REVIEW PAPER
UDK: 330.341.1:004
005.334.3
DOI: 10.5937/EKOPRE2006400U
Date of Receipt: January 29, 2020

**Bogdan Ubiparipović**
University of Novi Sad
Faculty of Economics
Department of Business Informatics
and Quantitative Methods
Subotica

**Predrag Matković**
University of Novi Sad
Faculty of Economics
Department of Business Informatics
and Quantitative Methods
Subotica

**Mirjana Marić**
University of Novi Sad
Faculty of Economics
Department of Business Informatics
and Quantitative Methods
Subotica

**Pere Tumbas**
University of Novi Sad
Faculty of Economics
Department of Business Informatics
and Quantitative Methods
Subotica

# CRITICAL FACTORS OF DIGITAL TRANSFORMATION SUCCESS: A LITERATURE REVIEW

## Kritični faktori uspešnosti digitalne transformacije – pregled literature

## Abstract

Over the last two decades, the digital era and the fourth digital revolution have led to a rapid increase in the influence that digital technologies have on all aspects of life. Rapid development and diffusion of technological innovations altered the business environment, additionally accelerating the dynamics of market changes through permeating globalisation and ever stronger competition. In such digital ecosystem, product life cycles became extremely short, while consumers became more demanding and their behaviour more volatile. Compelled by such business reality, organisations are forced to continuously adapt and digitally transform their business.

The aim of this paper is to identify and systemise critical success factors of attaining purposeful digital transformation by means of a literature review. The paper details the results of the conducted theoretical research, which may serve organisations as guidelines on their challenging paths to digital transformation and assist them in avoiding potential traps and mitigating risks associated with inadequate application of digital technology.

**Keywords:** *digitalisation, digital transformation, digital transformation strategy, critical success factors.*

## Sažetak

Digitalna era, praćena četvrtom industrijskom revolucijom, dovela je do rapidnog širenja uticaja digitalnih tehnologija na sve segmente života u poslednje dve decenije. Brz tempo razvoja i difuzni karakter tehnoloških inovacija doprineo je da kontekst poslovanja savremenih organizacija karakteriše visoka dinamika tržišnih promena, dodatno ubrzana sveprisutnom globalizacijom i sve oštrijim konkurentskim nadmetanjem. Ovakav digitalni ekosistem uticao je i da životni ciklus proizvoda i usluga postane ekstremno kraći, a ponašanje kupaca sve zahtevnije i nepostojanije. Suočene sa opisanom poslovnom realnošću organizacije su prinuđene na kontinuirano prilagođavanje i digitalnu transformaciju svog poslovanja.

Cilj ovoga rada bio je da se uvidom u referentnu literaturu identifikuju i sistematizuju kritični faktori uspešnosti u dostizanju svrsishodne digitalne transformacije. U radu su detaljno opisani rezultati sprovedenog teoretskog istraživanja, koji organizacijama mogu poslužiti kao svojevrstan orijentir na izazovnom putu digitalne transformacije, kako bi predupredile potencijalne zamke i rizike neadekvatne i neefikasne primene digitalnih tehnologija.

**Ključne reči:** *digitalizacija, digitalna transformacija, strategija digitalne transformacije, kritični faktori uspešnosti.*

## Introduction

Digitalisation is a part of the major global trend of the fourth industrial revolution (Industry 4.0), and at the same time, the principal reason why more than half of Fortune 500 companies ceased to exist over the last two decades. On one hand, digitalisation provides great opportunities for transformation and improvement of operations, while on the other, it renders some organisations' entire business models inadequate for the globalised market.

The phenomenon of digital transformation has completely changed the behaviour and expectance of clients in the global market. Clients no longer just expect organisation to respond to their articulated needs, but also to anticipate and address the future needs that they themselves have not yet become aware of. Dissatisfied clients are just a click away from taking their business to a competitor, which is why organisations are forced to redesign their businesses, or even completely alter their business models to survive in the market, attract new, and retain existing customers.

Organisations in all industries are facing the pressure to go digital and are aware that this must be done as promptly as possible — before they fall behind their digitally-oriented competitors or completely new entrants to the market [10].

However, in the Industry 4.0 settings, organisations are directly or indirectly faced with ambivalent effects of technology. On one hand, they are mostly driven by their desire to improve efficiency and customer satisfaction, while on the other hand, are most commonly inhibited by their lack of competences and financial resources [22].

The idea of digital transformation encompasses the transformational effects of SMACIT (social, mobile, analytics, cloud and Internet of Things) technology. Digital transformation can be broadly defined as the use of technology for a radical improvement of an organisation's performance and success.

Ismail, Khater and Zaki [7] provided a more specific definition of digital transformation, designating it as a "process through which companies converge multiple new digital technologies, enhanced with ubiquitous connectivity, with the intention of reaching superior performance and sustained competitive advantage, by transforming multiple business dimensions, including the business model, the customer experience (comprising digitally enabled products and services) and operations (comprising processes and decision-making), and simultaneously impacting people (including skills talent and culture) and networks (including the entire value system)" [7].

Despite the need for a comprehensive and systematic approach to digital transformation that would encompass all the elements, from prioritisation, through coordination mechanisms, to implementation steps, the academia has not yet proposed a coherent frameworks or a set of guidelines for steering digital transformation [4], [11].

The first step in defining such a framework is to systemise the critical success factors (hereinafter abbreviated CSFs) of successful digital transformation. In line with the described research topic and the identified research problem, we attempted to answer the following research question:

**RQ1**: What are the critical success factors of digital transformation?

The answer to the research question is provided in the Research results section, through a systematic overview or critical success factors within the 6 identified dimensions. Each critical success factor is described and explained in detail.

## Research methodology

The theoretical research was conducted as a review of relevant literature. The literature review process incorporated following phases: planning the review, conducting the review, and reporting the review.

The first stage of the literature review included a set of activities aimed at establishing a protocol for performing the second stage. The defined framework incorporated a document searching strategy, criteria for inclusion and exclusion of research material, as well as a strategy for extracting and synthesising the extracted data.

The search for papers was performed via a service provided by the Serbian Library Consortium for Coordinated Acquisition (Kobson). The following electronic databases were included in the search for the research material: Web

of Science, Scopus, AIS eLibrary. The research strategy involved using the following search terms: "digital business transformation" or "digital transformation" or "digital business agility" or "digital agility". The primary inclusion criteria were as follows: papers must have been published between 2011 and 2018, published in English, published in a reviewed academic journal and conference proceedings, and containing the defined search terms in the paper title. The final step in defining the framework for the literature review was to define the strategy for data extraction and synthesis of extracted data. The data extraction process involved repeated reading of relevant papers and identification of data relevant for answering the research question.

