DOI: 10.46541/978-86-7233-406-7_194

27th International Scientific Conference
Strategic Management
and Decision Support Systems
in Strategic Management
SM2022
Subotica (Serbia), 20th May, 2022

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DIGITAL TRANSFORMATION AND SUSTAINABLE DEVELOPMENT FOR PRIVATE AND PUBLIC ORGANIZATIONS: BARRIERS AND OPPORTUNITIES

Abstract: Two terms that have gained traction in the academia and policy making are Digital Transformation and Sustainable Development of public and private organizations. Digital transformation can be defined as the increasing application of digitization and automation that has important impacts on the structure of business ecosystems and their products and services. The core of Digital Transformation is the overall digitization and cross-linking of the value creation process. On the other hand, Sustainable Development has been defined as the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs..
As it can be observed, the two terms are defined in a vague way, however, their practical importance cannot be overstated. Despite the lack of a unified definition and methodological framework on how to define them, public and private organizations are making efforts to incorporate them in their practices.
Consequently, the purpose of the current paper is to map the opinions of employers, employees, policy makers, academics and students on what Digital Transformation and Sustainable Development mean for themselves and their organization. To achieve the objective of the paper, a survey was developed and disseminated across Europe. The questionnaire contained questions on the process of Digital Transformation and Sustainable Development themselves, what the respondents think of and fear about those two terms, what are barriers and finally what skills are missing that their organization faces in their effort to achieve Digital Transformation and Sustainable Development. Initial results indicate that missing skills by the employers and managers were considered as the main internal barrier for achieving the aforementioned goals of an organization.
Finally, a series of statistical tests is performed to examine the synergies between Digital Transformation and Sustainable Development. For example, we wanted to investigate whether the answer to the question of whether the organization has experienced difficulties in finding appropriate people to achieve Digital Transformation is independent of the answer to the same question for Sustainable Development. The respondents that consider that their organization has difficulties in finding appropriate people for Digital Transformation are likely to answer that they face the same difficulty for Sustainable Development. Consequently, since there is an overlap between those skills, training people could offer a double advantage for any organization.
Keywords: Digital Transformation; Sustainable Development; SMEs; survey

1. INTRODUCTION

One of the terms that have dominated the public debate in the last few years has been that of the Fourth Industrial Revolution. It has been achieved by advances in Big Data proliferation and Artificial Intelligence algorithms (Hoe, 2019) and has had significant consequences in industries, societies and governments (Bienhaus & Haddud, 2018); (Omar, 2019); (Schwab, 2017). Small and Medium Enterprises (SMEs) have not been immune to these changes, since they form the 95% of global enterprises and provide 60-70% employment to the world population (Viswanathan & Telukdarie, 2021). The factors that have shifted the culture of SMEs in the last few years and could possibly drive their

future development are: (1) an increasing trend to operate online, (2) the use of artificial intelligence for various tasks (3), increased use of social media and (4) a reliance on cloud technologies and services.
Hence, SMEs (and organizations in general) have strived to achieve Digital Transformation and continue to do so. Digital Transformation is not simply digitization; rather it means adopting a broader mindset that encompasses Big Data, cutting-edge technology and human-centered design which has the potential to transform traditional business models (Ghobakhloo, 2018); (Lin, et al., 2018). It requires the synergy of multiple stakeholders in order to innovate and create value across the ecosystem (Dellermann, et al., 2017); (Vogelsang, et al., 2019), to find a new way of combining products and services,(Kagermann, et al., 2013),(Schwab, 2017), to offer competitive advantages to businesses and optimize their processes (O'Leary, 2013) and to change the meaning of productivity, thus creating the opportunities for wide range impact across all economic sectors and the society (Lichtenthaler, 2018); (Matzner, et al., 2018);(OECD, 2018).
However, businesses and organizations face several obstacles in their effort to achieve Digital Transformation such as: lack of innovation, underestimation of the effort to push innovation, organizational and cultural barriers and lack of necessary skills (Hess, et al., 2016); (Smit, 2018); (Vogelsang, et al., 2019). Moreover, Digital Transformation is also being seen usually as a move accompanied by great risk by enterprises (Hoe, 2019). According to the World Economic Forum (2018) technological risks such as cyber-attacks and data fraud rank among the top global risks besides environmental risks, and these could result in financial losses and severe damage to reputation.
Another term that has dominated the discussion and internal processes of SMEs is that of Sustainable Development. The term made its appearance in the 1980s with the Brudtland report and is defined as “the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, et al., 1987).
Furthermore, the report identified that in order to achieve a state of sustainable development, not only economic development should be achieved without a detriment to the environment, but societal values needed to be included in any policy (Tsaples & Papathanasiou, 2021). Thus, Sustainable Development was conceived as a multi-dimensional issue and policies at any level should reflect that complexity.
Despite the importance of Sustainable Development and the recognition that is multi-dimensional in nature, no two definitions of it coincide. There are those that focus on the typical 3-dimensional structure (economic, environmental, societal) (Robinson, 2004) and there are those that highlight the importance of technological innovation as the path to be travelled (Drucker, 2014).
Nonetheless, international organisations and governments recognized the importance of Sustainable Development and a series of international treaties cemented the term as a goal of governmental policies. This has been expressed with the 2030 Agenda for Sustainable Development on which 17 Sustainable Development Goals (SDGs) have been outlined ranging from reducing CO_2 emissions to eradicating poverty (Zhang, Prouty, Zimmerman, & Mihelcic, 2016).
As a result, both Digital Transformation and Sustainable Development are complex processes which involve multiple stakeholders across industries and disciplines that are hard to define, but essential to achieve.
The purpose of the current paper is to report on the answers that were given by managers, employees, professors and students of public and private organizations, on the issues of Digital Transformation and Sustainable Development and more specifically on the barriers that their organizations are facing on how to achieve those two states.
The rest of the paper is organized as follows: Section 2 presents the premises of the research, section 3 is focused on presenting the main results and analysis of the responses, while conclusions and future research efforts are discussed in Section 4.

