

EFFECT OF MANAGEMENT'S COMPETENCIES AND DIGITAL SKILLS ON DIGITAL BUSINESS MODEL MATURITY FOR SMEs

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DOI: 10.7906/indecs.20.5.2
Regular article

Received: 19 October 2021.
Accepted: 11 March 2022.

ABSTRACT

The uptake of digital business models has been distinctly evident over recent years, causing profound changes across industries. Even though various scholarly papers attempt to investigate those developments, empirical studies of factors that influence digital business models' maturity are still scarce. This research article aims to address this literature gap, achieved by empirically testing the relationship between relevant managerial factors and digital business models' maturity. Through a multi-national study with 162 participating companies operating within the sector of yachting tourism, followed by a qualitative and quantitative analysis of the obtained primary results, it has been found that managerial competencies, including management education and their digital skills, positively affect digital business model maturity of the respective companies.

KEY WORDS

digital business models, digital maturity, management digital skills, digital leadership, digital transformation

CLASSIFICATION

JEL: D22, M15, O33

INTRODUCTION

As a consequence of rapid digitization, in recent years, one could have witnessed a series of radical business model shifts in numerous business sectors, particularly the flourishing of what has been denoted as Digital Business Models [1]. Such developments have caused considerable changes in business ecosystems across industries and geographies [2], resulting in how services are provided and created value [1, 3].

In a nutshell, digital business models are those business models that create and deliver value primarily by using digital technologies [4, 5]. Prior research, e.g. [6-9], has identified several distinct specificities of digital business models, such as value creation, innovation, or ability to use digital technologies, fostering their unparalleled growth and impact. Furthermore, to provide a more in-depth understanding of the development level of a particular business model, the concept of digital business model maturity has been introduced and studied (e.g. [10, 11]). In addition, a specific measurement framework for digital business model maturity has been proposed and empirically validated [12].

While previous research have stressed that the digital business model is connected with the concept of digital transformation [13] and explored various factors that may influence a company's digital business model maturity level, such as the adoption of digital technologies [14] or organizational readiness [15], this article is focusing specifically on the managerial factors identified as potentially highly relevant (e.g., [16, 17]). Therefore, the study empirically examines managerial factors that may impact the digital business model maturity, especially in the context of Small and Medium Enterprises (SMEs) as the most numerous type of business organization.

The research question is formulated as follows: What is the effect of managerial factors on the digital business model maturity of an SME? The above research question has been explored within this article through a combination of theoretical analysis and empirical research – coupled with an in-depth quantitative and qualitative study of the obtained findings and their relevant interrelations. In that context, the main scientific contribution of this article involves empirical testing and validation of the impacts of managerial factors on digital business model maturity. In addition, an important contribution is reflected in the fact that this research explores the prevailing SME segment, as opposed to the majority of earlier studies that focused predominantly on the corporate segment. As the growing number of companies are trying to shift to the digital business model, which appeared to be very important, the , especially in the Covid-19 pandemic environment, this article's results might help practitioners focus on specific factors in achieving digital business model maturity.

The remainder of this article has been outlined as follows: Section II contains theoretical background based on a structured literature review of prior studies about digital business models and their maturity and the relevant managerial factors. Section III describes the used methodology for the empirical research, including the data collection process, variables used in the study, their measurement, and the formulation of the hypotheses and the corresponding research model. Next, Section IV outlines and analyzes the obtained research results, starting with the frequency analysis and descriptive statistics, the analysis of correlations, and finally, the testing of the three hypotheses. Towards the end of the article, Section V summarizes the relevant findings and discusses their implications, pointing to the possible application in academia and practice and suggesting the potential directions of future research.

BACKGROUND

Digitalization that we are witnessing in recent years and decades represents the greatest systematic social and economic change since the time of the industrial revolution [6]. Accordingly, companies in all industries are increasingly becoming digitized and re-organized into new forms of digital organizations [16]; hence the role of digital business models are becoming ever more prominent. Such developments have spurred academic interest, including the studies of the characteristics of digital business models and their maturity and the role of leadership in that new context.

THE RISE OF DIGITAL BUSINESS MODELS

In recent years one could witness a sharp growth of research papers related to digital business models [18], following a rapid uptake of the popularity, prevalence, and market impact of such business models in practice [2]. Layers of technological innovation have enabled a galloping pace of digital transformation within business organizations [9] and the related transformation of entire industries and markets. Such developments are a part of a wider trend labeled a digital revolution [2], pointing to the broad and profound societal and organizational effects of the intense changes worldwide.

The term digital business model stands for a specific business model, where value creation and delivery are achieved mainly through digital technologies [4]. Authors have emphasized several notable characteristics of digital business models that describe them in further detail and differentiate them from the traditional business models. These characteristics have been illustrated in Table 1.

Table 1. Characteristics of digital business models.

| Frequent Characteristics of Digital Business Models | Authors |
|---|----------------------------------|
| Offer novel value propositions through digital technologies | Voigt and Hinz [3] |
| Leverage new opportunities enabled by digital technologies | Spremić et al. [5] |
| Improve efficiency in the use of resources | Härting et al. [6] |
| Lower importance of physical items and places | Weill and Woerner [27] |
| Enable very low marginal costs | Remane et al. [7] |
| Enable high scalability | Nielsen and Lund [8] |
| Improve customization and flexibility | Harting et al. [6] |
| Utilize data as a key resource | Weill and Woerner [27] |
| Provide next level of service to customers | Caputo et al. [9] |
| Accelerate business model innovation | Osterwalder and Euchner [19] |
| Enable exponential network effects | Remane et al. [7] |
| Stimulate the development of specific ecosystems | Weill and Woerner [2] |
| Open to “winner-takes-it-all” scenario on the market | Casadesus-Masanell & Ricart [20] |
| Enable disruptive business models | Ritala & Sainio [21] |

Table 1 indicates that it can be inferred that they have enabled new value propositions, faster pace of business innovation, and in general, fostered the opening of completely new business frontiers and new markets, including creating specific business ecosystems [2]. Furthermore, the digital business model is tightly related to digital transformation [13]. This highly pervading concept stands for extensive organizational changes connected to the implementation of digital technologies [15], frequently resulting in a thorough transformation of the company involved [22]. In the course of digital transformation, the company is typically pursuing innovation of its services and business models [14], along with the

profound shifts of the organizational culture and a range of other effects on the entire company [23] as well as a business ecosystem [15].

Several frameworks have been in use for that purpose regarding the components of digital business models and their visual representation, as summarized in [18]. In brief, the most frequently applied framework is the Business Model Canvas (BMC) developed by Osterwalder & Pigneur [24], which can be used for representing both digital and traditional business models. The central element of BMC is the Value Proposition, around which the entire business model revolves with its 9 interrelated elements. Weill & Woerner [2] is an especially relevant framework, which depicts a digital business model as a combination of three main components. These components are i) Content – digital information about products and services, and in some business models digital-only products, ii) Experience – including digital customer interfaces, customer-facing processes, etc., and iii) Platform – including a range of internal and external technologies and data. Such components are highly relevant for digital business models, and they can be used to study their development [2] and their maturity [12].