We analysed the titles and abstracts of all papers referenced in Table 1, and subsequently thoroughly analysed the papers selected in line with the defined protocol. A total of 17 relevant papers remained after the exclusion criteria had been applied. These papers were successively subjected to qualitative analysis by means of text coding [12].

An overview of the total number of matches for each of the queried electronic databases is given in Table 1.

In addition to the search results presented in Table 1, we conducted a search for papers published in Serbian in the Serbian Citation Index database (SCIndeks), using the search string "digital transformation". Out of 17 matches, only four papers complied with the defined criteria, and were included in the systematic literature review.

The following chapter includes the research results obtained using the described research methodology.

## Research results

Results of the theoretical research are presented in Table 2. We identified a set of 35 critical success factors of digital transformation and divided them into 6 groups – dimensions:

A Context and contents of digital transformation
B Vision and strategy
C Organisational capacities and capabilities
D Organisational culture
E Human resources capabilities and competences
F Technology

The following text contains detailed descriptions of all CSFs of digital transformation within respective dimensions listed in Table 2.

### Context and contents of digital transformation

We identified a total of four CSFs within the dimension "Context and contents of digital transformation". The first CSF was titled "Understanding of the general context of digital transformation (era, economy, industry, individual)" (Table 2). This CSF incorporates several broad aspects of digital transformation (listed in brackets within the CSF title) that directly or indirectly impact organisations. The world is in the era of the fourth industrial revolution (Industry 4.0), which builds on the results of the previous three, but utilises new digital technology to the maximum extent, making generation and dissemination of innovation faster than ever. A new global economy, more dynamic, with more intensive competition, and more customisation, is emerging. The industrial perspective highlights how the disruptive nature of digital technologies caused a revolution in the way whole industries operate, and erased the traditional borders between them. Digital transformation also manifests itself in the concept of "extended persona", i.e., changes in how individuals present themselves and communicate caused by technological advances. This led to an exponential increase in the volume of digital data, creating a flood of information that bypasses all barriers [7].

**Table 1: Total number of matches for each of the selected electronic databases**

| Source | Number of papers matching search terms | Number of papers included in further analysis |
|---|---|---|
| Web of Science | 450 | 29 |
| Scopus | 418 | 23 |
| AIS eLibrary | 902 | 19 |
| **Total:** | **1.777** | **71** |

Source: Authors.

**Table 2: Critical success factors of digital transformation, grouped into dimensions**

| | Dimension / Critical success factor (CSF) | Sources |
|---|---|---|
| **A.** | **Context and contents of digital transformation** | |
| 1. | Understanding of the general context of digital transformation (era, economy, industry, individual) | [7], [9], [11], [13], [16], [17], [23]. |
| 2. | Awareness of internal and external drivers of digital transformation | |
| 3. | Understanding of the potential content of digital transformation | |
| 4. | Understanding of the impact of digital technologies on key elements of the business model | |
| **B.** | **Vision and strategy** | |
| 1. | Need for digital transformation recognised in the business strategy | [1], [4], [5], [6], [7], [10], [11], [14], [18], [19], [20]. |
| 2. | Defined digital transformation strategy | |
| 3. | Established performance management methodology | |
| 4. | IT strategy aligned/integrated with digital transformation strategy | |
| **C.** | **Organisational capacities and capabilities** | |
| 1. | Digital agility (timely detection and prompt reaction) | [3], [5], [6], [11], [15], [16], [23]. |
| 2. | Client-centric approach | |
| 3. | Seamlessly integrated offline (physical) and online (digital) channels | |
| 4. | Digitalisation of products, services and interactions with clients | |
| 5. | Harnessing analytics for adapting products and services | |
| 6. | Optimised business processes and operational excellence | |
| 7. | Data-driven digital process automation | |
| 8. | Multi-level and multi-speed organisation for faster reaction | |
| 9. | Networking and integration with external partners | |
| 10. | Capacity for funding digital transformation initiatives | |
| **D.** | **Organisational culture** | |
| 1. | Openness towards change | [3], [5], [6], [7], [8], [10], [21], [23]. |
| 2. | Fostering a digital mindset | |
| 3. | Cooperation and cross-functional efforts | |
| 4. | Stimulating environment that encourages innovation | |
| 5. | Willingness to learn | |
| 6. | Willingness to take risks and tolerance towards failure | |
| 7. | Communication and participation in decision-making | |
| **E.** | **Human resources capabilities and competences** | |
| 1. | Level of digital skills and knowledge | [5], [6], [7], [19]. |
| 2. | Ability to recognise potential | |
| 3. | Ability to acquire and retain talent | |
| 4. | CDO (Chief Digital Officer) role | |
| **F.** | **Technology** | |
| 1. | Flexible IT infrastructure | [1], [2], [5], [6], [11], [15], [18]. |
| 2. | Digital operational platform | |
| 3. | Digital services platform | |
| 4. | Developed business analytics system | |
| 5. | IT sector's capacity for bimodal operations | |
| 6. | IT security | |

Source: Authors.

Digital business transformation is a major challenge for any organisation, which is why the first step in this process should be to answer the question "Why transform?" Digital business transformation can be driven by several factors, which is the reason why the second CSF, "Awareness of internal and external drivers of digital transformation", was included in Table 2. Ismail et al. [7] divided the drivers of digital transformation into two major groups: internal motivations and external triggers. Internal motives and external triggers jointly form the context of digital transformation, rendering such a dichotomy conditional, as most internal and external drivers of transformation are convergent.

Internal motivations include finance, operations, employees, differentiation, and innovation. That is, organisations are motivated to transform due to decreased sales and financial pressure on the core business [11]. They are attempting to secure social and economic benefits for all

stakeholders, with particular emphasis on employees, who demand greater interaction and cooperation with clients, improvement of organisational IT capacities, as well as greater flexibility and comfort in their working environment. Operational motivations of digital transformation are associated with achieving greater efficiency and work productivity. Many organisations see application of digital technology as an opportunity to adopt innovations and differentiate from the competition [7].