2. RESEARCH PREMISE

To identify the opinions of relevant stakeholders across Europe, a survey was developed in the context of the Erasmus+ project SYSTEMA (2020-1-IT02-KA204-080082). The project was conceived to address the incentive of the European Commission that is focused on Sustainable Development and Digital Transformation. In that aspect, a questionnaire was developed and distributed across European countries from the period between February and April of 2021. The questionnaire was disseminated in an electronic form. The responses were cleaned with entries that were left blank being replaced with the notation N/A. Entries in the dataset where more than half of the questions were missing or unanswered, were deleted. The final dataset includes 285 responses, originating from 16 countries and can be seen on Figure 1 below.

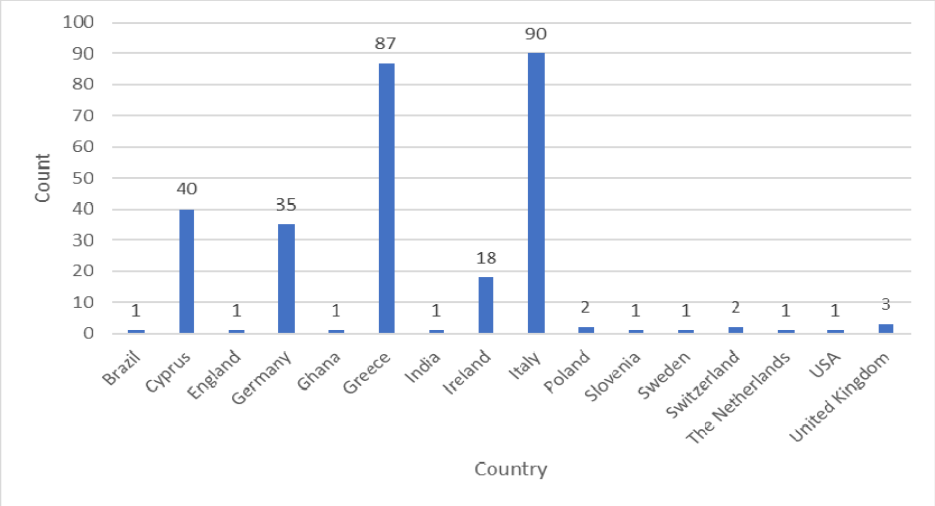

Figure 1: Distribution of responses per country

In addition, the respondents were from all age groups (Figure 2 on the left), with the majority being in the 25-34 cohort, while the majority were male (56.14%, Figure 2 on the right).