It should be noted that digital business models are subject to continuous optimization, development, and improvement. In this context, Muzellec et al. [10] point to the concept of the Business Model Lifecycle, emphasizing that businesses should continuously review the relevance of their digital business models and adapt them dynamically to changes in customer response to their value proposition and other relevant parameters. It is, therefore, a matter of continuous business modeling and the systematic testing of the changes made. Other authors, such as Weiner & Wiesbecker [25], agree with this approach, pointing out the need to permanently design and evaluate business model alternatives and continuously check whether customers and partners perceive the value provided in the way the company envisioned it. These authors also elaborate on several targeted questions about value proposition, customers, the role of partners, and key financial aspects, which the companies should regularly evaluate in developing and upgrading their digital business model.

DIGITAL BUSINESS MODEL MATURITY

The development level of a particular digital business model in a company is called digital business model maturity [12]. Measuring and improving the maturity of one's digital business model can be of particular importance when considering its presumed links to organizational performance. According to Debkowska [26], companies with a higher business model maturity typically achieve better financial results. An analogous conclusion can be derived from the work of Weil & Woerner [2, 27].

As a relatively recent field of academic study, the concept of digital business model maturity has been most frequently observed from a predominantly theoretical perspective. At the same time, several papers contain empirical studies in that regard. Furthermore, a common approach involves grouping companies according to predefined digital maturity stages (e.g. [28-30]). Another approach compares companies' business models to an envisioned ideal development level. One such example can be found in [11], who pointed out that industrial companies' highest digital business models maturity was observed for business models based on smart services. Alvares et al. [31] state that digital business models of multisided platforms are generally more mature than those with a linear value chain. A framework for the empirical measurement of digital business models maturity has been described in [12], and it will be correspondingly used in this study, as described in the next sections.

Regarding the staged approach, Muzellec et al. [10] have identified four stages, or levels, of digital business models' maturity of two-sided platforms. Likewise, Sehnem et al. [32] have defined five stages of business model maturity from the circular economy perspective. In this research and digital maturity stages, Kane et al. [29] can find a particularly interesting perspective, whose results

indicate that the companies in the lowest digital maturity group are often characterized by an insufficient managerial understanding of digital technologies and business. Similar findings are evident from the work of Berghaus & Back [28], where managerial understanding and support are found necessary for the company to move beyond stage 1 of digital maturity. Gill & Van Boskirk [30] have emphasized the role of developing digital skills for successful mastery of mid-stages of digital maturity. Similar importance to digital skills has also been given in [29].

MANAGERIAL FACTORS

The relevant literature has increasingly mentioned the crucial role of the company's management in digital transformation and the corresponding digital business models. In particular, Promsri [33] points out that leadership is a key factor for successful digital transformation and proceeds by identifying managers' digital knowledge and literacy as one of the necessary prerequisites in that context. Similarly, Borowska [34] suggests that continuous digital leadership is required and describes the necessity for digital leaders to develop and implement adequate strategies which would ensure relevant skills development, adoption of organizational changes adjusted to the digital age, as well as the active use of digital tools across the organization. Peter et al. [35] articulate that digital leadership is one of the core strategic fields for digital transformation, which needs to provide adequate conditions for creating and utilizing dynamic capabilities within the organization.

In essence, the authors agree that there has been a substantial change in leadership styles and requirements in the digital era [36-38], whereby the later authors have outlined a specific matrix with different digital leadership styles. Furthermore, to develop an adequate digital leadership capacity, managers need to achieve a certain level of digital literacy, involving the mastery of relevant technical language and concepts [39]. These findings imply that the company management should present specific know-how about digital technologies and business models. In addition, Tanniru [40] emphasizes the close interrelation between technological and business aspects of digital leadership. Finally, according to the research conducted by Larjovuori et al. [41], formulating an adequate digital strategy is central to digital transformation success, including a clear vision, adequate objectives, and consistent managerial support during the implementation process.

The above-described results indicate that the relevant aspects of managerial competencies include acquiring specific knowledge and developing the ability to combine various business and technical aspects and successfully set and implement a winning digital strategy. Such managerial competencies and skills have been related to the success of the overall digital transformation and the company's digital maturity level. In particular, companies with strong managerial competencies were also on higher stages of digital maturity [16, 17], which indicates a connection between such managerial factors the digital maturity concept.

METHODOLOGY AND APPROACH

The empirical study was conducted using a structured online survey questionnaire on a multi-national sample of 162 companies based in 42 different countries and five continents. The companies from the same business sector were involved in the research. In particular, the selected sector was yachting tourism, which has been chosen for this study for several reasons: a high share of digital business models, the substantial role of digital business models in tourism overall according to extant research [18], authors' prior familiarity with this sector, the possibility to obtain relevant international population data, as well as the fact that the companies in this sector are usually SMEs, which further enhances their comparability in the context of this research.

DATA COLLECTION PROCESS

The core information regarding the data collection process is laid out in Table 2, summarizing the main parameters of the field research. The lists of companies were obtained from available sectors' databases and global reservation systems specialized for this particular business segment (MMK Booking Manager and Nausys). Next, those lists have been rigorously checked and amended following a structured relevance-assessment process, thus resulting in the final database of relevant companies and their contact details. In particular, the population consisted of 932 companies distributed across the world, which have all been invited to participate in the study. It should be noted that the sample included companies from all continents except Africa and Antarctica, which is because the yachting tourism sector is not present to a sufficient extent on those two continents.

Table 2. Data collection process summary.

| | |
|---|--|
| The main research instrument used | Structured questionnaire |
| Primary data collection method | Online |
| Language of the questionnaire | English |
| Pre-testing the questionnaire on a small sample | Yes, in Feb 2020 |
| Main field research period | Feb 2020 – Apr 2020 |
| Total number of companies invited – population | 932 |
| The final number of respondents – final sample | 162 |
| Final response rate | 17,38 % |
| Countries represented in the final sample (according to the location of the company's headquarters) | Argentina, Austria, Australia, Belgium, Belize, British Virgin Islands, Canada, China, Croatia, Czech Republic, Cyprus, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Lithuania, Malaysia, Monaco, Montenegro, Netherlands, New Zealand, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Thailand, Turkey, United Arab Emirates, United Kingdom, Ukraine, United States of America. |
| Continents represented in the final sample | 5 continents: Europe, North America, South America, Asia, Australia |

As visible from Table 2, the survey was administered online. In particular, the invited companies have been contacted primarily by e-mail, and in addition, some have been contacted through relevant social networks. The process included several professional reminders over approximately two months, resulting in 172 filled questionnaires. However, a few questionnaires had to be removed for not adhering to the required criteria (such as removing the duplicates, etc.). The final sample of 162 relevant and complete questionnaires was established. These 162 companies and their responses have been the subject of quantitative and qualitative analysis in this study. It should also be noted that the vast majority of the actual respondents were either managers or owners of those companies, which implies that they are adequately familiarized with their companies' business models and the studied managerial factors.

