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How Companies Can Gain a Sustainable Competitive Advantage in the New Digital Era? The Case of Romania

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Abstract. *The purpose of this article is to analyze how digitalization can impact the level of competitiveness of those organizations that implement a digitalization strategy and to define the current situation in Romania in terms of the level of competitiveness at the international level and the main associated influencing factors. The research covers, first of all, the critical analysis of the current scientific literature on this topic. In the second part of the paper, we used econometric analysis, statistical data interpretation as well as descriptive analysis. The main results show, on the one hand, a positive and strong correlation between digitalization and competitiveness, and on the other hand the fact that Romania is far behind, in terms of international competitiveness, for reasons not exclusively related to digitalization. The article is a contribution to the specialized literature because it confirms some of the results obtained by other researchers regarding the relationship between innovation and business performance and at the same time proposes concrete measures to improve the level of competitiveness according to the main current issues that we have identified. Our study also presents possible practical implications, both for the academic environment, and for the policymakers and managers involved in the development of the Romanian business sector.*

Keywords: business performance, competitiveness, innovation, digitalization, sustainability.

Introduction

Nowadays, society is fundamentally and rapidly changing, mostly due to the digital and technological revolutions. Consumers' needs and requirements are constantly changing, requiring companies to identify new ways of fulfilling them and gaining a competitive advantage on the market. On the other hand, because of the development of open global markets and the new market requirements, companies must constantly develop their economic business models in order to effectively respond to environmental, social and corporate governance challenges and to become more resilient.

At the academic level, a high emphasis is placed on the development and implementation of new digital and technological capabilities as the main factor that can support the sustainable adaptation of companies to new requirements (Dicuonzo et al., 2022), and at the same time for increasing their competitive advantage globally (Bacinello at al., 2020; Kuzma et al., 2020).

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In this context, the main objective of this article is, on the one hand, to confirm or deny the previous results regarding the link between digitalization and competitiveness, and on the other hand, to highlight the current state in Romania, as well as the main factors which determine the position of Romania in the global competitiveness ranking. We believe that this empirical analysis can support the definition of concrete measures that will contribute to obtaining sustainable competitive advantages for business sectors in Romania in the new digital era.

The research is structured in 3 main sections, as follows: in Section 1 we present synthetically the state of knowledge in the field, in Section 2 we describe the research methodology applied in this research, and in Section 3 we detail the results obtained. The paper ends with the authors' general conclusions.

Literature review

At the level of specialized literature, there are numerous scientific studies that analyze the relationship between business innovation (especially through digitalization and new technologies) and business competitiveness, and most of the results indicate a positive and strong relationship between the two variables.

Farida and Setiawan (2022) confirm the validity of the relationship in the construction and real estate industry, based on a case study of 150 SMEs, showing that by improving innovation capabilities, companies increase their competitive advantage. The same results were obtained by Lookman, Pujawan and Nadlifatin (2023) at the level of the trucking industry in Indonesia.

Sener and Delican (2019) also analyzed the link between innovation and competitiveness both at the level of developed and developing countries, and their results highlighted unidirectional causality from ICT development index to the global competitiveness index, in the case of both categories of countries.

On the other hand, Malesev and Cherry (2021) show that due to continuous digital development and accelerated technological progress, it is necessary for companies to continuously innovate in order to maintain their competitive advantage on the market, while Krüger and Meyer (2021) highlight the importance of companies' ability to adapt to industrial changes by incorporating innovation in their business strategy.

Xia and Xiao (2023) demonstrated the reverse relationship between innovation and competitiveness, showing based on a case study applied to a sample of Chinese companies listed on the stock exchange, that the innovation capacity of companies is stimulated by their interest in competitive advantage.

In another study, Tu and Wu (2021) concluded based on an extensive case study of 235 Chinese manufactures that the competitive advantage of companies is closely related to green innovation and the process by which organizations develop over time by accumulating experience, which in turn creates knowledge.

