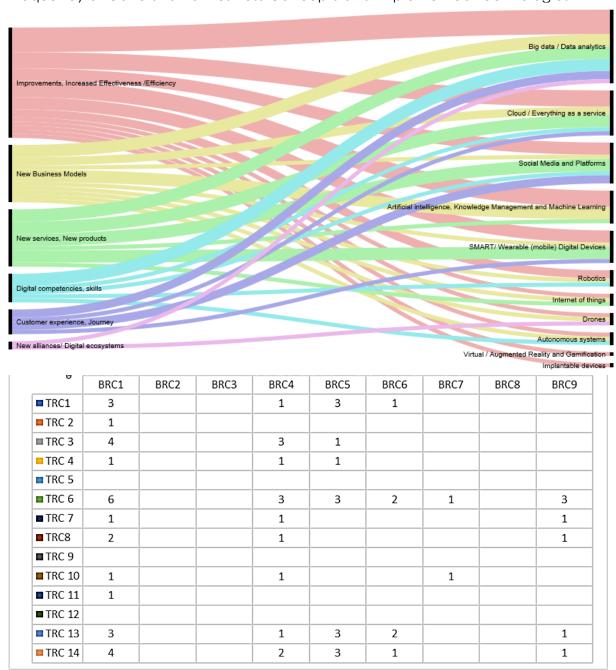The background factors raise following research question for further research: Why do organizations rely on external support in Digital Transformation initiatives: is it related to the lack Digital Transformation methodology knowledge or experience, is it related to the intensity of technology development, is it related to the lack of internal resources with appropriate competencies and skills?

Business and Technology Related Concepts

Part 3 of the questionnaire comprises evaluation of business and technological concepts within the Digital Transformation initiative (project). The most important findings regarding the second research question (RQ2) about how organizations perform Digital Transformation initiatives are presented and discussed in this section; giving insight into which technologies have been found in real case studies in Croatia and which business-related concepts have been aimed.

Figure 1 presents business and technology concept implementation frequency according to Digital Transformation expert for case studies.

Figure 1
Frequency of Correlation of Business Concepts and Implemented Technologies

	BRC1	BRC2	BRC3	BRC4	BRC5	BRC6	BRC7	BRC8	BRC9
■ TRC1	3			1	3	1			
■ TRC 2	1								
■ TRC 3	4			3	1				
■ TRC 4	1			1	1				
■ TRC 5									
■ TRC 6	6			3	3	2	1		3
■ TRC 7	1			1					1
■ TRC8	2			1					1
■ TRC 9									
■ TRC 10	1			1			1		
■ TRC 11	1								
■ TRC 12									
■ TRC 13	3			1	3	2			1
■ TRC 14	4			2	3	1			1

Source: Author's illustration

The frequency of business concepts and implemented technologies for realizing these business concepts are presented in Figure 1. Data sheet attached to the figure represents a number of appearances for each technology within at least three aimed business related concepts. This means that technologies are meant to support achieving of business goals, and it is possible that same technology supports one or more business goals (business concepts) per one case study. Additionally, one business goal could be addressed with one or more technologies.

On the left side, the graphic shows only a subset (6 elements) of the initial business related concepts (9 elements from Table 2) which appeared in a case studies as aimed business improvements. The right side is respectively comprised of 11 technology concepts, as a subset of appearing technologies (out of 14 elements from Table 3). From top to bottom of the graphic, business and technology concepts are listed according to their frequency in the third part of the questionnaire (data sheet in the bottom of Figure 1), illustrating thereby that the three most significant business related concepts were (1) BRC1, (2) BRC4 and (3) BRC5. On the other side, three most used technologies implemented to achieve business goals were: (1) TRC6, (2) TRC14, and (3) TRC13. The appearance of TRCs is influenced by business improvement concepts, which are in accordance with business focus investigated in similar literature review based research (Bosilj Vukšić et al. 2018.).

The third part of our questionnaire was intended for exploring how organizations perform Digital Transformation initiatives in terms of investigating which technologies have been found in real case studies in Croatia and which business-related concepts have been aimed (RQ2).