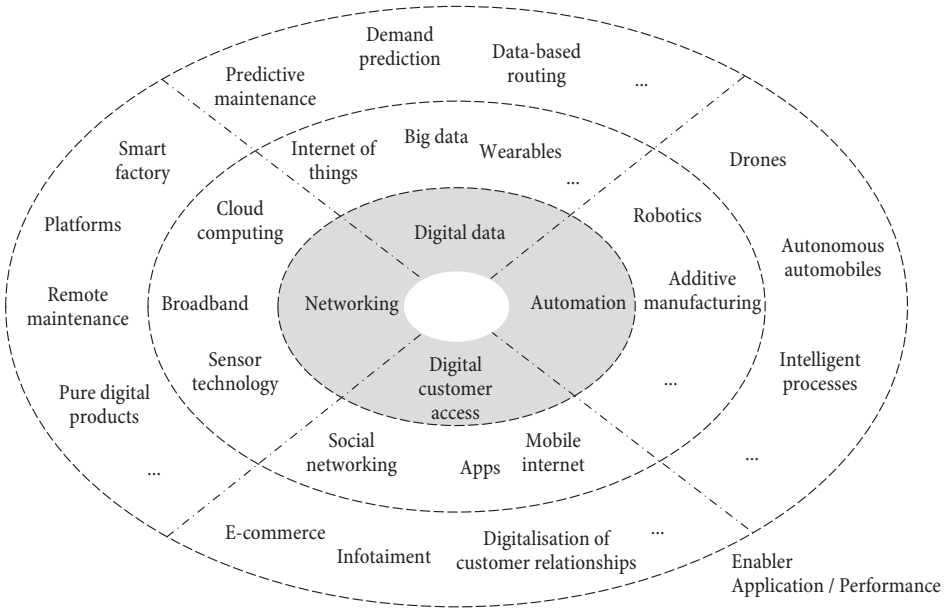
External motivations and triggers of digital transformation include evolution of technology, the environment, competition, and start-ups. New technologies cause changes in the market that compel organisations to mobilise their entire digital resources and come up with prompt responses. In addition to that, new technologies have improved connectivity, mobility, and allowed for unlimited access to social networks. This caused tech-savvy and networked clients to completely change their behaviour and expectations from organisations [7]. Clients nowadays actively seek better service at lower prices [23].

An increasing number of already digitalised competitors in the global market, operating with better business models and offering better value propositions to their clients at lower prices, is also an external trigger for digital transformation [23]. Innovative start-ups are yet another external trigger of digital transformation, since they are based on entirely novel, digitally agile business models that pose a serious threat to existing business models [7].

The second step organisations must make on their journey towards digital transformation is to answer the question "What should be transformed?". Organisations must explicitly define the content to be transformed. Therefore, "Understanding of the potential content of digital transformation" is included in Table 2 as the third CSF.

Wade [23] listed seven categories of content that could potentially be digitally transformed: business model (how an organisation makes money), organisational structure, people, processes, IT capability (how information is managed), offerings (products and services offered by the organisation), and the engagement mode (how an organisation engages with its clients and other entities). According to the same author, these elements are the most important in terms of digital transformation. Schallmo and Williams investigated technological aspects of digital transformation and identified specific technologies that facilitate digital transformation. The authors divided digital technologies and their applications into four categories - digital data, automation, digital customer access, and networking — and presented them in a figure illustriously titled "The digital radar" (Figure 1) [17].

**Figure 1: The digital radar with technologies and applications**




Source: Adapted from [17].

Ismail et al. [7] focused on three business dimensions that can be transformed (Figure 2):

- Operations: can be transformed at different levels, from business process reengineering, through business network redesign, to business scope redefinition.
- Customer experience: involves generating digitalised products and services.
- Business model: can be transformed in different ways, form digitally altering the present model, to devising a completely new digitalised business model.

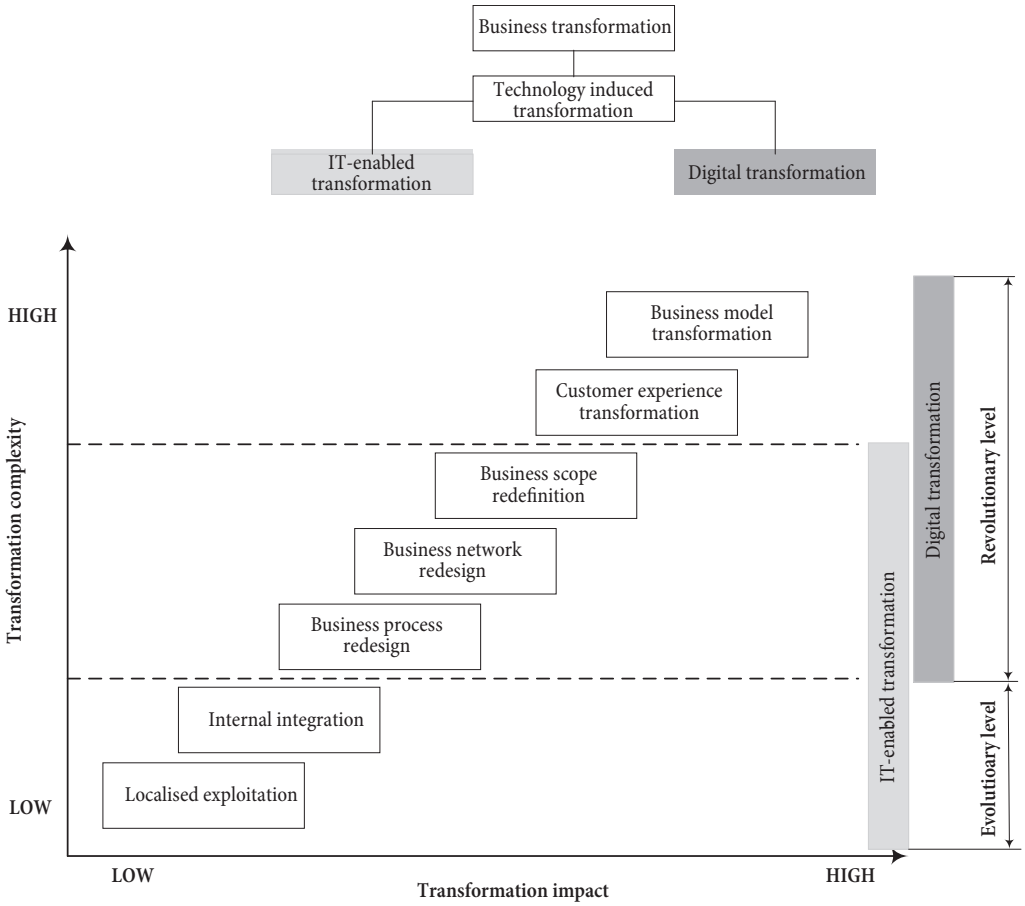
As Figure 2 depicts, Ismail et al. [7] suggest that the business model is the most challenging area for business transformation, since it involves all elements within the organisational value chain and the entire value system. Because of such significance, "Understanding of the impact of digital technologies on key elements of the business model" is introduced as the fourth CSF in Table 2.