Related to this aspect, Hermundsdottir & Aspelund (2021) in turn demonstrate the link between sustainability innovations and the company's competitiveness based on the systematization of the results of several scientific studies in the field. The importance of digitalization on companies' performance is also supported by Truant, Broccardo and Dana (2021), who demonstrated that digitalization has a positive influence on the performance of Italian companies in various fields listed on the stock market.

New digital technologies do not only generate competitive advantages for the business environment, Crolic et al. (2022) stating that they also lead to the creation of new customers and new competitors on the market.

Furthermore, Marmier et al. (2021) draw attention to the fact that the increase in digitalization within the production processes implies a change in jobs profile and the skills that employees must have, but for the time being the development of their skills is not achieved with the same speed as the advance of digital technologies.

Therefore, we can conclude that continuous digital transformation is a critical condition for sustainable business development and to obtain sustained competitive advantage on the market, but in the case of certain companies it is not a sufficient condition. For example, Cao et al. (2022) highlight the importance of relational resources, and Wiechmann et al. (2022) discuss the importance of agile management.

After this section, in which we presented the main results of some of the most representative scientific works in the field, we will continue to describe the research methodology used in this article.

Methodology

The research methodology used in this article is diversified, being correlated with the established research objective.

In the first part of the paper, we applied the method of critical analysis of specialized literature at the international level to capture some of the most representative results obtained so far regarding the link between the competitive advantage of companies and their sustainable development and innovation process.

In the second part of the paper, we used the econometric analysis and statistical data interpretation to test the link between competitiveness and digitalization, respectively to determine Romania's position in the European Union (EU) regarding the level of competitiveness and the main causes of the current position.

To test the intensity of the link between competitiveness and digitalization, we used a simple linear regression based on two variables: general competitiveness score (dependent variable) and digital competitiveness score (independent variable).

The data refers to the EU Member States for the year 2022, and its sources are represented by the International Institute for Management Development (IMD) World Digital Competitiveness Ranking 2022 Report, respectively the IMD World Competitiveness Booklet 2022. The data was processed using EViews software.

The first analysis step consists of a Johansen test to check if there is a cointegration relationship between the variables included in the analysis.

The equation underlying the Johansen test is the following:

$$Y_t = \prod_1 Y_{t-1} + \cdots + \prod_n Y_{t-n} + \varepsilon_t \quad (1)$$

where:

- Y_t is the vector for integrated of order one variables
- Π_1 through Π_n are $m\ x\ m$ coefficient matrices
- ε_t is an $n\ x\ 1$ vector of innovations

The Johansen test has two forms, specifically Trace test and Maximum Eigenvalue test, shown in equations (2) and (3) respectively.

$$J_{trace} = -T(\sum_{i=r+1}^{n} \ln(1 - \lambda_i) \quad (2)$$

$$J_{max} = -T(1 - \lambda_{r+1}) \quad (3)$$

where:

- T is the sample size
- λ_i is the i largest canonical correlation

In the case of Trace test, the rejection of null hypothesis of r cointegrated vectors and acceptance of alternative hypothesis of n cointegrating vectors indicate that between the variables is at least one cointegration relationship.

On the other hand, in the case of Maximum Eigenvalue test, the null hypothesis is the same as in the case of the Trace test, only differing the alternative hypothesis of $(r + 1)$ cointegrated vectors.

In the second step, we tested the simple linear regression equation between the dependent variable and the independent variable using the least squares method:

$$y = \alpha + \beta x + \varepsilon \quad (4)$$

where:

- y is the dependent variable
- x is the independent variable
- α is the intercept (constant term)
- β is the slope coefficient
- ε is the error term (residuals)

Next, we graphically analyzed Romania's position in the competitiveness ranking at the EU level (Figure 1) based on the IMD World Competitiveness Booklet 2022 data and checked for possible causes of the ranking. Thus, we interpreted the data obtained from The Organization for Economic Co-operation and Development (OECD) statistics regarding the level of innovation of companies in the EU Member States (Figure 2), as well as the data regarding the level of digital competitiveness of Romania (Table 3). To determine the values shown in Figure 2, we calculated for each country the average based on the following activity sectors of the companies: Mining & quarrying, Manufacturing of food, beverages & tobacco products, Electricity, gas, steam & air conditioning supply, Wholesale trade, excluding vehicle engine &motorcycle, Transportation & storage, Information & communication, Financial & insurance activities, Architectural, engineering, technical testing act. In this case, data refers to the year 2021.