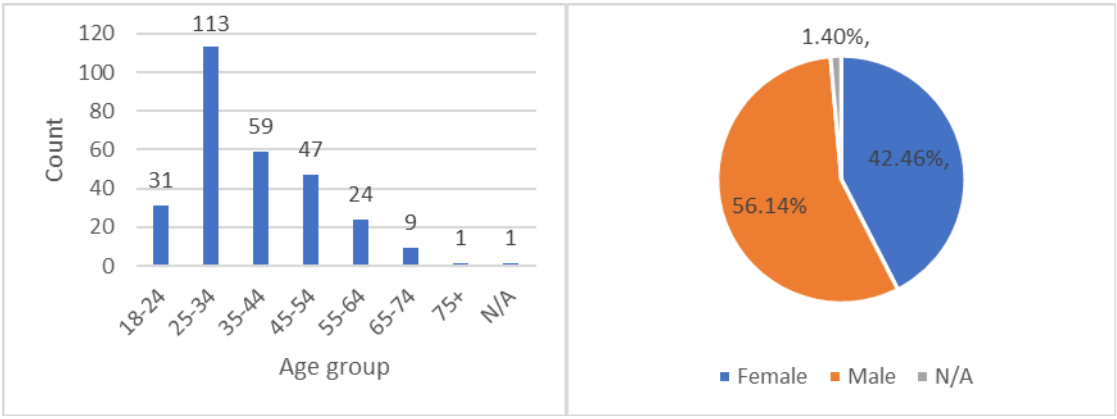

Figure 2. Age cohorts (left) and gender (right)

Furthermore, the majority of the respondents had a first degree or higher, and 113 out of 285 had a Masters degree (Figure 3).

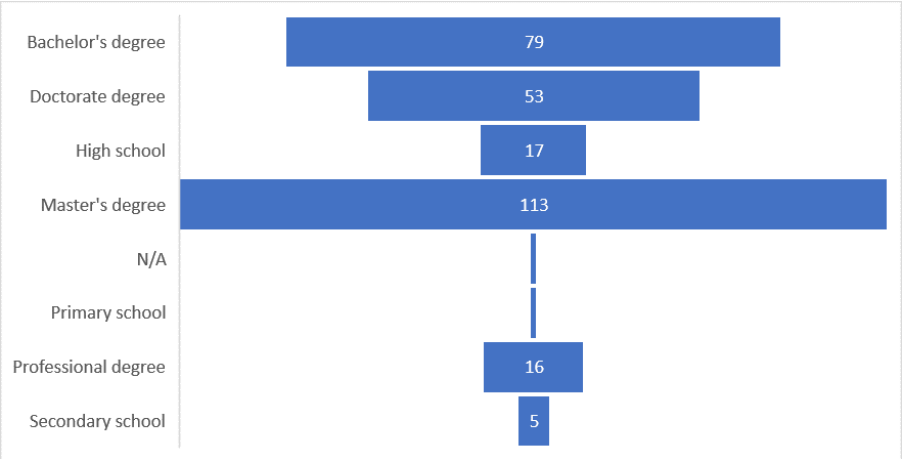

Figure 3: Educational level of survey participants

Moreover, the respondents worked across a variety of sectors, with education being the most common one, followed by Information and Communication Technology and Research and Consulting (Figure 4). 25.26% of the respondents self-identified employees with managerial responsibilities either in a public or private organisation, while 22.46% identified as employees without managerial responsibilities. Finally, 14.04% of the respondents were teachers, trainers etc. (Figure 5).