The collected questionnaires were first analyzed for completeness and relevance, after which several steps of statistical analyses have been performed, as described in the following sections. It should also be noted that some respondents have sent their additional comments in the form of

free text, which have been of further help to the authors to understand better the subject matter and the challenges present in the field. Finally, it needs to be mentioned that in addition to the main research instrument, the authors have also used supplementary sources such as a review of the websites and social network profiles of the studied companies and their competitors to observe a wider perspective and improve the contextualization of the obtained research findings.

VARIABLES IN THE STUDY

Table 3 summarizes the research variables, which were defined following prior literature. In particular, the upper part of the table describes the constructs that measure relevant managerial factors, while the lower part contains constructs measuring digital business models maturity and its components.

Table 3. Variables in the measurement model (In part adapted from [2, 12]).

| Variable name | Abbreviation | Variable description |
|---------------------------------|--------------|--|
| Managerial factors | MFA | This variable encompasses the specific managerial factors below as a second-level construct. |
| Managers Education | EDU | Managers' education includes the company management's formal and non-formal education and the aspect of their continuous learning following contemporary trends. |
| Managers Digital Skills | DGS | Managers' digital skills relate to an understanding and knowledge about the relevant digital trends and technologies and the ability to apply them successfully in business. |
| Digital business model maturity | MAT | Digital business model maturity refers to the level of development of the company's digital business model, which is measured following a specific framework for digital business models. |
| Content | CON | As one of the components of digital business models maturity, the content component includes: <ul style="list-style-type: none"> • various information presented to clients in digital formats, such as information about products and services, their characteristics, instructions, prices ... • Purely digital products (where applicable) include e-books, audio products, movies, other video products, online accounts, software products, etc. • Content generated by the end-users, such as reviews and recommendations, user photos and videos, etc. |
| Experience | EXP | The second component of digital business model maturity is the Experience component, which includes the complete digital processes for the customers, interfaces on computers and other user devices (e.g., smartphones, tablets), transactions history, various digital tools, etc. It should be noted that an adequate user experience implies an uncomplicated purchase process and an overall pleasant digital journey for the customers. |
| Platform | PLA | The third component of digital business model maturity is the Platform component, which includes technological architecture enabling business processes and relationships and delivering products and services. The Platform component includes internal elements (such as own technology, business processes, customer data, etc.) and external elements (such as partner technologies, hardware components, public networks, etc.) |

As described further in the text, the study used these variables to postulate and test the hypotheses and the corresponding research model.

RESEARCH HYPOTHESES

Three hypotheses have been postulated and empirically tested in this article. The first hypothesis examines the effect of managerial factors on digital business model maturity, while the remaining two hypotheses focus on specific impacts of the particular managerial factors studied. Specifically, the first hypothesis has been developed in line with the prior work of Peter et al. [35], Borowska [34], and Promsri [33], who all articulated the highly important role of leaders in the success of their companies' digital transformation endeavours. It has been argued that digital leadership is a core strategic aspect of businesses' digital transformation [33], essential for providing adequate conditions for the organization to explore its digital capabilities successfully. Such prior findings are highly relevant in the context of this research, as the observed population consists mostly of SMEs, where the role of management is of particular importance. Likewise, Schwer et al. [17] clearly emphasize the importance of company leadership for achieving digital maturity. In this context, managerial factors can be expected to impact the maturity of digital business models positively, and therefore, the first hypothesis in this research is postulated as follows:

H₁: *Managerial factors affect the digital business models maturity.*

The second hypothesis examines the impact of management education on the maturity of their company's digital business model. Promsri [33] has identified managers' digital knowledge and literacy as one of the necessary prerequisites for a successful digital transformation. Likewise, according to [16, 17], companies with strong managerial competencies were also in higher stages of digital maturity. Considering such research, it can be reasonably hypothesized that the relevant management education will be expected to impact digital business models' maturity positively. Thus, the second hypothesis in this study is stated as follows:

H₂: *There is a positive impact of management education on digital business model's maturity.*

Finally, the third hypothesis explores the effect of digital skills of managers on their organization's digital business model maturity. According to extant research, managers need to develop sufficient digital literacy to achieve adequate digital leadership capacity, including the mastery of relevant technical language and concepts [39]. These findings imply that the company leaders should be well versed in specific know-how about digital technologies and business models. The necessity to combine technological and business aspects of digital leadership has been noted in [40]. In contrast, Gonciarski & Swiatkowski [36] have documented a substantial change in leadership styles in the digital era, which implies the utilization of specific digital skills. Based on such prior findings, the important role of managers' digital skills becomes evident. It can be reasonably expected for the management digital skills to positively impact the maturity of their companies' digital business models. Therefore, the third hypothesis in this research is formulated as follows:

H₃: *Management digital skills positively affect the digital business models maturity.*

The three hypotheses and their interrelations in the research model, are illustrated in Figure 1.

In the next sections, we summarize the empirical testing of these hypotheses on companies within the observed industry to examine the validity of the research model and enable further studies with samples from other comparable industries.

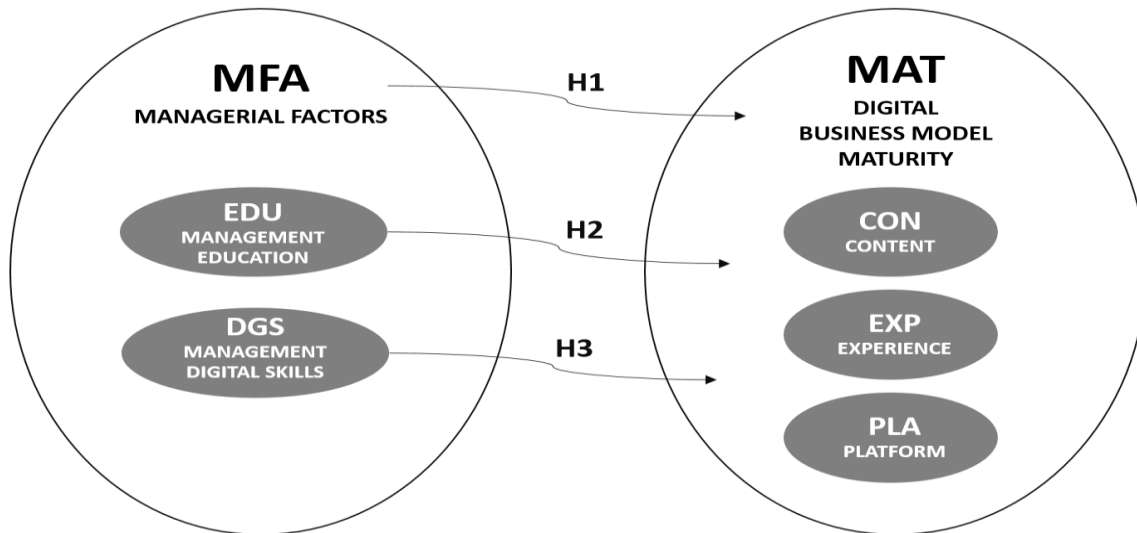


Figure 1. Research model.