We also used the descriptive analysis to see what are currently the determining factors that influence the level of digital competitiveness of a country, with an emphasis on the factors associated with the business environment. In this regard, we used the IMD data based on which the 2022 World Digital Competitiveness Ranking was created. Concretely, this ranking is composed of three main factors: knowledge, technology, and future readiness. Each of these main factors is made up of three sub-factors, as follows:

- knowledge: talent, training & education, scientific concentration;
- technology: regulatory framework, capital, technological framework;
- future readiness: adaptive attitudes, business agility, IT integration.

Each sub-factor is in turn divided into other component factors, according to the description of the 2022 IMD World Digital Competitiveness Ranking (pp. 170-172).

As part of our research, we analyzed Romania's position in the global ranking of digital competitiveness and described what are the main factors that influence this position in order to identify what are the necessary characteristics for companies to develop sustainably and obtain competitive advantages in the new global conditions and requirements.

Malta was excluded from the analysis due to the unavailability of statistical data.

Results and discussions

By applying the previously described research methodology, we analyzed the link between the general degree of competitiveness of the EU Member States and their degree of digital competitiveness to see the extent to which the competitive advantage is influenced by the level of innovation and digital development.

As we stated, it is important to initially test if there is a cointegration relationship between the two variables analyzed, and the results obtained are presented in Table 1.

Table 1. The Johansen test results for the two variables included in the analysis

Included observations: 24 after adjustments

Trend assumption: Linear deterministic trend
Series: GENERAL COMPATITIVENESS SCORE DIGITAL COMPETITIVENESS SCORE

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.538363	21.05884	15.49471	0.0065
At most 1	0.099204	2.507432	3.841465	0.1133

Treace test indicates 1 cointegration eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.538363	18.55141	14.2646	0.0099
At most 1	0.099204	2.507432	3.841465	0.1133

Max-eigenvalue test indicates 1 cointegration eqn(s) at he 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: made by authors based on IMD data.

The results of the Johansen test show us that there is a cointegration relationship between the two variables, so at this point we can determine the regression equation between the data series to analyze the impact of digital competitiveness on general competitiveness. The results of the regression test are displayed in Table 2.

Table 2. The regression equation between general and digital competitiveness score

Dependent Variable: GENERAL COMPETITIVENESS SCORE
Method: Least Squares
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.022252	7.89322	0.256202	0.8000
DIGITAL COMPETITIVENESS SCORE	1.560126	0.1709	9.128901	0.0000
R-squared	0.776405	Mean dependent var		72.93000
Adjusted R-squared	0.767088	S.D. dependent var		14.83043
S.E. of regression	7.157301	Akaike info criterion		6.847946
Sum squared resid	1229.447	Schwarz criterion		6.944723
Log likelihood	-87.0233	Hannan-Quinn criter.		6.875815
F-statistic	83.33648	Durbin-Watson stat		1.959121
Prob(F-statistic)	0.00000			

Source: made by authors based on IMD data.

The regression test results show us, first of all, that the independent variable selected for this analysis is statistically significant due to its p-value that is equal to 0.00 (<0.05).

The value of Akaike information criterion is the lowest compared with different values that we have calculated for several possible models, showing that our model best fit for the data series.

On the other hand, the Durbin-Watson test value of 1.959 indicates a normal situation, being in the range of 1.5 - 2.5. Our value is very close to 2.0, proving that there are no significant clues of autocorrelation.

The data in Table 2 shows that the level of digital competitiveness of a country explains in a proportion of approximately 77% the degree of general competitiveness, which confirms the results of the previously presented research studies.

In this case, in order to determine how the business sector in Romania can obtain competitive advantages at the international level, in the context of the new digital development requirements, we will first analyze the situation in Romania from the point of view of the current level of competitiveness, as well as in terms of the main influencing factors.