Schallmo and Williams [17] state that the business model is "the basic logic of a company that describes what benefits are provided to customers and partners". A business model depicts how an organisation generates its revenue, and how it differentiates from competitors to consolidate customer relations and ensures competitive advantage through created value [17]. According to the same source [17], a business model is composed of the following dimensions and elements:

- The customer dimension — contains the customer segments, customer channels, and customer relationships
- The benefit dimension — includes products, services, and values
- The value-added dimension — includes resources, skills, and processes
- The partners dimension — includes the partner, partner channels
- The financial dimension — includes revenues and expenses.

It is every organisation's goal to combine the listed business model elements in a way they reinforce each

**Figure 2: Positioning digital transformation**




Source: [7].

other and act in synergy. Sathananthan et al. [16] define a business model as an abstract representation of an organisation and its operations.

Digital transformation of a business model can be defined as its adjustment to the technological progress and innovation that trigger changes in consumer and social behaviour. In a 2018 paper, Kotarba presents the scope of changes in the morphology of business models in modern organisations that happened over the last decades [9].

Good design and implementation of a business model and diligent strategic analysis are required for technology innovations to become commercially successful. In absence of those, even the most creative organisation will fail [13].

## Vision and strategy dimension

As presented in Table 2, we included a total of four CSFs of digital transformation in "Vision and strategy" dimension. The CSFs are described in the following text.

Given that the matter of digital transformation is still in an evolutionary stage, organisations should carefully consider their mission, vision and strategic focus when choosing the model and the framework to follow in the process of digital transformation [14].

Organisations must have a clear vision with future positioning for digital transformation in order to achieve it. The vision must be coupled with an aspiration for improvements, and readiness to learn from interactions with customers, partners, and employees, as well as tight feedback loops that allow the organisation to revise its vision and in turn, update its products and services [5].

Over the last several years, organisations in almost all industries have undertaken numerous initiatives for exploring new digital technologies and instrumenting their advantages. This was, however, followed by a transformation of core business operations, products and processes, as well as organisation structures and management concepts. Organisations need practical guidelines for managing such complex transformations. Above all, an organisation should recognise the need for digital transformation, and subsequently formulate a digital transformation strategy, as a central concept that integrates all the important elements — coordination, integration mechanisms, and implementation [11], "author":[{"dropping-particle":"","family":"Matt","given":"Christian","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Hess","given":"Thomas","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Benlian","given":"Alexander","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Business and Information Systems Engineering","id":"ITEM-1","issue":"5","issued":{"date-parts":[["2015"]]},"page":"339-343","publisher":"Springer Fachmedien Wiesbaden","title":"Digital Transformation Strategies","type":"article-journal","volume":"57"},"uris":["http://www.mendeley.com/documents/?uuid=3ce5ebb1-f3b8-4e4b-b6e1-556f15ebdd3d"]},{"id":"ITEM-2","itemData":{"DOI":"10.5937/tehnika1702273s","ISSN":"0040-2176","abstract":"Using data from FTSE 350 firms, we examine factors influencing explicit relative performance evaluation (RPE[20].

Sebastian et al. [18] articulate two types of digital transformation strategies that they identified in an empirical research on a sample of 25 large organisations undergoing digital transformation: customer engagement strategy (CSS), and a digital solutions strategy (DSS). Organisations following a customer engagement strategy strive to build customer loyalty and gain their trust by offering superior, innovative, personalised, and integrated customer solutions by harnessing the analytical capabilities applied to customer data, as to better understand and anticipate different customer demands.

A digital solutions strategy is aimed at reshaping the organisation's value proposition by integrating a combination of products, services and data. This type of digital strategy is driven by research and development efforts that seek to anticipate customer needs, not just respond to present ones. An efficient digital solutions strategy always involves acquisition and utilisation of additional data, often gathered via sensors [18].

Berman [1] concludes that key areas for organisations to confront the challenges of the new digital age include: reconfiguring the customer value proposition (what is being offered) and reshaping the operating model (how it is delivered). So far, most organisations focused on one of these areas through a set of specific initiatives. Products and services, information and customer engagement

can be reshaped using new capabilities for mobility, interactivity and access to information. The operating model can be adapted so that customer preferences and requirements affect each activity in the buying and selling chain. This requires integration and optimisation of all business activities, as well as efficient tracking and managing of data associated with these activities. An organisation's strategic path to transformation will be determined by which of the two fields is emphasised in the transformation process [1].

This points to two CSFs of digital transformation that we defined in Table 2, "Need for digital transformation recognised in the business strategy" and "Defined digital transformation strategy".

The goal of digital transformation is to create added business value. Organisations can improve their prospects of achieving this goal by defining a clear digital transformation strategy to coordinate many independent threads of digital transformation and facilitate identification of optimal goals for their digital transformation [4]. As the authors state, "…a digital agenda has to be aligned with other operational or functional strategies and can act as a unifying concept for integrating all coordination, prioritisation and implementation efforts of a firm's digital transformation efforts" [4].

Establishment of a strong coordination mechanism through rules of communication and cooperation and with efficient management of performance and KPIs (key performance indicators) are of paramount significance to keeping the organisation on track on their path to digital transformation [11]. There is a plethora of strategic planning and strategic management models that can be useful for digitalisation. The balanced scorecard is possibly one of the most recognised models for strategic planning and management. It is used for quick, but comprehensive assessment and monitoring of organisational performance at a strategic level [10].

Emphasis on the need for efficient implementation of a strategy, coordination of activities, prioritisation, and performance measurement points to the necessity of developing a performance management methodology, which we identified as the third CSF within the "Vision and strategy" dimension, as presented in Table 2.

Since technologies drive digitalisation, organisations must continuously harmonise their business operations with new technologies through the consistent implementation of their IT strategies. This requires digitalisation and automation, as well as an IT infrastructure ready to facilitate data integration, process orchestration, and analytics. In addition to that, it is useful to implement holistic methods for measurement and benchmarking, based on data from both internal and external sources, which would facilitate forecasting and timely adaptation [6].

A digital transformation strategy is considered as a comprehensive, company-wide strategy that guides an organisation throughout its entire journey towards digital transformation. As such, it surpasses functional thinking and holistically manages opportunities and risks associated with digital technologies that trigger and facilitate transformation [19].

A distinct feature of digital transformation strategy is that it incorporates all business segments and dimensions of an organisation, as well as at least two coordination mechanisms. First, coordination with the business strategy, and second, coordination with functional strategies in a way that it integrates different strategy levels within an organisation [4], [11].