VARIABLES MEASUREMENT APPROACH

Each variable has been measured with a set of specific questions in this research, using the 5-point Likert scale – a frequently applied method in comparable studies. Specifically, variables of digital business models maturity have been measured according to the framework displayed in Figure 2. As can be observed from that illustration, the digital business model maturity level was obtained by measuring the achieved development stage of each of the three components: Content, Experience, and Platform. The actual measurement questions have been analogous to [12] and based on the previous work [2].

Likewise, the variables about the studied managerial factors have also been measured through a set of specific statements – indicators, as presented in Figure 3.

Regarding the presented measurement frameworks, it should be noted that a statistical evaluation of the measurement model reliability was conducted following widely used procedures in comparable research. Specifically, the reliability of the measurement model was evaluated with the use of the Cronbach Alpha coefficient, which is one of the most frequently used measures of reliability in similar studies [42]. The results of those calculations are outlined in Table 4.

As shown in Table 4, for all maturity-related constructs, the corresponding Cronbach Alpha coefficients are around 0,9, while for managerial factors constructs, they range from nearly 0,7 to over 0,9. Such Cronbach Alpha coefficients indicate that the measurement model reliability in this research is satisfactory. It should be noted that the displayed coefficient for the EDU variable has been obtained after removing the M1 indicator. Namely, that particular indicator was insufficiently consistent with the rest of the measurement model and therefore has been removed from the corresponding structural model, following the usual procedure of comparable research. The remaining indicators were found to be reliable in the context of this measurement model, and therefore no further indicators had to be removed.

RESULTS

The statistical analysis of the collected responses has encompassed the univariate analysis (e.g., response frequency distributions and descriptive statistics) and the multivariate analysis, particularly based on the structural equations modeling technique. Furthermore, extensive correlations analyses have been performed, both at indicators and constructs. In addition, the potential improvement areas with regards to managerial factors have been identified in this study.

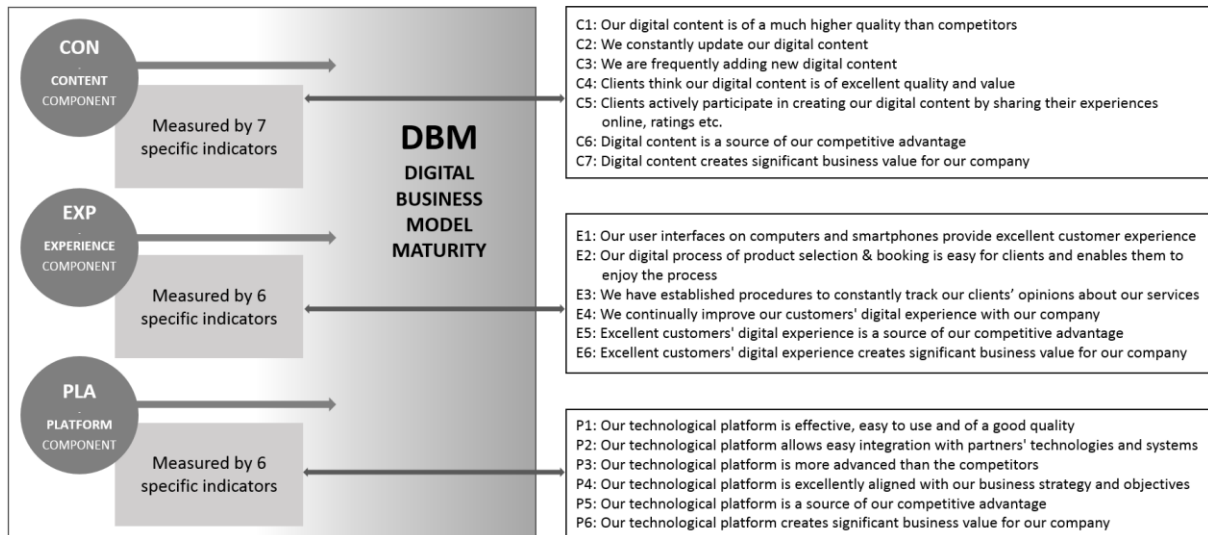


Figure 2. Digital business model maturity measurement framework (Adapted from [2, 12]).

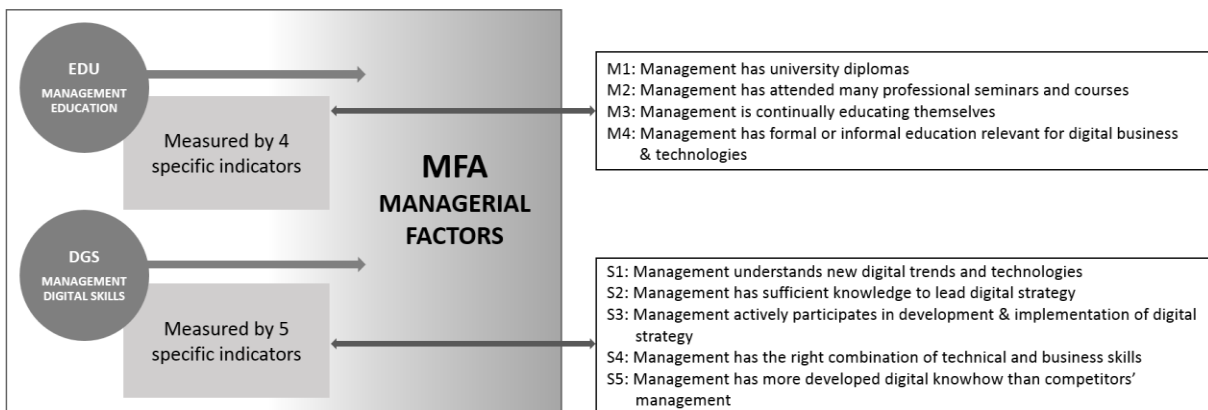


Figure 3. Measurement framework for managerial factors.

Table 4. Measurement model reliability.

| Construct Full Name | Abbreviation | Cronbach Alpha |
|---------------------------------|--------------|----------------|
| Management Education | EDU | 0,794* |
| Management Digital Skills | DGS | 0,933 |
| Managerial Factors | MFA | 0,676 |
| Content | CON | 0,905 |
| Experience | EXP | 0,892 |
| Platform | PLA | 0,932 |
| Digital Business Model Maturity | MAT | 0,904 |

*result after the removal of M1 indicator

DESCRIPTIVE STATISTICS

The observed frequency distributions for the studied managerial factors are presented in the Appendix. for EDU and DGS indicators. The upper part of the table contains frequency distribution for EDU – Management Education indicators. It can be observed that all of these indicators are right-skewed, which indicates that the respondents rate quite positively the educational aspects of their company management. In particular, the highest number of “I fully agree” answers has been recorded for the indicator M1 (university diplomas). In contrast, the lowest number of such responses is evident for M4 (education relevant for

digital business and technologies). It should be noted that the indicator M1 was subsequently excluded from the structural modelling part of the analysis due to the findings of the measurement model reliability analysis, as already explained in the previous section.