International Institute for Management Development data for 2022 shows that Romania ranks penultimate in the EU Member States competitiveness ranking (Figure 1).

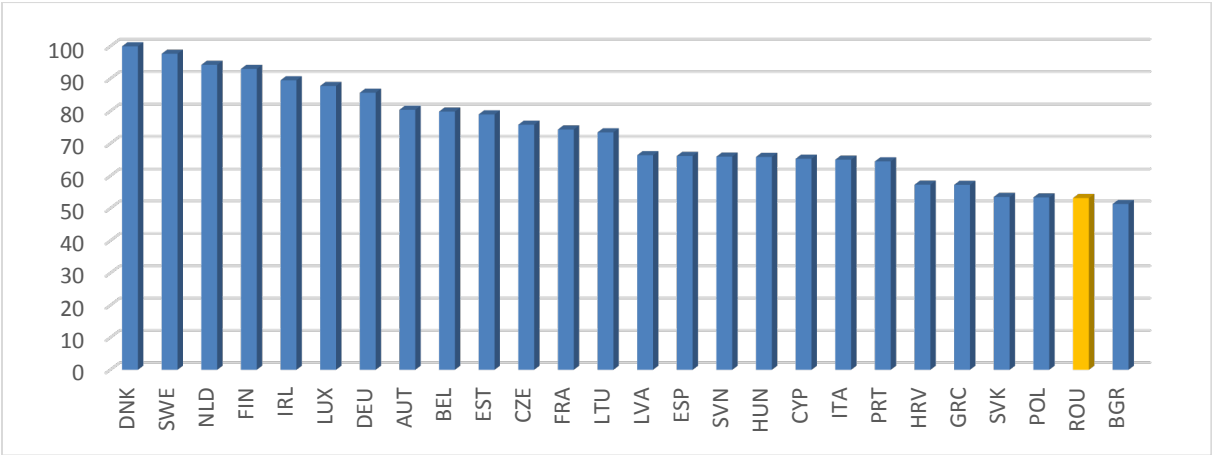


Figure 1. The 2022 IMD EU Competitiveness Ranking

Source: made by authors based on IMD data.

The position of Romania shows that at the moment the local business sector does not have the capacity to compete sustainably and efficiently with companies from other EU Member States, and one of the main causes can be represented by the level digital innovation. A first proof in this regard is the innovative capacity of Romanian companies, as current data shows that in EU the fewest product and business process innovative companies are those located in Romania (Figure 2).

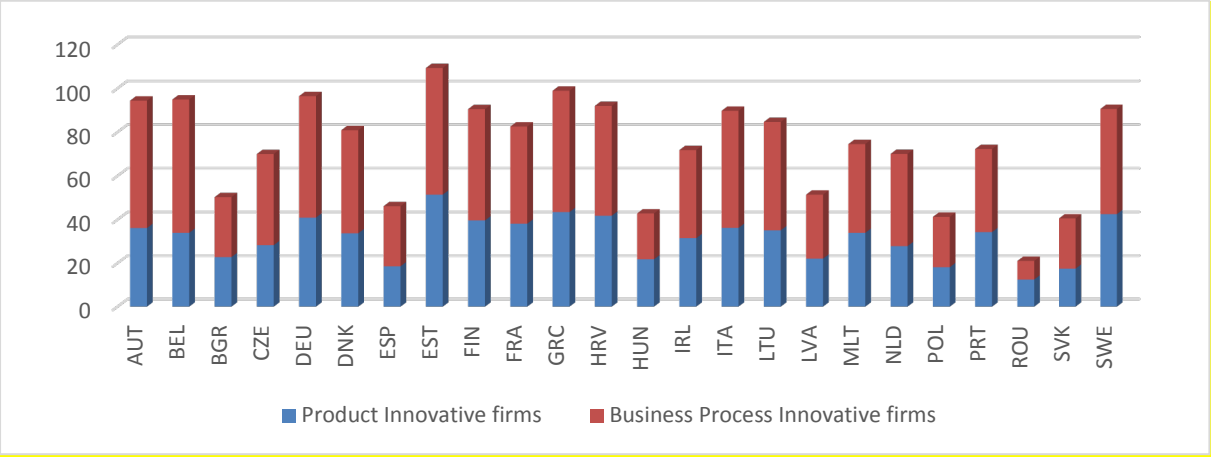


Figure 2. Percentage of innovative companies in EU (% of total firms)

Note: Cyprus, Luxembourg and Slovenia are not included due to incomplete data

Source: made by authors based on OECD data.