We can draw the following insights from gained answers. First, no additional technology or business related concepts were added in the filled questionnaires, confirming that we have covered most significant concepts in Digital Transformation initiatives and that experts in our study agree with them from the professional standpoint. Second, participants had no difficulties with identifying at least 3 business concepts aimed by the Digital Transformation initiative, confirming that these Digital Transformation initiatives are seen as wide business improvements across more organizational levels or business functions. Third, the more-than-one technology aiming more-than-one business concept paradigm confirmed by the filled questionnaires of Digital Transformation initiatives illustrates the complexity of Digital Transformation initiatives, and assures us in the correctness of our research model and instrument for further studies on a broader population.

Conclusion

The goal of our research was to examine the background, technological and business concepts of Digital Transformation, in order to explore real-life Digital Transformation initiatives and thereby form a research base for future studies. By using a multiple-case study approach, we gathered data from experts who participated in Digital Transformation initiatives in Croatia. Based on qualitative background, technology and business related data, some implications for academia and practice can be drawn.

The implications related to background factors describing the context are as following. First, the profile of Digital Transformation leaders and actors indicates that those experts lean on their formal education, but recognize the need for tracking trends and learning and evolving continuously by gathering experience on similar projects. Second, experts involved in the Digital Transformation initiative are external project members, which indicates that organizations strongly rely on the resources outside the company to introduce Digital Transformation. Third, the transformation

drivers and expectations can be categorized within organizational, customer and technology driven initiatives, whereby the organizational drivers and expected results were the most notable by the experts.

Finally, regarding the variety of business and technology concepts in investigated case studies following implications can be useful in the following manner. According to the frequency of implemented business related concepts the most significant are aimed at (BCR1) achieving business Improvements and increasing Effectiveness or Efficiency and (BCR4) the introduction of new business models, which is aligned with other research. Digital Transformation is oriented on business transformation. For achieving aimed business related concepts there is no single one right combination of technological concepts.

Our implications indicate that other background factors could have more influence potential on the decision on selecting appropriate technologies for aimed business transformation than previously supposed.

The limitations of this study are in the business orientation perspective is in analysed cases due to the significant business focus of participating examinees and a relatively small number of case studies (6), as well as its local coverage.

Our further research will be aimed at exploring background factors like methodology, technology related knowledge and experience, and building internal capacities explaining why organizations rely on external support in Digital Transformation. Due to the acknowledged correctness of our research model and instrument in further studies we would cover a broader population.

References

1. Berghaus, S., Back, A. (2016), „Gestaltungsbereiche der Digitalen Transformation von Unternehmen: Entwicklung eines Reifegradmodells", Die Unternehmung, Vol. 70 No. 2, pp 98-123.
2. Betchoo, N.K. (2016), "Digital Transformation and its impact on Human Resource Management: A Case Analysis of two unrelated businesses in the Mauritian public service", IEEE International Conference on Emerging Technologies and Innovative Business Practices for the Transformation of Societies (EmergiTech), 2016, pp.147-152.
3. Bhimania, H., Mention, A., Barlatier, P. (2019), "Social media and innovation: A systematic literature review and future research directions", Technological Forecasting and Social Change, Vol. 144, pp 251-269.
4. Bolton, R.N., McColl-Kennedy, J.R., Cheung, L, Gallan, A., Orsingher, C., Witell, L., Zaki, M. (2018), "Customer experience challenges: Bringing together digital, physical and social realms", Journal of Service Management, Vol. 29 No. 5, pp 776–808.
5. Boschert, S., Rosen, R. (2016), "Digital Twin – The Simulation Aspect", in Hehenberger P, Bradley, D. (Ed.), Mechatronic Futures: Challenges and Solutions for Mechatronic Systems and their Designers, Springer International Publishing, pp. 59-74.
6. Bosilj Vukšić, V., Ivančić, L., Suša Vugec, D. (2018), "A Preliminary Literature Review of Digital Transformation Case Studies", 20th international research conference proceedings, Roma, IRC, 2018, pp. 952-957.
7. Brown, A., Fishenden, J., Thompson, M. (2014), "Organizational Structures and Digital Transformation", In Digitizing Government, Business in the Digital Economy, Palgrave Macmillan, London, pp. 165-183
8. Clohessy, T., Acton, T., Morgan, L. (2017), "The Impact of Cloud-Based Digital Transformation on ICT Service Providers' Strategies", International Journal of Cloud Applications and Computing, Vol. 7 No. 4, pp. 1-19.
9. Čorejová, T., Rovňanová, A., Genzorová, T., Valica, M. (2016), "Digital Transformation and its impact on brand", Marketing Identity Part 2, Conference Proceedings from International Scientific Conference, November 2016, pp. 54-65.