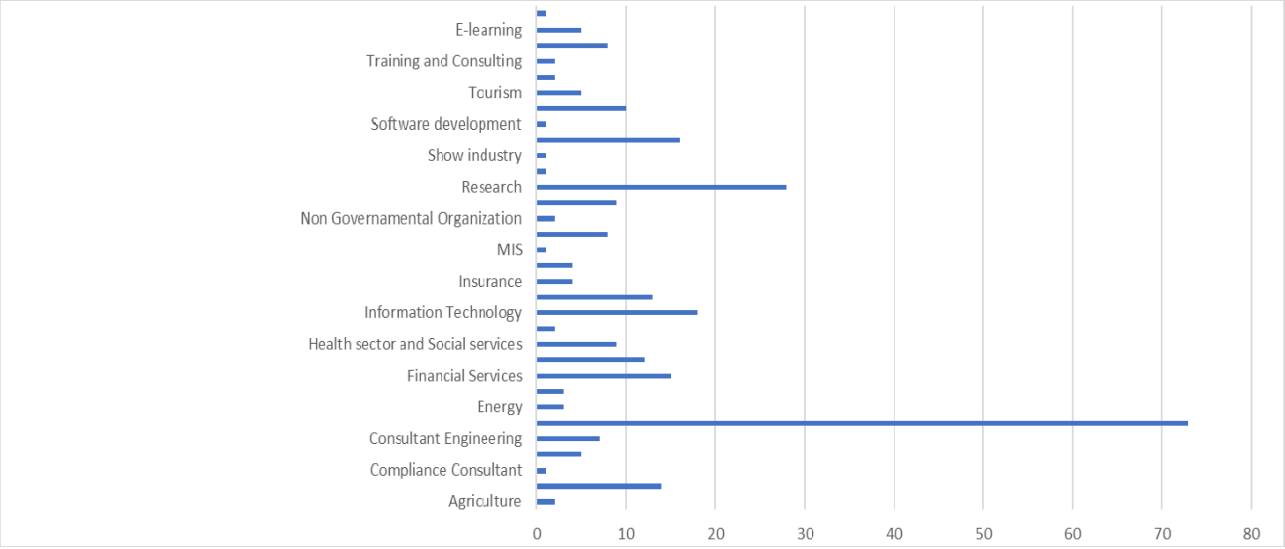

Figure 4: Employment sector of the respondents

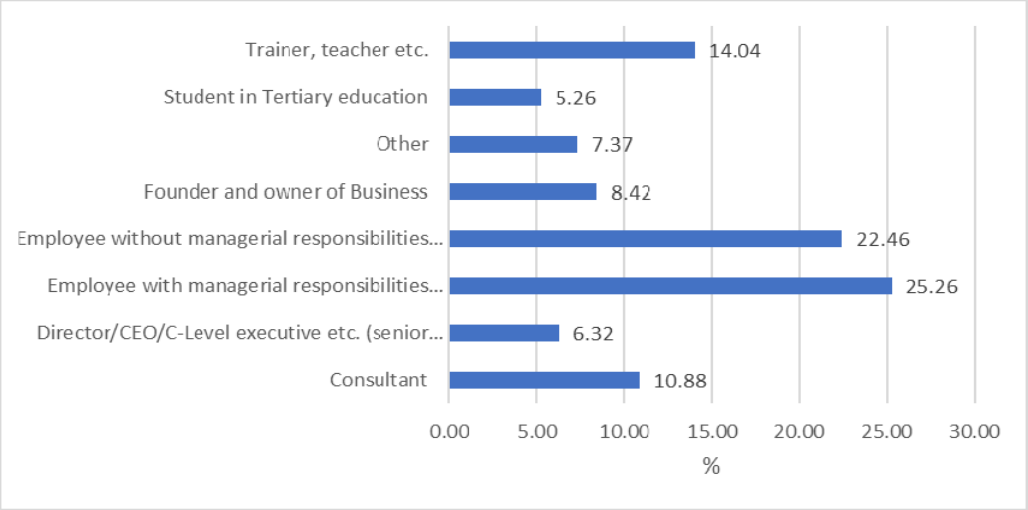

Figure 5: Role at the workplace of survey participants

Apart from the demographic questions, the survey was grouped into two parts one for Digital Transformation and one for Sustainable Development. Each part consisted of 8 questions and they did not differ between Digital Transformation and Sustainable Development. The logic of the questionnaire was to capture the opinion of people around the two issues and investigate whether the responses about Digital Transformation correlated to the responses about Sustainable Development. In the context of the current paper, the focus will be on the barriers for the two processes and the results (and subsequent analysis) will be based on the descriptive statistics and the conduction of chi-square tests (Pearson, 1900) due to the measurement level of the variables.

3. INDICATIVE RESULTS

An important question focused on what the respondents believe were the most important factors that hinder the successful Digital Transformation of their organisations. The respondents were given a list of factors and they could vote the ones they believed were the most important (each respondent could cast more than one vote). The results are summarised in Table 1 below.

Table 1: Factors that hinder Digital Transformation

Factor that could hinder Digital Transformation	Count
a. Underestimation of the effort to push innovation	97
b. Missing skills by employees	94
c. Missing skills by employers/managers etc.	146
d. Technical/Technological barriers	92
e. Security issues	58

f. Individual employee barriers (fear of job loss, fear of demotion etc.)	59
g. Individual manager barriers (fear of losing traditional roles, no clear vision etc.)	53
h. Tax rates and tax administration of the country	13
i. Political instability of the country	10
j. Access to finance	51
k. Labor regulations	11
l. Corruption	9
m. None of the above	19

As it can be observed, missing skills by the employers, managers etc. (21%) is considered by far the most important factor that could limit the extent of an organization's Digital Transformation and it is followed by the Underestimation to push innovation (14%), missing skills by the employees (13%) and finally Technological barriers (13%). Consequently, the responses indicate that Digital Transformation is affected more by the skills and vision of management and less by the missing skills of the employees, and any failures with regards to Digital Transformation are considered to be related more to management or organisational inadequacies and less to the surrounding circumstances.
The same question was asked in the context of Sustainable Development and the respondents consider that the same barriers that hinder Digital Transformation remain for Sustainable Development (Figure 6).