A digital transformation strategy should [7]:

- Align and harmonise the business strategy and IT strategy
- Translate the digital layer of a business strategy into different functional strategies, acting as a missing link
- Provide appropriate guidelines for transformation in order to reach the desired future state
- Consider wider requirements for organisational restructuring and acquisition
- These characteristics, as well as the mentioned alignment mechanisms, position the digital transformation strategy at the level of a business strategy in an organisation's strategy hierarchy. This allows for better utilisation of vast opportunities offered by the digital environment and readily available digital technologies [18]. Figure 2 illustrates the role of a digital transformation strategy.

From all described above, we identified the fourth CSF within this dimension, "IT strategy aligned/integrated with digital transformation strategy"

## Organisational capacities and capabilities dimension

There are vast differences in digital maturity and potential for digital pressure on an organisation among industries. Due to such variances, there is no unique approach for achieving successful digital business transformation. However, regardless of the roadmap and the plan they are attempting to implement, organisations should develop a fundamental capability that Wade [23] describes as "digital business agility". This ability has three components: hyperawareness, informed decision-making, and fast execution. Hyperawareness component can be defined as an organisation's ability to timely detect future trends that may impact it. Digital tools, such as social media, connected devices, and analytics can serve as "digital barometers "that constantly monitor the status quo and signify relevant changes. Informed decision-making component is the capability for active analysis of information resulting from practicing hyperawareness. The effects of this activity are manifested as increased capacity for making timely fact-based decisions. The third component, fast execution, includes two sub-elements: speed and implementation. Both elements are essential for accomplishing a successful digital business transformation. Fast execution is the response capability that involves turning decision into action and, according to Wade, fast innovation and high agility are the two most dangerous traits of new digital disruptors (start-ups) [23].

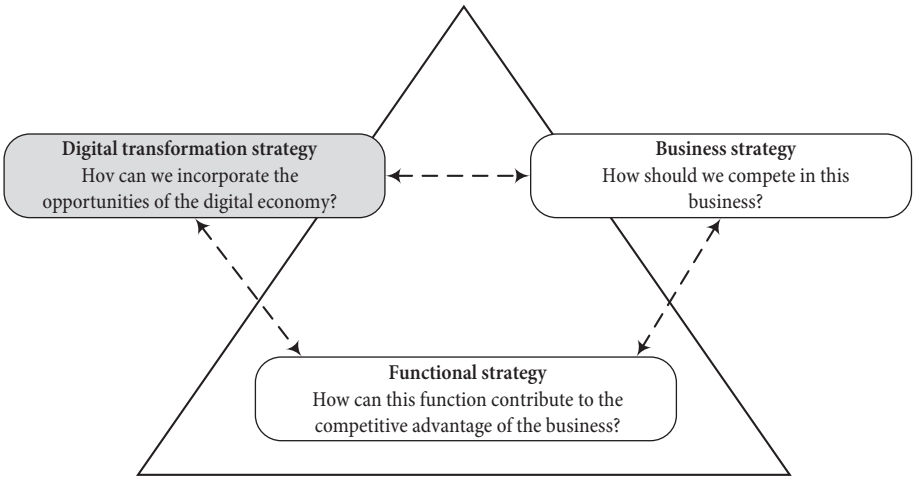
Agility is an integral part, or even the DNA of a business strategy, that compels an organisation to continuously and finely align its organisational structure with ever changing market conditions. A digital business strategy is based on organisational agility to enable rapid adaptation through cooperation and change that surpasses traditional organisational limits. Organisational agility involves transforming business in accordance with changes in customers' needs, and relies on novel operational and business models, capability for quick scaling and learning. Proper change management prepares employees and sets the organisation on a new course [5].

Other authors [6] also concur that continuously variable market conditions compel an organisation to a degree of flexibility that involves: organisational agility, scalability, and adaptability.

Based on the review of relevant literature, we concluded that "Digital agility" (timely detection and prompt reaction) can be considered the most significant CSF of digital transformation. This CSF was included in the dimension "Organisational capacities and capabilities", as presented in Table 2.

Modern business is oriented on customers, with a preference for direct contact with them. In such a way, organisations develop more profound relationships with the client through their products. Digitalisation of sales and marketing channels creates opportunities for a more personal approach to customers and customer care. We

**Figure 3: Positioning digital transformation strategy**




Source: [7].

recognised this as a CSF and included it in Table 2 under the name "Client-centric approach".

Sathananthan et al. [16] conclude that a client-centric approach is crucial for executing a successful digital transformation within an organisation. More specifically, ideas for new offerings and improving interaction with clients by way of digital technology should be the epicentre of new digital transformation. According to Sahu et al. [15], the customer dimension concerns the entire customer interaction journey with the organisation through digital transformation. The focus is on a two-way interaction between customers and organisations. Two significant aspects should be considered when aiming to improve customer experience through digital transformation: customer touch points, and customer engagement. Likewise, Hartl and Hess [3] particularly highlight customer-centricity as a key factor, interpreting it as organisation's orientation of all activities to satisfy customer needs (products and processes are designed with a focus on customer needs and are continuously adapted to changes in these needs).

According to Holotiuk and Beimborn [5], seamless customer experience stands out as the most common critical success factor. It focuses on the integration of all offline (physical) and online (digital) channels. Intangible digital experiences around the products are superior to the physical use of the product [5].

"Seamlessly integrated offline (physical) and online (digital) channels" was introduced as the third CSF within the "Organisational capacities and capabilities", as presented in Table 2.

Augmented reality, customer-focused technology, and digital decision support lead to digitalisation of products and services, as well as interaction with clients, which allows organisations to gain deeper insight into data on clients and their activities. Organisations are compelled to provide permanent access to digitalised products and services via digital channels. Furthermore, business models must allow for each product to be extended with a corresponding digital service. Continuous data analytics can enable an organisation to create customised products and services, as well as individualised messages, tailored to customers' wishes and preferences [5].

In accordance with the arguments made above, we included "Digitalisation of products, services and interaction with clients" in the "Organisational capacities and capabilities" dimension as the fourth CSF.

In order to help organisations overcome the challenges of digital transformation, Imgrund et al. [6] investigated the possibility of applying business process management (BPM) concepts for creating a management framework for digital transformation. Based on the results of a literature review, they identified characteristic requirements of digital transformation, after which they analysed BPM's potential for addressing these requirements. The authors argue that organisations can improve the feasibility of digital transformation by achieving a particular level of organisational and process maturity.

Hence, organisations can successfully address the requests of digital transformation by employing the concept of business process management. Therefore, we identified "Optimised business processes and operational excellence" as a CSF and included it in Table 2 as the sixth CSF under "Organisational capacities and capabilities". Functional business process management can assist in resolving various digitalisation requirements, which may in turn increase the likelihood of a thorough transformation process. This means that organisations may benefit from mechanisms and structures established through the practice of BPM and use them as a starting point on a long journey to becoming digitally transformed.