The lower part of the same table contains frequency distributions for DSK – Management Digital Skills indicators. It is interesting to note that the indicators S1-S4 have relatively similar distribution shapes: all are skewed positively with the highest score for the “I mostly agree” option, which over 60 respondents selected in each of those questions. However, when looking at the “I fully agree” answers, one can notice a solid difference between indicators S1 and S2. This implies that the participants have given quite higher ratings to their management’s general understanding of the new digital trends and technologies than their actual knowledge to lead a digital strategy.

It can be observed that the results for the S5 indicator differ substantially from the other four DSK indicators. The S5 frequency distribution is only mildly positively skewed, with the majority of the answers being neutral. This is logical given that this indicator tackles the managers’ digital skills compared to the competition. Most of the respondents believe to be neither particularly better nor worse compared to the digital skills of the competitor’s management.

Selected descriptive statistics for the studied managerial factors have been displayed in Table 5. Initially, it should be noted that the individual numerical values, as a base of this calculation, have been obtained by transforming the descriptive Likert-scale answers into corresponding numerical scores, ranging from 1 (for “I fully disagree” answers) to 5 (for “I fully agree” answers). Thus, obtained numerical values have been the basis for further statistical analysis. In particular, from the upper part of Table 5, about management education, one can observe that the indicators M1 and M3 have very high mean values. In contrast, the lowest mean has been recorded for the indicator M4. This may imply a certain room for improvement in managers’ education about digital business and technologies.

When it comes to DSK indicators, as visible from the lower part of the table, the highest mean score has been obtained for S1 and the lowest for the S5 indicator. The S5 means is somewhat above the middle of the measurement scale, indicating that the respondents may have assessed themselves overly positively compared to the competition. As for the remaining DSK indicators, one can notice a certain discrepancy between a general statement such as S1 and more practical statements such as S2 and S3, which may indicate a potential area for improvement when it comes to managers’ knowledge to lead a digital strategy and their actual participation in developing and implementing it.

Table 5. Descriptive statistics for the managerial factors.

| | Mean | Std. Deviation | N |
|--|-------------|----------------|------------|
| M1 | 4,06 | 1,32 | 162 |
| M2 | 3,75 | 1,12 | 162 |
| M3 | 4,06 | 0,97 | 162 |
| M4 | 3,54 | 1,18 | 162 |
| EDU – MANAGEMENT EDUCATION | 3,85 | 0,88 | 162 |
| S1 | 4,02 | 0,92 | 162 |
| S2 | 3,67 | 1,01 | 162 |
| S3 | 3,73 | 1,09 | 162 |
| S4 | 3,80 | 0,99 | 162 |
| S5 | 3,28 | 1,12 | 162 |
| DSK – MANAGEMENT DIGITAL SKILLS | 3,70 | 0,91 | 162 |
| MANAGERIAL FACTORS | 3,62 | 0,93 | 162 |

Overall, it can be observed that the participants rated themselves rather highly for all of the studied indicators, which is logical when considering that the vast majority of the respondents in this study were the managers themselves. Therefore, when interpreting the numerical results, one needs to consider the possibility of some bias towards more positive answers in general.

In this context, it is obvious that the surveyed managers have rated their knowledge and skills partly (and those of their other colleagues); hence the high mean values are not surprising. Considering such conditions, the identified potential improvement areas with relatively lower average scores than other indicators may be relevant, even though those scores are nominally high.

The correlations between the measured indicators have been analysed using Pearson correlation coefficients, a frequently used measure of association [43]. This part of the analysis examines the nature and the direction of mutual connections between the studied indicators and the respective constructs.

The correlations coefficients for each pair of indicators of the studied managerial factors are presented in Table 6. From the data presented, it can be observed that all those correlations are positive and statistically significant at the level of 1 %. Regarding the strength of the mutual correlations, it should be borne in mind that the closer the correlation coefficient to 1, the stronger the positive Correlation between that pair of indicators or variables [43]. This implies that most of the observed indicators have correlations of medium strength. Yet, some pairs of indicators (such as S1 and S2, for example) have a rather strong positive correlation.

Table 6. Correlations between the indicators for managerial factors.

| | | | | | | |
|------------|-----------|-----------|-----------|-----------|------------|------------|
| | M1 | M2 | M3 | M4 | EDU | |
| M1 | 1 | | | | | |
| M2 | 0,346*** | 1 | | | | |
| M3 | 0,339*** | 0,666*** | 1 | | | |
| M4 | 0,361*** | 0,479*** | 0,578*** | 1 | | |
| EDU | 0,699*** | 0,793*** | 0,809*** | 0,783*** | 1 | |
| | S1 | S2 | S3 | S4 | S5 | DGS |
| S1 | 1 | | | | | |
| S2 | 0,814*** | 1 | | | | |
| S3 | 0,733*** | 0,757*** | 1 | | | |
| S4 | 0,725*** | 0,792*** | 0,778*** | 1 | | |
| S5 | 0,668*** | 0,708*** | 0,736*** | 0,710*** | 1 | |
| DGS | 0,877*** | 0,911*** | 0,903*** | 0,897*** | 0,866*** | 1 |

***correlation is significant at the 0,01 level (2-tailed)

Next, Table 7 contains the correlation analysis between the constructs, i.e., between the studied managerial factors and digital business model maturity. It can be observed that all pairs of the constructs are mutually positively correlated, with the correlations being statistically significant at the level of 1 %. Such results imply that the companies with higher scores on managerial factors are likely also to have higher scores on their digital business model maturity.

Table 7. Correlations between the variables – Pearson's correlation coefficients.

| | | | | |
|------------|------------|------------|------------|------------|
| | DGS | EDU | MFA | MAT |
| DGS | 1 | | | |
| EDU | 0,510*** | 1 | | |
| MFA | 0,849*** | 0,777*** | 1 | |
| MAT | 0,601*** | 0,356*** | 0,555*** | 1 |

***correlation is significant at the 0,01 level (2-tailed)

Overall, the presented correlation analysis results suggest that positive relationships exist between the variables in the model. This will be further examined through the formal testing of the relevant hypotheses.

STRUCTURAL MODELLING

The hypotheses postulated in this article have been tested using Structural Equations Modeling [43, 44]. Before estimating the parameters, relevant model assumptions, and the frequently used model fit indices [43, 44]. These indices for structural models related to all three hypotheses are summarized in Table 8. As can be observed, the value of each index lies within the recommended range, which implies that the model fit is adequate in all three cases.

Table 8. Model fit indices.

| | RECOMMENDED | H₁ | H₂ | H₃ |
|-------------|--------------------|----------------------|----------------------|----------------------|
| χ^2/df | < 3 | 2,558 | 2,231 | 2,885 |
| GFI | > 0,8 | 0,977 | 0,979 | 0,975 |
| CFI | > 0,9 | 0,986 | 0,990 | 0,988 |
| NFI | > 0,9 | 0,978 | 0,981 | 0,982 |
| RMR | < 0,08 | 0,021 | 0,021 | 0,023 |

Next, we present relevant structural models for the hypotheses testing, displayed in Figure 4, along with the estimated parameters. It should be noted that the model parameters were estimated using the Maximum Likelihood (ML) method. The most relevant parameters for testing the hypotheses are those in the middle of the structural model, connecting the two main constructs. In particular, the regular parameter is displayed above the arrow, while the corresponding standardized parameter is displayed in brackets below that arrow. All the estimated parameters were statistically significant at 1 % in all three structural models.