This reality is also confirmed by the position of Romania in the EU Member States ranking in terms of digital competitiveness, where Romania ranks penultimate (Table 3).

Table 3. 2022 World Digital Competitiveness Ranking of EU Member States

DNK	**1**
SWE	3
NLD	6
FIN	7
AUT	18
DEU	19
EST	20
FRA	22
BEL	23
IRL	24
LTU	25
ESP	28
LUX	30
CZE	33
LVA	34
SVN	37
PRT	38
ITA	39
HUN	42
HRV	43
CYP	45
POL	46
SVK	47
BGR	48
ROU	49
GRC	50

Source: made by authors based on 2022 IMD World Digital Competitiveness Ranking data (pp. 40).

Considering these aspects, it is imperative to analyze the causes that led to this situation in order to identify possible solutions to obtain a competitive advantage in the future. In this sense, based on the methodology described in the previous section, we have determined the main factors that influence the position of Romania in the digital competitiveness ranking, carried out by IMD in 2022 (Figure 3).

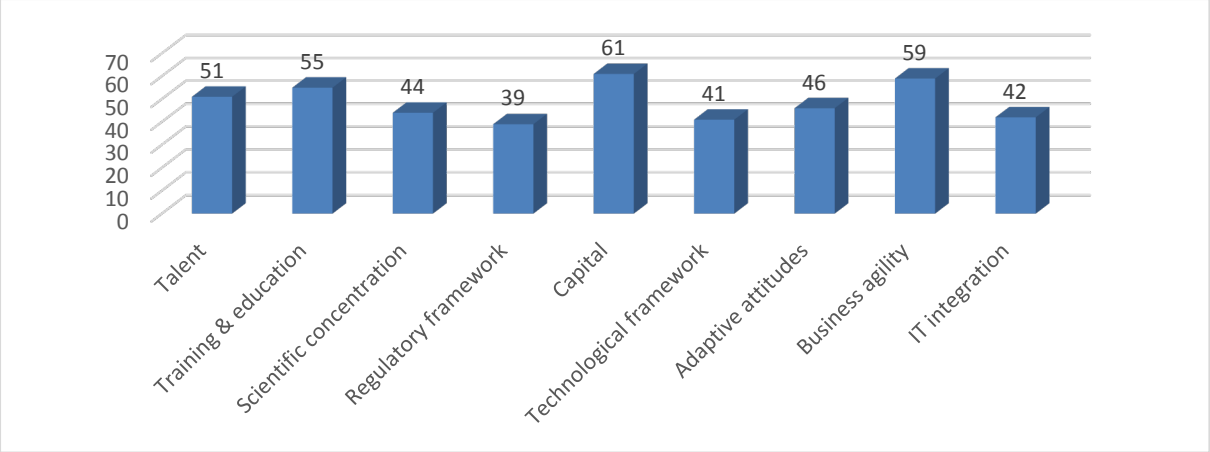


Figure 3. Romania's ranking according to World digital competitiveness sub-factors
Source: made by authors based on 2022 IMD World Digital Competitiveness Ranking data (pp. 138-139).

The data presented in Figure 3 shows that the most significant causes that determine Romania's ranking at the bottom of the EU Member States in terms of digital competitiveness are represented by capital, business agility and training & education.

Regarding capital, the data shows that companies do not benefit from sufficient and efficient financial support, both from the banking sector and stock market. Another problem is represented by insufficient investments in technological development and telecommunications. Romania does not offer a very good position even from the point of view of country credit rating (52nd position in the ranking), which makes it even more difficult for companies to access external financing under favorable conditions.