According to Holotiuk and Beimborn [5], operational excellence is achieved through the development of digitalised, highly automated, data-driven processes. For this reason, we included "Data-driven digital process automation" as the seventh CSF under "Organisational capacities and capabilities".

This allows supply chains to anticipate customer demand and adapt quickly. Also, automated service management and complete automated client interaction, if introduced to the business model, increase responsiveness and efficiency [5].

Same authors [5] argue that a multi-level and multi-speed organisation is required for a more efficient reaction, which would enable an organisation to simultaneously remodel its core operations and peripheral activities.

Such organisations are capable of rapidly responding to clients' needs, all while balancing internal constraints with a need for a rapid reaction. A "multi-level and multi-speed organisation" was introduced as the eighth CSF under "Organisational capacities and capabilities", as presented in Table 2.

Organisations should strive to form strong, collaborative partnerships by utilising network effects with open systems integration. In addition, extensive external orientation facilitates learning and innovation. Cooperation surpasses organisational limits and extends to customers, technology vendors, and suppliers. Organisations allow partners to cooperate as specialised experts and use partnerships for specific innovation [5]. "Networking and integration with external partners" was therefore identified as the ninth CSF within "Organisational capacities and capabilities", as presented in Table 2.

The financial aspect of digital transformation is very significant since it relates to an organisation's capability to finance digital transformation efforts. Financial resources simultaneously serve as a driver and a limiting factor of digital transformation. That is why organisations should recognise the need for transformation in advance and explore the possibility of funding it in a timely manner [11]. Imgrund et al. [6] also stress that the success of digital transformation depends also on securing reliable funding for digital initiatives, since unforeseen contingencies can otherwise jeopardise these initiatives. In line with this, we introduced the tenth CSF within the group "Capacity for funding digital transformation initiatives".

## Organisational culture dimension

In their paper, Hartl and Hess [3] stipulate that, although organisational culture is often considered a strategic resource with the potential for assisting digital transformation, it can also be the source of inertia that inhibits change. Both in research and practice, cultural changes are deemed significant for a successful digital transformation, especially for managing disruptive changes caused by new technologies. As a result of their research endeavour, the authors have isolated several organisational values that are of key significance to the success of digital transformation: openness towards change, innovation, willingness to learn, risk affinity, tolerance towards failure, communication, and participation. Business experts agree that the success of digital business transformation does not depend solely on the adoption of adequate digital technology, but also radical strategic and cultural changes within the organisation [10]. However, the most significant cultural barrier — one often underestimated and not recognised by organisations at the beginning — may be the reluctance to change and adapt to something as radical as digitalisation.

It is clear that "Openness towards change" is a CSF of digital transformation, which is why we decided to include it as the first CSF within the dimension "Organisational culture".

Organisations must be aware of the significance of providing active support to employees, so that they may prepare for using new technologies and assume a positive attitude towards change. In addition, organisations must encourage and inspire employees to develop a digital mindset, which vastly differs from the traditional business settings [7].

For this reason, we included "Fostering digital thinking" as the second CSF of digital transformation in the "Organisational culture" dimension (Table 2).

An organisation's focus on promoting innovation is also an important element. Organizations are encouraged to explore the possibilities that new digital technologies provide for upgrading user experience and changes in interaction with clients. This can be achieved by looking into all modes of interaction with the customer and integrating customer interaction across all channels, both physical and digital [1], [8].

A "Stimulating environment that encourages innovation" is undoubtedly an important CSF of digital transformation, which is why we included it in Table 2, as the fourth CSF under "Organisational culture".

Hartl and Hess [3] emphasise willingness to learn in the context of support to successful digital transformation, defining it as "the organisation's pursuit of continuous advancement through the acquisition of new skills and knowledge." Pace at which digital initiatives are realised can be directly related to organisational culture, which should encourage experimenting, as well as be tolerant

towards errors and failure. Innovation and experiments, which at times may, naturally, end in failure, necessitate a certain level of propensity to risk, as well as repeated attempts [5], [6], [7], [23].

In the process of literature review, we recognised two additional CSFs, whose significance was described in the previous paragraph: "Willingness to learn" (the fifth CSF under "Organisational culture") and "Willingness to take risks and tolerance towards failure" (the sixth CSF under "Organisational culture" in Table 2).

Cooperation and cross-functional work encourage the creation of new ideas and propel innovation. Organisations are abandoning silo-thinking [5], [21], which is why we included "Cooperation and cross-functional work" in Table 2 as the third CSF under "Organisational culture".

In order to fully harness the potential of cooperation, organisations must establish proper coordination and co-creation in decentralised activities [6]. Hartl and Hess [3] emphasise an organisation's capacity to build internal and external networks for exchanging knowledge and information, as well as support an open non-hierarchical discussion and democratisation of the decision-making process. Therefore, "Communication and participation in decision-making" can be considered yet another CSF of digital transformation within the "Organisational culture" dimension.

## Human resources capabilities and competencies dimension

The need for digital skills, knowledge, and talent is on top of nearly all organisations' lists. In order to devise and execute their digital business strategies, organisations must train their employees in all necessary digital skills, revise their reward systems, and ensure financial resources for developing human capital [5]. Imgrund et al. [6] emphasise the need for IT skills and abilities, especially in data management and data processing technologies. Besides clearly technical IT skills, a digital business strategy requires some non-IT skills as well, such as visioning, collaboration, and organisational change management [5].

In alignment with the attitudes in the reviewed relevant literature, we decided that the "Level of digital skills and knowledge" must be included as a CSF of digital transformation. As presented in Table 2, we classified it under the dimension "Human resources capabilities and competences".

Organisations should question the need for developing a collaborative working environment and ensure that the digital transformation project is adequately staffed. Staff structure can be assessed in terms of maturity, through an analysis of their roles, expertise, and abilities. As tasks become increasingly complex, organisations can benefit from greater employee specialisation, but also from relying on knowledge management mechanisms in order to ensure knowledge transfer and cooperation [6]. Similarly, Ismail et al. [7] advise organisations to pay greater attention to the structure of the staff, talents, skills and leadership. Aforementioned authors' conclusions lead us to include "Ability to recognise potential" as a SCF within the "Human resources capabilities and competences" dimension, as presented in Table 2.

Formulation of a digital transformation strategy should involve decisions on how to acquire individuals with necessary skills and talents, so that organisations may make full use of the digital trends. Ismail et al. [7] recommend that organisations should consider on-demand talent markets as strategic sources, balance full-time and part-time talent, as well as strive to develop such an environment where the best people want to work. New talent is attracted by the opportunity to participate in a digital transformation, by a leader's digital literacy, and an understanding of the power of digital technologies within a company [5].