10. de Reuver, M., Sørensen, C., Basole, R.C. (2017), "The digital platform: a research agenda", Journal of Information Technology, Vol. 33 No. 2, pp. 124–135.
11. Eisenhardt, K.M. (1989), "Building theories from case study research". Academy of Management Review, Vol 14 No 4; pp 532-550.
12. Eurostat (2016), Glossary: Statistical classification of economic activities in the European Community (NACE), NACE rev. 2, 2018, available at: https://ec.europa.eu/eurostat/ statistics-explained/index.php/Glossary:Statistical_classification_of_economic _activities_in_the_European_Community_(NACE) (12 October 2019)
13. Frenkena, K., Schor, J. (2017), "Putting the sharing economy into perspective", Environmental Innovation and Societal Transitions, Vol. 23, pp. 3-10.
14. Gartner (2019), Hype cycle research methodology, Gartner Inc., available at: https://www.gartner.com/smarterwithgartner/5-trends-appear-on-the-gartner-hype-cycle-for-emerging-technologies-2019/ (30 October 2019)
15. Hosseini C., Haddara M. (2020), "Gamification in Enterprise Systems: A Literature Review", In: Arai K., Bhatia R., Kapoor S. (Ed.), Proceedings of the Future Technologies Conference (FTC) 2019, Advances in Intelligent Systems and Computing, Vol. 1070, Springer, pp 552-562.
16. Hrustek, L., Kutnjak, A., Tomičić Furjan, M. (2019b), "Implementation of digital transformation in curricula – insights based on analyzing leading universities", Proceedings of the 11th International Conference on Education and New Learning Technologies EDULEARN 2019, IATED, Palma, Spain, pp. 5413-5420.
17. Hrustek, L., Tomičić Furjan, M., Pihir, I. (2019a), "Influence of Digital Transformation Drivers on Business Model Creation", Proceedings of the 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics MIPRO 2019, IEEE, Opatija, pp. 1509-1513.
18. Ivančić, L., Suša Vugec, D., Bosilj Vukšić, V. (2019), "Robotic Process Automation: Systematic Literature Review", in Di Ciccio, C. et al. (Ed.) Business Process Management: Blockchain and Central and Eastern Europe Forum BPM 2019, Lecture Notes in Business Information Processing, Vol 361, Springer, Cham, pp. 280-295.
19. Kreutzer, R.T. (2017), "Treiber und hinterguende der digitalen transformation", in. Schalmo, D. et al. (Ed.), Digitale Transformation von Geschaeftsmodellen, Springer, pp. 33-58.
20. Kutnjak, A., Križanić, S., Pihir, I. (2019a), "Educational and practical view of knowledge, skills and experience needed by a Chief Digital Officer", Proceedings of the 11th International Conference on Education and New Learning Technologies EDULEARN 2019, IATED, Palma, Spain, pp. 5711-5718.
21. Kutnjak, A.; Pihir, I.; Tomičić Furjan, M. (2019b), "Digital Transformation Case Studies across Industries – Literature Review", Proceedings of the 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics MIPRO 2019, IEEE, Opatija, pp. 1498-1503.
22. Lederer, M., Knapp, J., Schott, P. (2017), "The Digital Future Has Many Names, How business process management drives the digital transformation", 6th International Conference on Industrial Technology and Management ICITM 2017, IEEE, Cambridge, pp. 22-26.
23. Lichtenthaler, U. (2017), "Shared Value Innovation: Linking Competitiveness and Societal Goals in the Context of Digital Transformation", International Journal of Innovation and Technology Management, Vol. 14 No. 4, pp. 1750018: 1-14.
24. Loonam, J., Eaves, S., Kumar, V., Parry, G. (2018), "Towards digital transformation: Lessons learned from traditional organizations", Strategic Change, Vol. 27 No. 2; pp 101–109.
25. Loucks, J., Macaulay, J., Noronha, A., Wade, M. (2016), Digital Vortex – How todays market leaders can beat disruptive competitors at their own game, International Institute for Management Development, Switzerland.
26. Matt, C., Hess, T., Benlian, A. (2015), "Digital Transformation Strategies", Business and Information Systems Engineering, Vol. 57 No. 5, pp 339–343.
27. Mazzone, D. (2014), Digital or Death: Digital Transformation – The Only Choice for Business to Survive, Smash, and Conquer, Smashbox Consulting Inc.
28. McKinsey (2018), "Digital reinvention: Unlocking the 'how'", Digital/McKinsey, January 2018, available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-reinvention-unlocking-the-how (30 October 2019)