Regarding business agility, the main problem in the case of Romania is the transfer of knowledge between companies and universities, which is not carried out efficiently due to the fact that the universities are not sufficiently adapted to the new requirements of the business sectors and there is no complex and developed framework of cooperation between the academic and business environment on different types of specific projects, leading to innovation, increasing quality and productivity, respectively external competitiveness. Romanian companies also face agility problems and have difficulties in quickly adapting to new economic conditions, opportunities, and threats.

Furthermore, related to the third main cause, training & education, we identify the fact that in Romania there is an insufficient number of people with tertiary education, which shows that currently the labor market is not competitive, and the offer of skilled work for companies is limited. One of the reasons for this situation is that public spending on education is one of the lowest in the EU, but also the fact that there are not many companies that offer specialized training to employees.

In addition to these main sub-factors, there are a few specific problems that make Romania sit at the bottom of the World digital competitiveness ranking, namely: a small number of public-private partnerships to boost technological development, the lack of international experience of top managers or poor management at the level of urban structures, with an extremely important role in supporting the sustainable development of businesses.

On the other hand, there are a number of factors that support the improvement of Romania's position in the competitiveness ranking, such as: government cyber security capacity, internet bandwidth speed, the weight of graduates in ICT, engineering, math and natural sciences, or digital and technological skills.

Once we have identified the causes that prevent the innovative development of Romanian companies and at the same time the capacity to obtain competitive advantages in the medium and long-run in the new economy based on digitalization, innovation and sustainability, we will proceed to outline a set of measures that we believe will support innovative, inclusive and sustainable development of the business sector in Romania, with positive effects on its degree of competitiveness at the international level.

First of all, it is absolutely necessary that development strategies and measures integrate the governmental sector, the business sector, the needs of society, people and the environment in a holistic approach. Only through such an approach, we believe that the business models in Romania will be able to develop smart, sustainably, inclusively, and resilient in the long-run and will be able to obtain competitive advantages globally.

Secondly, analyzing the current situation of Romania, we notice that companies must intensify their investments in innovation and digitalization as soon as possible, present concrete and sustainable plans in this regard, which are in accordance with ESG requirements (Environment, Social and Governance) of the EU, and this will later help them to obtain financing more easily both from public institutions, the banking sector, and from the capital market.

On the other hand, it is imperative to develop the collaboration between the academic and the business environment, on the one hand by adapting educational programs to the new market requirements, and on the other hand through research projects that innovate economic processes. Also, we believe that public spending in education must be increased, and governmental programs must be created and implemented to stimulate the participation of individuals in tertiary education, which at the same time lead to increased competitiveness on the labor market. This aspect needs to be supported by the business sector through training programs and the stimulation of employees to adapt in time to the new market requirements and to adopt a lifelong learning attitude.

These are only part of the main measures that must be implemented in Romania for the business sector to develop sustainably and innovatively and to finally obtain a solid competitive advantage at the international level.

As we have seen, Romania has some assets that can contribute to the innovation process at the level of the business sector, but these are not enough without the application of measures like those proposed by us.

Conclusion

In this work, we confirmed the results of many researchers who analyzed the link between innovativeness and competitiveness, demonstrating that the two indicators are positively correlated. Our research showed that the business sector in Romania is not currently characterized by a high level of digitalization, which means that it does not have a high competitive advantage.

We can also state that it is not enough to create our own innovative business models for the Romanian business sector to have competitive advantages at the international level, but it is essential that other conditions to be met, such as: facilitating access to finance on the markets, increasing the collaboration between the business and the academic environment, increasing the degree of participation in tertiary education, increasing the number of strategic partnerships between the Government and the private sector or a better organization in terms of city administration.

The present study has some limitations since we did not include also an analysis based on historical data of the analyzed competitiveness indicators, so as to capture the way in which they were impacted by different economic shocks.

There are possible future directions of this research by extending with historical data, and also by including in the analysis another variable, namely ESG (environment, social and governance) scores for both developed and developing countries.

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