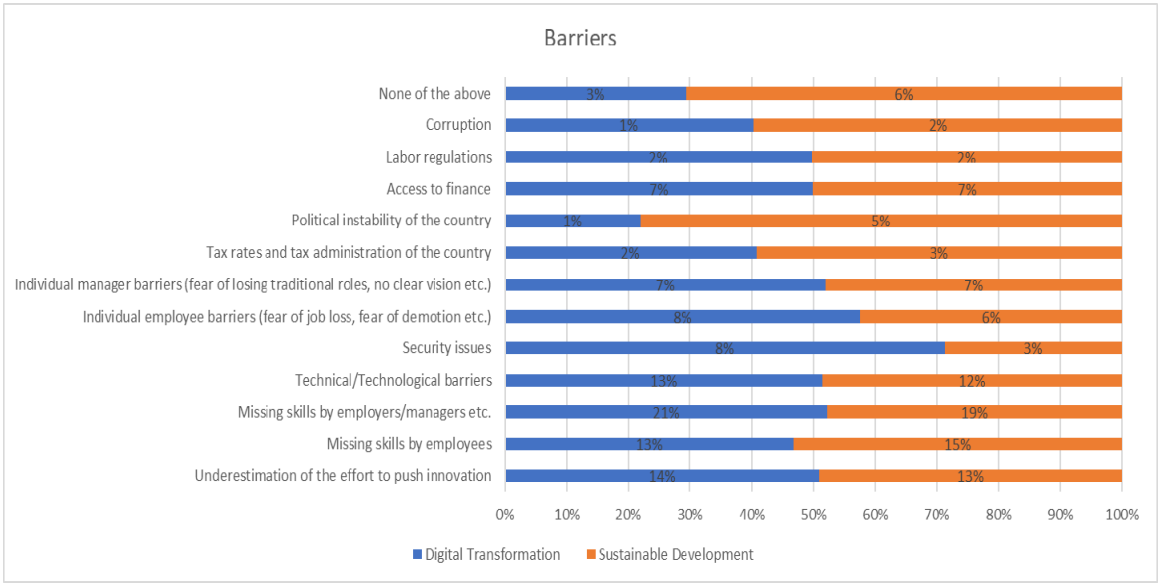

Figure 6: Barriers that hinder Digital Transformation and Sustainable Development

However, there are two notable differences:

1. Security issues are more important in Digital Transformation than Sustainable Development. Issues of privacy, loss of data etc, may stop an organisation from achieving a successful Digital Transformation. This has not been neglected from policy makers. Laws and regulations such as GDPR attempt to address the specific gap even if it has not gained the widespread attention that it deserves.
2. Political instability of the country is more important in Sustainable Development than in Digital Transformation. An organisation's attempt to achieve sustainable development is not independent from the country's effort. As a result, an unstable country could hinder private initiatives towards that goal.

These differences illustrate that Digital Transformation is seen more as an internal/organisational effort and any effort to achieve it depends largely on the organisational skills, vision etc. On the other hand, Sustainable Development is linked with the political/regional environment and any effort to achieve it depends on it.
Furthermore, to investigate whether there was a relationship between the difficulty to find appropriate people to achieve Digital Transformation is related to the difficulty to find people with the appropriate skills for Sustainable Development, a chi-square test was performed.
The null hypothesis can be stated as follows:
H0: The answer to the question of whether the organisation has experienced difficulties in finding appropriate people to achieve Digital Transformation is independent of the answer to the same question for Sustainable Development.

The results of the chi-square test are summarised on table 2 below.

Table 2: Results of the chi-square test

	x^2	Degrees of freedom	Critical value for 5%	p value
H0	114,81	36	50.998	3.69478E-10

The result of χ^2 is larger than the critical value which means that the null hypothesis can be rejected. Therefore, respondents that consider that their organisation has difficulties in finding appropriate people for Digital Transformation are likely to answer that they face the same difficulty for Sustainable Development. Consequently, since there is an overlap between those skills, training people could offer a double advantage for any organisation.
Finally, it was investigated whether there is a relationship between the answers to the question if the organisation has commenced the processes of Digital Transformation and Sustainable Development. The null hypothesis can be stated as follows:
H0: The answer to the question of whether the organisation has commenced the process of Digital Transformation is independent of the answer to the same question for Sustainable Development.