29. Murphy, B. (2018), "How Green is Your Digital Footprint?", The Wall Street Journal, January 2018, available at: https://partners.wsj.com/digiplex/green-digital-footprint/ (12 October 2019)

30. Nandico, O.F. (2016), "A Framework to Support Digital Transformation", in El-Sheikh, E. et al. (Ed.), Emerging Trends in the Evolution of Service-Oriented and Enterprise Architectures, Intelligent Systems Reference Library 111, pp. 113-138.

31. Nwaiwu, F. (2018), "Review and Comparison of Conceptual Frameworks on Digital Business Transformation", Journal of Competitiveness, Vol .10, No. 3, pp 86–100.

32. Opdenakker, R. (2006), "Advantages and Disadvantages of Four Interview Techniques in Research", Forum: Qualitative Social Research, Vol 7 No 4, 175.

33. Osterwalder, Y., Pigneur, G.B., Smith, A. (2014), Value proposition design, John Wiley & Sons, Hoboken, New Yersey.

34. Oxford dictionary (2019), Definition of the term „Driver", available at: https://en.oxforddictionaries.com/definition/driver (12 October 2019)

35. Pejić Bach, M., Spremić, M., Suša Vugec, D. (2017), "Integrating Digital Transformation Strategies into Firms: Values, Routes and Best Practice Examples", in Novo Melo, P., Machado, C. (Ed.), Management and Technological Challenges in the Digital Age, Taylor & Francis Group: CRC press, Boca Raton, Florida, pp. 107-128.

36. Pejić Bach, M.; Šebalj, D.; Garbin Praničević, D.; Pihir, I. (2018), "Employment of Business Informatics Graduates: Preliminary Results", in Strahonja, V., Kirinić, V. (Ed.), Proceedings of the 29th Central European Conference on Information and Intelligent Systems. Faculty of Organization and Informatics, University of Zagreb, Varaždin, pp 55-60.

37. Petrova, D. A., Ilieva, S. (2019), "Methodological Framework for Digital Transition and Performance Assessment of Smart Cities", Proceedings of the 4th International Conference on Smart and Sustainable Technologies (SpliTech). IEEE, pp 1-6.

38. Pihir, I., Tomičić-Pupek, K., Tomičić Furjan, M. (2019), "Digital Transformation Playground - Literature Review and Framework of Concepts", Journal of Information and Organizational Science, Vol. 43 No. 1, pp. 33-48.

39. Porter, M.E., Kramer, M.R. (2011), "Shared Value - How to reinvent capitalism—and unleash a wave of innovation and growth", Harvard Business Review, January–February 2011.