"Ability to acquire and retain talent" was hence listed in Table 2 as the second CSF within "Human resources capabilities and competences".

Until recently, chief information officers (CIO) were responsible for digital innovation. Over the last several years, organisations expect that their CIOs extend their purely technical roles and become business strategists. These new responsibilities are highly complex and exert a great amount of pressure on CIOs. In addition to that, novel digital technologies require a different mindset and a different set of skills compared to previous waves of transformational technology. This may be yet another

reason why CIOs are often not adequately equipped for steering digital transformation. An increasing number of organisations is instituting an additional top-level management position — chief digital officer (CDO) — making it one of the fastest-growing executive positions. Regardless of their formal position in an organisation, a CDO promotes digital transformation in order for it to become an organisation's strategic priority. A CDO's role, therefore, includes supporting top management in formulating and executing a digital transformation strategy. Internally, a CDO encourages cross-functional collaboration and mobilises the entire organisation, at all hierarchical levels. It should also be emphasised that CDOs have a more comprehensive role than heads of individual digital business units: CDOs assume authority and responsibility for digital initiatives at a level above individual business functions and attempt to transform the entire organisation [19].

Together with chief information officers or even chief executive officers, new positions such as CDOs are also emerging as potential candidates for driving the transformation [7].

"CDO (Chief Digital Officer) role" is a CSF of a successful digital transformation, and as such, we included it in Table 2 as the fourth CSF under "Human resources capabilities and competences".

## Technology dimension

Information technology has a strategic role in every organisation's prospective technological ambitions. An organisation must decide whether it wants to become a market leader in the application of technology, with the possibility of developing its own technical standards or wants to rely on already established standards, viewing technology as an instrument for realising its business operation. Opting for a role of a market leader can enable an organisation to gain competitive advantage and make other organisations dependant on its technical standards, but also bears risks and necessitates certain technological competences [11].

In the context of technology, Sahu et al. [15] emphasise adaptability, usability, and integration of digital technologies and their applications into the present organisational infrastructure.

In line with this, we introduced "Flexible IT infrastructure" as the first CSF within the "Technology" dimension, as shown in Table 2.

In their study on digital transformation in large organisations, Sebastian et al. [18] argue that large organisations must opt for one of the previously mentioned digital transformation strategies: a customer engagement strategy, or a digital solutions strategy. Choice of one of the strategies will outline the priorities for building two technology-enabled infrastructures: operational backbone, and a digital services platform. The authors define the operational backbone as a technology and a business capability that ensures efficiency, scalability, reliability, quality, and predictability of core operations. Operational backbone should ensure the efficiency of transaction processing and decision-making. Ever since the 1990s, organisations have been building their operational backbones by implementing ERP systems and customer relationship management (CRM) systems, aiming for the benefits of standardised and integrated systems and processes. Based on such perspectives in the analysed literature, we conclude that "Digital operational platform" should be introduced as CSF within the "Technology" dimension.

Since the operational backbone is designed for reliability and efficiency, it doesn't offer responsiveness and flexibility organisations need for rapid digital innovation. That is why, in addition to the operational backbone, organisations need a digital service platform, which Sebastian et al. [18] define as a technology and a business capability that facilitates rapid development and implementation of digital innovation. A digital services platform should ensure fast innovation of an organisation's critical digital offering to customers.

Both the operational backbone and the digital services platform rely on technology, but what makes them so powerful is the business capabilities they provide. An operational backbone supports efficiency and operational excellence, while a digital services strategy facilitates business agility and rapid innovation [18]. Ergo, "Digital services platform" was added as the third CSF within "Technology" dimension.

In their paper on critical success factors of digital business strategy, Holotiuk and Beimborn [5] identified information technology as a separate dimension, particularly emphasising the use of data and information. They pointed to the vital significance of big data analytics and making sense of both structured and unstructured data, acquired from both internal and external sources and stored within a central data repository. Analytics are a necessity for making the decision-making process data-driven, enabling it to support rational economic decisions, learning about clients, and turning data into knowledge. Data is a source of competitive advantage since information is the centrepiece of business models in today's digital business environment. According to Berman [1], organisations must be prepared to tightly integrate new data processing technologies into their processes and decision-making. Organisations should be equipped with tools for extracting predictive insights from analytics and use data to optimise their digitalised supply chains and client interaction [1]. We have included "Developed business analytics system" as the fourth CSF under "Technology".

According to the findings of Holotiuk and Beimborn [5], digital transformation fundamentally alters the traditional role of IT in an organisation. In its new role, IT does not only provide support to business, but rather influences the creation of business value through the utilisation of information technology. IT sector's capacity for bimodal operation enables organisations to manage IT at two different speeds, with quick results, short response times, extreme flexibility on the client-side, and a strong internal operational backbone on the inside. This bimodal approach facilitates digitalisation with fast front-end changes, simultaneously meeting the background requests. "IT sector's capacity for bimodal operation" was introduced as the fifth CSF within the "Technology" dimension.

As digitalisation poses a risk to IT and data security, organisations must adapt their compliance rules and respond to IT security threats by formulating guidelines for conduct, risk management systems, and a comprehensive defence strategy [2], [6]. In accordance with this, we identified "IT security" as the sixth CSF within the "Technology" dimension.

## Conclusion

Digital business transformation is a conditio sine qua non for modern organisations. The final goal of digital business transformation is to create added business value. Introduction of a vast number of digital technologies in an organisation will not by itself provide the expected benefits. Organisations can make this goal more feasible by defining a clear, comprehensive digital transformation strategy, which should emphasise the key digital advantages. A digital transformation strategy must be aligned both with the business strategy and the functional strategies and integrate different strategic levels within an organisation.

Results of the theoretical research were used for systemising the critical success factors within the 6 introduced dimensions. Such systemisation, coupled with a detailed description of individual CSFs, may serve organisations on their journey towards meaningful business transformation.

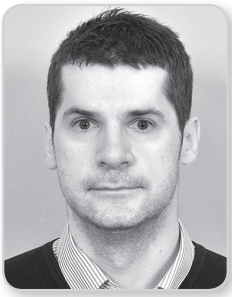
In addition to that, the research results presented in this paper present a sound basis for future research in the domain of digitalisation and digital business transformation. These topics, even after an entire decade in a limelight, have not yielded many research papers, which indicates an area with various opportunities for further research in which original contributions are yet to be made.

Finally, the obtained research results will serve as a basis for a future empirical research we plan to realise in near future. The empirical research will include entities established in Serbia and the neighbouring countries, with the aim of verifying and eventually modifying the CSFs identified and systemised in the theoretical research in line with the results of interviews with expert practitioners.