The results of the chi-square test are summarised on table 3 below.

Table 3: Results of the chi-square test

	x^2	Degrees of freedom	Critical value for 5%	p value
H0_12	91,77	36	50.998	9.15089E-07

The result of x^2 is larger than the critical value which means that the null hypothesis can be rejected. Therefore results indicate that respondents who consider that their organisation has commenced the process of Digital Transformation are likely to answer the same for Sustainable Development.
In conclusion, the series of tests illustrate that Digital Transformation and Sustainable Development share many similarities for organisations. People see both processes as advantageous, they both share the same set of skill-lacking and if an organisation has commenced the process of Digital Transformation, then it is likely that they have also engaged in activities that could foster sustainable development.

4. CONCLUSIONS

The purpose of the current paper was to investigate the opinions of relevant stakeholders with regard to Digital Transformation and Sustainable Development for their organization. In that aspect, a survey was designed, developed and disseminated in various European countries.
From the answers it was derived that both of them share many similarities for organisations. People see these processes as advantageous, they both share the same set of skill-lacking and if an organisation has commenced the process of Digital Transformation, then it is likely that they have also engaged in activities that could foster Sustainable Development.
However, there were also some differences especially to the identification of the barriers that hinder the two processes: Security issues are more important in Digital Transformation than Sustainable Development. Issues of privacy, loss of data etc. may stop an organisation from achieving a successful Digital Transformation. Moreover, political instability of the country is more important in Sustainable Development than in Digital Transformation. An organisation's attempt to achieve sustainable development is not independent from the country's effort. As a result, an unstable country could hinder private initiatives towards that goal.
Future research efforts would include the dissemination of the survey to a wider audience, the analysis of results with Machine Learning algorithms, the conduction of more tests to identify the common factors that affect both Digital Transformation and Sustainable Development for an organization. Moreover, the analysis of the results will continue and will delve into the responses about missing skills for each process and how they have affected their initiation to the respective organizations. Finally, the answers could be adapted to a Multi-Criteria Decision Aid format with the purpose of classifying and ranking those skills for each process, thus providing a roadmap for decision makers.

REFERENCES

Bienhaus, F., & Haddud, A. (2018). Procurement 4.0: factors influencing the digitisation of procurement and supply chains. *Business Process Management Journal, 24*(4), 965-984.

Brundtland, G.H., M., K., Agnelli, S., Al-Athel, S., & Chidzero, B. (1987). *Our common future.* New York.

Drucker, P. (2014). *Innovation and entrepreneurship.* Routledge.

Hoe, S. (2019). Digitalization in practice: the fifth discipline advantage. *The Learning Organization, 27*(1), 54-64.

Lichtenthaler, U. (2018). The world's most innovative companies: a meta-ranking. *Journal of Strategy and Management, 11*(4), 497-511.

Ljubojević, D., & Dimitrijević, A. (2010). *Customer Relationship Management.* Subotica: Faculty of Ecnomics.

Marković, M. (2010). *Strategic Management - Referencing guide.* Retrieved January 15, 2013, from Faculty of Economics Subotica: http://www.ef.uns.ac.rs/sm/referencing_guide_sm-v1.pdf

Omar, N. (2019). Innovation and economic performance in MENA region. *Review of Economics and Political Science, 4*(2), 158-175.

Pearson, K. (1900). On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling. The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, 50(302), 157–175.

Perić, O. (2013). Choosing your CRM Strategy. *Strategic Management, 15*(2), 5-8.

Robinson, J. (2004). Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological Economics, 48*(4), 369-384.

Schwab, K. (2017). *The Fourth Industrial Revolution.* New York, NY: Crown Publishing Group.

Tsaples, G., & Papathanasiou, J. (2021). Data envelopment analysis and the concept of sustainability: A review and analysis of the literature. Renewable and Sustainable Energy Reviews, 138, 110664.

Viswanathan, R., & Telukdarie, A. (2021). A systems dynamics approach to SME digitalization. *Procedia Computer Science, 180*, 816-824.

World Economic Forum. (2018). *Digital Transformation.* Geneva: World Economic Forum.

Zhang, Q., Prouty, C., Zimmerman, J. B., & Mihelcic, J. R. (2016). More than target 6.3: a systems approach to rethinking sustainable development goals in a resource-scarce world. *Engineering, 2*(4), 481-489.