Regarding the structural model for hypothesis H₁, the obtained parameters indicate that the relationship between managerial factors and digital business model maturity is characterized by a positive and statistically significant coefficient of 0,99, corresponding to the standardized coefficient of 0,66. This means that the higher the company's score on managerial factors, the higher the expected level of its digital business model maturity. This result implies that hypothesis H₁ has been empirically confirmed in this research.

For hypothesis H₂, the estimated parameter connecting the two constructs is 0,46 (standardized 0,37), implying a positive connection between management education and digital business model maturity. The estimated parameters in the model are statistically significant. Therefore, should the score on managerial education increase, one could expect, on average, that the company's score on digital business model maturity would increase as well. This concludes that hypothesis H₂ has also been confirmed empirically in this study.

Finally, looking at the structural model for H₃, it can be observed that the constructs are connected with a positive parameter of 0,62, which corresponds to the standardized parameter of 0,63. As these estimated parameters are statistically significant, too, this implies that an increase in score for the management digital skills would lead to an expected increase in the score for digital business model maturity of the company. In light of such results, it can be inferred that hypotheses H₃ have been confirmed.

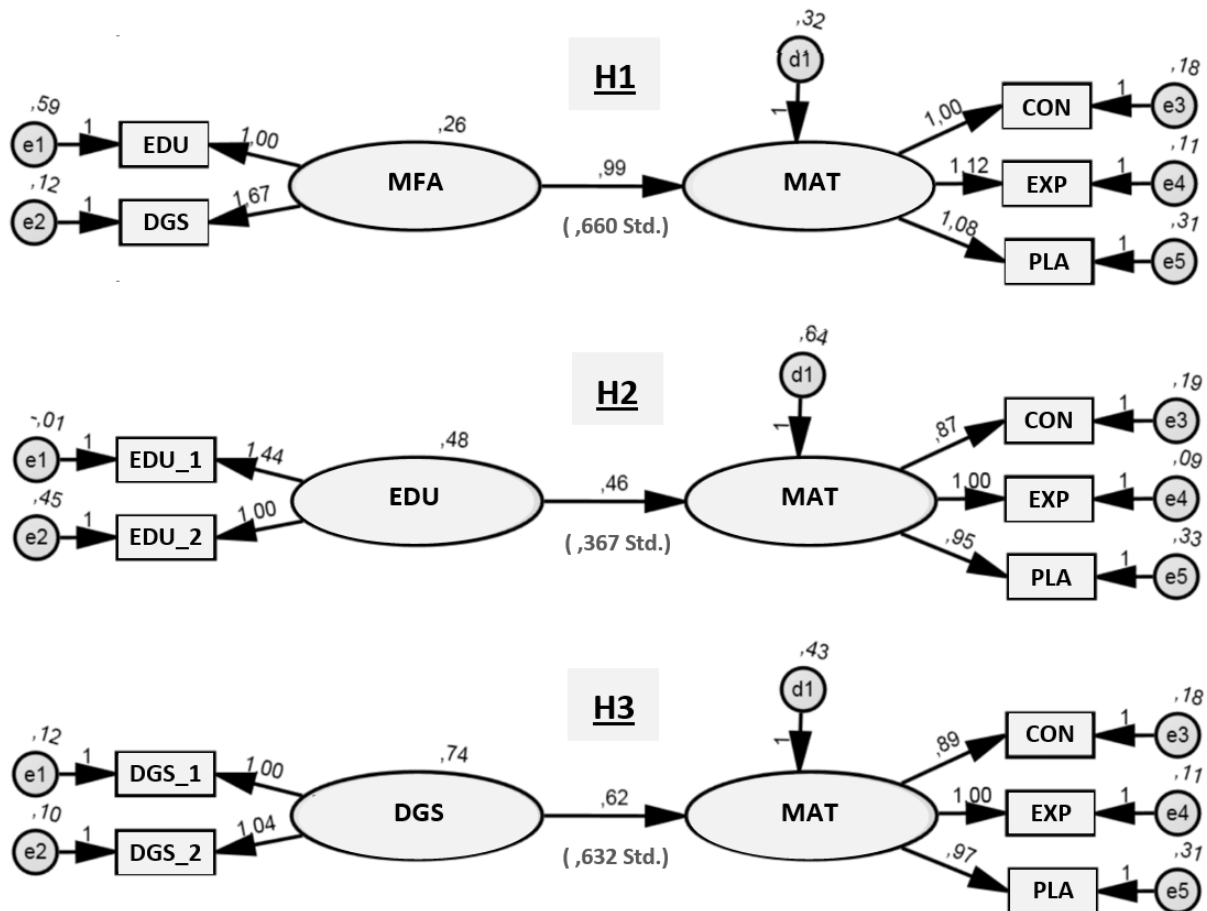


Figure 4. Structural models with estimated parameters.

DISCUSSION AND CONCLUSIONS

This article explored digital business model maturity and the managerial factors affecting it, focusing on the particular context of SMEs. The key concepts have been analyzed theoretically and empirically, whereby the three hypotheses have been tested to reveal the nature of the relationship between relevant constructs. In particular, all variables in the research model were measured on a multi-national sample of 162 SMEs operating in a single business sector, which contributed to the adequate comparability of the results. The measurement model was checked for reliability and coherence. At the same time, the resulting structural models have also been assessed through adequate statistical procedures, including the calculation of relevant model fit indices. All observed constructs were positively mutually correlated, with a statistical confidence level of 1%, and all corresponding hypotheses have been empirically confirmed in this research.

Therefore, the obtained findings of this study imply that the managerial factors have a statistically significant positive impact on digital business model maturity, which proves H₁ and answers the research question. Specifically, both management education (H₂) and management digital skills (H₃) have exerted a positive influence on the maturity of the company's digital business model, which implies that one of the possible ways to improve company's digital business model maturity is by fostering targeted improvements in the relevant managerial education and their digital skills. While previous studies have focused on the adoption of technology, ability to innovate, organizational readiness, capacity to stimulate the development of business ecosystems, this study stressed the importance of managerial

factors in achieving digital business model maturity. This empirical research aligns with previous papers, namely with the work of [29], who pointed out that digital transformation efforts must be led from the top. In addition to those general findings, the research results indicate several potential improvement areas on a deeper level, including managers' education about digital business and technologies and managers' knowledge to lead a digital strategy and their actual participation in developing and implementing it. In that capacity, the results of this study show that managerial factors can be seen as the prerequisites for successful digital transformation and implementation of a digital business model.