40. Roedder, N., Dauer, D., Laubis, K., Karaenke, P., Weinhardt, C. (2016), "The digital transformation and smart data analytics: An overview of enabling developments and application areas", IEEE International Conference on Big Data, IEEE, Washington, DC, USA, pp. 2795-2802.

41. Schallmo, D., Williams, C.A., Boardman, L. (2017), "Digital Transformation of Business models – best practice, enablers, and roadmap", International Journal of Innovation Management, Vol. 21 No. 8, pp. 1740014:1-17.

42. Schalmo, D., Rusnjak., A. (2017), „Roadmap zur Digitalen Transformation von Geschaefts-modellen", In: D. Schalmo et al. (Ed.), Digitale Transformation von Geschaeftsmodellen, Springer, pp 1-31.

43. Schwab, K. (2017), The fourth industrial revolution, Portfolio penguin, UK.

44. SFIA (2018), SFIA 7 framework, SFIA Foundation, 2018, available at: https://www.sfia-online.org/en (12 October 2019)

45. Solis, B., Lieb, R., Szymanski, J. (2014), The 2014 State of Digital Transformation – How Companies are investing in the Digital Custumer Expirience (DCX), Altimeter Group, available at: https://www.briansolis.com/2014/07/2014-state-digital-transformation/ (12 October 2019)

46. Spremić, M. (2017), Digitalna transformacija poslovanja, Ekonomski fakultet, Zagreb.

47. Tomičić-Pupek, K., Pihir, I., Tomičić Furjan, M. (2019), "Smart city initiatives in the context of digital transformation – scope, services and technologies", Management: journal of contemporary management issues, Vol. 24 No. 1, pp. 39-54.

48. Uhl, A., Steiger, C. (2014), "Digital Enterprise Transformation – How World-Class Orhanizations Innovate their Business Model", 360° - the Business transformation journal, No.12, pp 39-48.

49. Vial, G. (2019), "Understanding digital transformation: A review and a research Agenda", Journal of Strategic Information Systems, Vol. 28 No.2, pp. 118–144.

50. Watkinson, M. (2019), "The Ten Principles Behind Great Customer Experiences", in Kompella, K. (Ed.), Marketing Wisdom, Springer, Singapore, pp. 101-114.
51. Westerman, G., Bonnet, D., McAfee, A. (2014), Leading Digital – turning technology into business transformation, Harvard business review press, USA.
52. Winter, R. (2011), „Business Engineering Navigator: Gestaltung und Analyse von Geschäftslösungen ‚Business-to-IT'", Springer-Verlag, Berlin Heidelberg.
53. Yin, R.K. (2014), Case Study Research: Design and Methods. Sage Publications.

About the authors

Martina Tomičić Furjan, Ph.D. is an Assistant Professor at the Faculty of Organization and Informatics in Varaždin, University of Zagreb. She teaches courses at undergraduate and graduate studies, and as a researcher and consultant, she has worked on various scientific and professional projects. Areas of her interest are related to digital transformation, strategic development and implementation of information and communication technologies in organizations and performance measurement. The author can be contacted at **martina.tomicic@foi.unizg.hr**

Katarina Tomičić-Pupek, Ph.D. is an Associate Professor at the Faculty of Organization and Informatics in Varaždin, University of Zagreb. She teaches courses at undergraduate and graduate studies, and as a researcher and consultant, she has worked on various scientific and professional projects. The area of her interest includes business processes modelling, strategic planning of information systems and digital transformation. She is the project leader of one and participated in eight scientific and development projects and a variety of professional projects. The author can be contacted at **katarina.tomicic@foi.unizg.hr**

Igor Pihir, Ph.D. is an Assistant Professor at the Faculty of Organization and Informatics in Varaždin, University of Zagreb. He teaches courses at undergraduate, graduate and professional studies and as a researcher and consultant, he worked on various scientific and professional projects with the economy and public administration. Areas of his interest are related to business process modelling and improvement, application of information and communication technologies, digital transformation, and measurement of organizational efficiency. The author can be contacted at **igor.pihir@foi.unizg.hr**