## References

1. Berman, S. J. (2012). Digital transformation : opportunities to create new business models. *Strategy & Leadership*, *40*(2), 16–24. https://doi.org/10.1108/10878571211209314.
2. Čelik, P. (2019). Bezbednosne implikacije digitalnog poslovanja. *Ekonomija: teorija i praksa*, *12*(4), 61–81.
3. Hartl, E., & Hess, T. (2017). The role of cultural values for digital transformation : Insights from a Delphi study. *Twenty-Third Americas Conference on Information Systems*, 1–10.

4. Hess, T., Benlian, A., Matt, C., & Wiesböck, F. (2016). Options for formulating a digital transformation strategy. *MIS Quarterly Executive*, *15*(2), 17–33.
5. Holotiuk, F., & Beimborn, D. (2017). Critical Success Factors of Digital Business Strategy, in Leimeister, J.M.; Brenner, W. (Hrsg.): *Proceedings der 13. Internationalen Tagung. Wirtschaftsinformatik (WI 2017)*, St. Gallen, S. 991–1005. https://doi.org/10.1016/S0144-8188(01)00064-3.
6. Imgrund, F., Fischer, M., Janiesch, C., & Winkelmann, A. (2018). Approaching digitalization with business process management. *Proceedings of the MKWI*, 1725–1736.
7. Ismail, M. H., Khater, M., & Zaki, M. (2017). Digital business transformation and strategy : What do we know so far ? Retrieved from https://www.semanticscholar.org/paper/Digital-Business-Transformation-and-Strategy-%3A-What-Ismail-Khater/35b2bd95aeb8e6ca0ea0652d0d7fc697eda3362a.
8. Kostić, Z. (2018). Innovations and digital transformation as a competition catalyst. *Ekonomika*, *64*(1), 13–23. https://doi.org/10.5937/ekonomika1801013k.
9. Kotarba, M. (2018). Digital transformation of business models. *Foundations of Management*, *10*(1), 123–142. https://doi.org/10.2478/fman-2018-0011.
10. Leipzig, T. Von, Gamp, M., Manz, D., & Schöttle, K. (2017). Initialising customer-orientated digital transformation in enterprises. *Procedia Manufacturing*, *8*, 517–524. https://doi.org/10.1016/j.promfg.2017.02.066.
11. Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business and Information Systems Engineering*, *57*(5), 339–343. https://doi.org/10.1007/s12599-015-0401-5.
12. Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* . Sage.
13. Murawski, M., Bühler, J., Martensen, M., Rademacher, C., & Bick, M. (2018). How Digital Business Strategy Affects Profitability: Opening the "Black Box" of Performance. *24th Americas Conference on Information System 2018*. Retrieved from https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1329&context=amcis2018.
14. Nwaiwu, F. (2018). Review and comparison of conceptual frameworks on digital business transformation. *Journal of Competitiveness*, *10*, 86–100.
15. Sahu, N., Deng, H., & Mollah, A. (2018). Investigating the critical success factors of digital transformation for improving customer experience. *International Conference on Information Resources Management*.
16. Sathananthan, S., Hoetker, P., Gamrad, D., Katterbach, D., & Myrzik, J. (2017). Realizing digital transformation through a digital business model design process. *Internet of Things Business Models, Users, and Networks*, 1–8. IEEE.
17. Schallmo, D., & Williams, C. (2017). Digital transformation of business models — best practice, enablers, and roadmap. *International Journal of Innovation Management*, *21*(8), 1–17. https://doi.org/10.1142/S136391961740014X.
18. Sebastian, I. M., Ross, J. W., Beath, C., Mocker, M., Moloney, K. G., & Fonstad, N.O. (2017). How Big Old Companies Navigate Digital Transformation. *MIS Quarterly Executive*, *16*(3), 197–213.
19. Singh, A., & Hess, T. (2017). How Chief Digital Officers Promote the Digital Transformation of their Companies. *MIS Quarterly Executive*, *16*(1), 31–44.
20. Sofronijević, A., Milićević, V., & Ilić, B. (2017). Strategic approach to digital transformation of business. *Tehnika*, *72*(2), 273–279. https://doi.org/10.5937/tehnika1702273s.
21. Vučeković, M., Radović, M., & Marković, D. (2020). Koncept digitalnog preduzeća i njegove virtualizacije. *Trendovi u poslovanju*, *15*(1), 75–82.
22. Vuksanović Herceg, I., Kuč, V., Mijušković, V. M., & Herceg, T. (2020). Challenges and Driving Forces for Industry 4.0 Implementation. *Sustainability*, *12*(10), 1–22.
23. Wade, M. (2015). Digital business transformation. Retrieved from https://www.s-ge.com/sites/default/files/static/downloads/digital_business_transformation_framework_imd_0.pdf.


**Bogdan Ubiparipović**

graduated from the Faculty of Electrical Engineering at the University of Belgrade. Currently a PhD student at the Department of Business Informatics, Faculty of Economics, University of Novi Sad, attending courses in Digital Business Transformation, Business Intelligence, DSS (Decision Support System), CRM (Customer Relationship Management), BSC (Balanced Scorecard), Data Warehouse and Data Mining. He is the Head of the Business Intelligence Department of Nova Banka AD Banja Luka, responsible for: management of the business intelligence team, implementation and operational management of bank's data warehouse, data modelling, reporting, designing (KPIs, metrics, dashboards, scorecards), data mining and predictive modelling.



**Predrag Matković**

is Associate Professor at the University of Novi Sad, Faculty of Economics in Subotica, teaching undergraduate, master's and PhD courses in the field of business informatics. He has authored numerous journal and conference papers and was a member of several national and international research project teams. His research interests include business process management, agile software development, object-oriented analysis and design, and integrated ERP, SCM, CRM software solutions.

**Mirjana Marić**

is Assistant Professor at the University of Novi Sad, Faculty of Economics in Subotica, teaching undergraduate, master's and PhD courses in the field of business informatics. She has authored numerous journal and conference papers and was a member of several national and international research project teams. Her research interests include business process management, traditional and agile project management and integrated ERP, SCM, CRM software solutions.

**Pere Tumbas**

is Full Professor at the University of Novi Sad, Faculty of Economics in Subotica, in the field of business informatics. He has authored and co-authored several textbooks, handbooks and monographs, as well as numerous journal and conference papers. In over 38 years of working at the faculty, he has been a member of more than 70 scientific research project teams. He is an editor or editorial board member of several international journals, as well as a member of several programme committees of scientific conferences. His primary areas of interest include business process management, integrated business processes, digitalisation and business transformation, information systems.