The obtained results further develop the scientific understanding of digital business model maturity and its relevant managerial factors. While previous research endeavors have frequently focused on a general notion of digital business models maturity, mainly pursuing a theoretical approach (e.g. [10, 31]), this article goes a step further. It contributes with international empirical research, encompassing the companies from 42 different countries across 5 continents.

Regarding the limitations of this research, there are several of them to be noted. On the one hand, the research has been performed within a single business sector, enabling internal comparability. Still, it could also be viewed as a limitation because some of the findings may not be applicable in the same way to other business sectors. On the other hand, there are some limitations to the survey methodology itself. In particular, the most notable issue has been related to the highly structured format of the research instrument, which did not allow for individual free-style comments by the respondents. To compensate for this limitation, some of the respondents sent additional thoughts and comments to the authors via e-mail or social networks, which is why it is recommended that further studies of this topic do include more space for such additional comments within the very research instrument.

With all this in mind, this article extends the body of knowledge in the field, contributing empirical evidence on achieving the appropriate level of digital business model maturity, which is important from both scientific and managerial viewpoints. The results of this study can be useful to other researchers to design their empirical studies in this field and seek to understand these constructs in other kinds of business settings, such as for large companies or specific business sectors of interest. Further research may involve comparative studies, seeking to observe and explain any systematic differences between industries or geographies or validate the research model shown here with in-depth case studies (such as those in [45]) in specific industries. Researchers may also opt to explore the impact of other factors on digital business models maturity and the impact of the digital business model maturity on certain aspects of the company performance.

The managerial implications of this article are threefold. Firstly, it could help practitioners shed more light on the fast-evolving field of digital business models and understand the relevant managerial factors that may be a tool to improve the company's digital business model maturity. The ability of a company to shift to a digital business model proves to be one of the most important topics in adjusting businesses to the Covid-19 pandemic environment, and the results of this article might provide useful guidance for practitioners and managers. Secondly, they may also choose to benchmark their own company by answering the questions provided in the measurement model, which could also be useful for identifying gaps and areas for future improvement in that particular company. Finally, this research may inspire the managerial community to explore different approaches and ideas and assist them in taking certain strategic and tactical decisions regarding the digital aspect of their operations.

In conclusion, due to the highly intense uptake of digital business models, as an integral part of the new digital age, it is increasingly relevant to continue studying these phenomena from a scientific perspective, seeking to understand further their nature, potential impacts, and facets of possible implications.

APPENDIX – FREQUENCY DISTRIBUTION CHARTS FOR MANAGERIAL FACTORS

Table 9. Frequency distribution for EDU and DGS indicators.

| | I fully disagree | I mostly disagree | I neither agree nor disagree | I mostly agree | I fully agree |
|--|------------------|-------------------|------------------------------|----------------|---------------|
| EDU indicators: | | | | | |
| M1: Management has university diplomas | 15 | 9 | 18 | 30 | 90 |
| M2: Management has attended many professional seminars and courses | 7 | 14 | 43 | 47 | 51 |
| M3: Management is continually educating themselves | 3 | 9 | 26 | 62 | 62 |
| M4: Management has formal or informal education relevant for digital business & technologies | 12 | 19 | 38 | 56 | 37 |
| DGS indicators: | | | | | |
| S1: Management understands new digital trends and technologies | 2 | 9 | 28 | 68 | 55 |
| S2: Management has sufficient knowledge to lead digital strategy | 4 | 17 | 43 | 63 | 35 |
| S3: Management actively participates in development & implementation of digital strategy | 6 | 18 | 34 | 60 | 44 |
| S4: Management has the right combination of technical and business skills | 4 | 12 | 38 | 66 | 42 |
| S5: Management has more developed digital know-how than competitors' management | 11 | 23 | 67 | 32 | 29 |

REFERENCES

- [1] Kotarba, M.: *Digital Transformation of Business Models*. Foundations of Management **10**, 123-142, 2018, <http://dx.doi.org/10.2478/fman-2018-0011>,
- [2] Weill, P. and Woerner, S.L.: *What's Your Digital Business Model?* Harvard Business Review Press, Boston, 2018,
- [3] Voigt, S. and Hinz, O.: *Making Digital Freemium Models a Success: Predicting Customers' Lifetime Value via Initial Purchase Information*. Business & Information Systems Engineering **58**(2),107-118, 2016, <http://dx.doi.org/10.1007/s12599-015-0395-z>,
- [4] Bock, M. and Wiener, M.: *Towards a Taxonomy of Digital Business Models – Conceptual Dimensions and Empirical Illustrations*. ICIS 2017 Proceedings, 2017,
- [5] Spremić, M.; Ivančić, L. and Bosilj Vukšić, V.: *Fostering Innovation and Value Creation Through Ecosystems: Case of Digital Business Models and Digital Platforms*. In: Sandhu, K., ed.: *Leadership, Management, and Adoption Techniques for Digital Service Innovation*. IGI Global, Hershey, pp.25-44, 2020, <http://dx.doi.org/10.4018/978-1-7998-2799-3.ch002>,

- [6] Härting, R.C.; Reichstein, C. and Schad, M.: *Potentials of Digital Business Models – Empirical Investigation of Data Driven Impacts in Industry*.
Procedia Computer Science **126**, 1495-1506, 2018,
<http://dx.doi.org/10.1016/j.procs.2018.08.121>,
- [7] Remane, G., et al.: *Discovering Digital Business Models in Traditional Industries*.
Journal of Business Strategy **38**(2), 41-51, 2017,
<http://dx.doi.org/10.1108/JBS-10-2016-0127>,
- [8] Nielsen, C. and Lund, M.: *Building Scalable Business Models*.
MIT Sloan Management Review **59**(2), 2018,
- [9] Caputo, A., et al.: *Digitalization and business models: Where are we going? A science map of the field*.
Journal of Business Research **123**, 489-501, 2021,
<http://dx.doi.org/10.1016/j.jbusres.2020.09.053>,
- [10] Muzellec, L.; Ronteau, S. and Lambkin, M.: *Two-sided Internet Platforms: A Business Model Lifecycle Perspective*.
Industrial Marketing Management **45**, 1-47, 2015,
<http://dx.doi.org/10.1016/j.indmarman.2015.02.028>,
- [11] Moser, B., et al.: *Sales of Smart Services: How Industrial Companies Can Successfully Sell Smart Services*.
2nd Smart Services Summit, Zürich, 2019,
- [12] Zentner, H.; Spremić, M. and Zentner, R.: *Measuring Maturity of Digital Business Models for SMEs*.
IEEE TEMSCON Technology & Engineering Management Conference – Europe, 2021,
- [13] Aagaard, A., ed.: *Digital Business Models: Driving Transformation and Innovation*.
Palgrave Macmillan, 2019,
- [14] Suša Vugec, D.; Spremić, M. and Pejić Bach, M.: *Integrating Digital Transformation Strategies into Firms: Values, Routes and Best Practice Examples*.
In: Novo Melo, P. and Machado, C., eds.: *Management and Technological Challenges in the Digital Age*. CRC press, pp.107-128, 2018,
- [15] Ivančić, L., Bosilj Vukšić, V. and Spremić, M.: *Mastering the Digital Transformation Process: Business Practices and Lessons Learned*.
Technology Innovation Management Review **9**(2), 36-50, 2019,
<http://dx.doi.org/10.22215/timreview/1217>,
- [16] Zeike, S., et al.: *Digital Leadership Skills and Associations with Psychological Well-Being*.
International Journal of Environmental Research and Public Health **16**(14), No. 2628, 2019,
<http://dx.doi.org/10.3390/ijerph16142628>,
- [17] Schwer, K., et al.: *Digital Maturity Variables and Their Impact on the Enterprise Architecture Layers*.
Problems and Perspectives in Management **16**(4), 141-154, 2018,
[http://dx.doi.org/10.21511/ppm.16\(4\).2018.13](http://dx.doi.org/10.21511/ppm.16(4).2018.13),
- [18] Zentner, H. and Spremić, M.: *Typology of Digital Business Models in Tourism*.
International Journal of E-Services and Mobile Applications **13**(2), 21-42, 2021,
<http://dx.doi.org/10.4018/IJESMA.2021040102>,
- [19] Osterwalder, A. and Euchner, J.: *Business Model Innovation*.
Research-Technology Management **62**(4), 12-18, 2019,
<http://dx.doi.org/10.1080/08956308.2019.1613114>,
- [20] Casadesus-Masanell, R. and Ricart, J.E.: *How to design a winning business model*.
Harvard Business Review **89**(1/2), 100-107, 2011,
- [21] Ritala, P. and Sainio, L.-M.: *Coopetition for Radical Innovation: Technology, Market and Business-Model Perspectives*.
Technology Analysis & Strategic Management **26**(2), 155-169, 2014,
<http://dx.doi.org/10.1080/09537325.2013.850476>,

- [22] Rojers, P.J.: *Digital Transformation, Business Model Innovation and Efficiency in Content Industries: A Review*.
The International Technology Management Review **7**(1), 59-70, 2018,
<http://dx.doi.org/10.2991/itm.7.1.6>,
- [23] Hess, T., et al.: *Options for Formulating a Digital Transformation Strategy*.
MIS Quarterly Executive **15**(2), 123-139, 2016,
- [24] Osterwalder, A. and Pigneur, Y.: *Business Model Generation*.
John Wiley & Sons, Inc., New Jersey, 2010,
- [25] Weiner, N. and Weisbecker, A.: *A Business Model Framework for the Design and Evaluation of Business Models in the Internet of Service*.
Annual SRII Global Conference, pp.21-33, 2011,
- [26] Dębowska, K.: *E-logistics as an Element of the Business Model Maturity in Enterprises of the TFL Sector*.
Procedia Engineering **182**, 143-148., 2017,
<http://dx.doi.org/10.1016/j.proeng.2017.03.141>,
- [27] Weill, P. and Woerner, S.L.: *Optimizing Your Digital Business Model*.
MIT Sloan Management Review **54**(3), 71-78, 2013,
http://dx.doi.org/10.1007/978-4-431-54457-9_9,
- [28] Berghaus, S. and Back, A.: *Stages in Digital Business Transformation: Results of an Empirical Maturity Study*.
Proceedings of 10th Mediterranean Conference on Information Systems (MCIS), Paphos, 2016,
- [29] Kane, G.C., et al.: *Strategy, not Technology, Drives Digital Transformation*.
MIT Sloan Management Review, 2015,
- [30] Gill, M. and Van Boskirk, S.: *The Digital Maturity Model 4.0, Benchmarks: Digital Business Transformation Playbook*.
Forrester Research Inc., Cambridge, 2016,
- [31] Alhava, O.; Laine, E. and Kiviniemi, A.: *Construction Industry Needs an Airbnb of Its own!*
International Research Conference: Shaping Tomorrow's Built Environment, 2017,
- [32] Sehnem, S., et al.: *Circular Business Models: Level of Maturity*.
Management Decision **7**, 2019,
- [33] Promsri, C.: *The Developing Model of Digital Leadership for a Successful Digital Transformation*.
GPH – International Journal of Business Management **2**(8), 1-8, 2019,
- [34] Borowska, G.: *Digital Leadership for Digital Transformation*.
Contemporary Economy **10**(4), 11-19, 2019,
<http://dx.doi.org/10.2979/blackcamera.11.1.0010>,
- [35] Peter, M.K.; Kraft, C. and Lindeque, J.: *Strategic Action Fields of Digital Transformation: An Exploration of the Strategic Action Fields of Swiss SMEs and Large Enterprises*.
Journal of Strategy and Management **13**(1), 160-180, 2020,
<http://dx.doi.org/10.1108/JSMA-05-2019-0070>,
- [36] Gonciarski, W. and Swiatkowski, M.: *Managerial Challenges in the Context of Digital Economy*.
6th International Academic Conference on Strategica – Challenging the Status Quo in Management and Economics, pp.332-345, 2018,
- [37] Kokot, K.; Đundek Kokotec, I. and Klačmer Čalopa, M.: *Impact of Leadership on Digital Transformation*.
IEEE TEMSCON Technology & Engineering Management Conference – Europe, pp.1-6, 2021,
- [38] Oberer, B. and Erkollar, A.: *Leadership 4.0: Digital Leaders in the Age of Industry 4.0*.
International Journal of Organizational Leadership **7**(4), 404-412, 2018,
<http://dx.doi.org/10.33844/ijol.2018.60332>,
- [39] Pande, A. and Schrey, C.: *Five Questions Boards Should Ask About it in a Digital World*.
McKinsey & company, 2016,

- [40] Tanniru, M.R.: *Digital Leadership*.
In: Pomffyova, M., ed.: *Management of information systems*. IntechOpen, pp.93-109, 2018,
<http://dx.doi.org/10.5772/intechopen.68966>,
- [41] Larjovuori, R.L.; Bordi, L. and Heikkilä-Tammi, K.: *Leadership in the Digital Business Transformation*.
Proceedings of the 22nd International Academic Mindtrek Conference, 2018,
- [42] Bonet, D.G. and Wright, T.A.: *Cronbach's Alpha Reliability: Interval estimation, hypothesis testing, and sample size planning*.
Journal of Organizational Behavior **36**, 3-15, 2015,
- [43] Tabachnik, B.G. and Fidell, L.S.: *Using Multivariate Statistics*. 6th Edition.
Pearson Education Limited, Essex, 2013,
- [44] Iacobucci, D.: *Structural Equations Modeling: Fit Indices, Sample Size and Advanced Topics*.
Journal of Consumer Psychology **20**(1), 90-98, 2010,
<http://dx.doi.org/10.1016/j.jcps.2009.09.003>,
- [45] Tomičić Furjan, M., Tomičić-Pupek, K. and Pihir, I.: *Understanding digital transformation initiatives: Case studies analysis*.
Business Systems Research Journal **11**(1), 125-141, 2020,
<http://dx.doi.org/10.2478/bsrj-2020-0009>.