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Overcoming the Challenges of Digitalization. A Study Case Based on DESI and EIBIS

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Abstract. *In the present days, the business environment faces one important wave in its development, therefore due to the wave of rapid technological advancements, the digital era that is currently reshaping behaviour, habits, and trends, stands as a testament to the necessity of innovation and adaptation of the latest digital technologies. At first glance, the benefits of digitalization are well recognized, such as: increasing connectivity as a catalyst for communication and collaboration while increasing access to information. Hence, both businesses and individuals find themselves empowered by the great benefits of the digital era, presented as a world in which the barriers determined by time and space are no longer an issue, being transcended by the implantation of the latest digital technologies. Therefore, it is necessary to inspect the corelations between the two important indexes provided by the European database, such as DESI and EIBIS, in order to identify how the score of DESI can influence directly, or not, the business environment's investment in digital technologies, both on single technologies and multiple technologies, taking into account the usage of the emergent digital technologies, such as: BigData, AI and Clouds. The correlations will provide a better understanding of the role of digitalization in developing the economic environment of a state, or at a bigger image, of the European Union's business environment.*

Keywords: digitalization, digital technologies, business environment, economic environment, investments.

Introduction

In the present days, the business environment faces one important wave in its development, therefore due to the wave of rapid technological advancements, the digital era that is currently reshaping behaviour, habits, and trends, stands as a testament to the necessity of innovation and adaptation of the latest digital technologies.

At first glance, the benefits of digitalization are well recognized, such as: increasing connectivity as a catalyst for communication and collaboration while increasing access to information. Hence, both businesses and individuals find themselves empowered by the great benefits of the digital era, presented as a world in which the barriers determined by time and space are no longer an issue, being transcended by the implantation of the latest digital technologies.

Therefore, it is important to formulate the answer to the following research question: Is the DESI score a factor that determinates the business environment to invest more in digital technologies? The main hypothesis is that the lower the DESI score position a country on the EU hierarchy, the lower the investments in digital technologies are.

Hence, since the DESI can be correlate with the EIBIS, the current paper aims to identify the correlations that are present between the data collected by the European Commission for DESI 2022 composite index and by the European Investment Bank for EIB Investment Survey 2023.

Other than this, the paper aims to also provide a brief overview on how businesses and the economic environment are overpassing the frontiers of digitalization, including the benefits and

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the challenges of the current shift of the economic paradigm, from traditional economy to a digital economy that nowadays is predominantly present in every field.

Since many aspects of digitalization have been successfully implemented in daily activities by both businesses and individuals, there is no reason to not recognize its benefits on the efficiency that has been largely improved.

On the other hand, is well-known that efficiency and innovation are two aspects that do complement each other. Therefore, it is important to increase the awareness on both benefits and challenges that the digitalized environment provides over the daily duties.

Hence, the current paper aims to answer, on a theoretical basis to a question that has been predominantly approached by scholars, especially in the past years: How do the benefits and challenges of overpassing the frontiers of digitalization impact the efficiency, competitiveness, and ethical considerations within the contemporary business environment?

Or, to establish a more specific research question: How can business increase their benefits from digitalization, and how can them overcome the challenges?

Literature review

General context

Since digitalization represents a term that has increased in use in the latest trends of economic and business research, it should also be considered that nowadays, it is not a magic wind for businesses to increase their efficiency or productivity overnight, but rather a stimulant for businesses to develop, to become more competitive and to engage more in achieving their internalization goals (Vadana et al., 2019).

It is already acknowledged that digitalization, through the adoption and the use of the emerging digital technologies can provide great advantages for businesses, improving their resource management and their operational outputs, which will therefore lead to revenue growth and possible competitive advantages (Ludbrook et al., 2019).

The necessity of sustainable latest digital technologies into their business activities, has been strongly led by the unprecedented wave of digitalization that is nowadays driving innovation in the business environment, becoming a priority for businesses management to employ the digital tools and instrument in their business strategy and operations, aiming a higher return on investment and more value created, ensuring therefore the possibility of sustainable development into this fast paced economic environment (Legner et al., 2017).

For approaching a method easy to follow, the benefits and the challenges of implementing the latest digital technologies into the business environment will be analysed individually, providing a possible solution for the challenges, and empowering the benefits with their major outcome on business plans, strategies, and activities. Therefore, the benefits and the challenges driven by the adaptation of digitalization into the business environment can be observed in Figure 1, a brief general overview.

Therefore, the benefits and the challenges of digitalization should be addressed separately to highlight the importance of each of them, step by step.

Benefits of digitalization

1. *Increasing efficiency and productivity*

At the first look, the implementation of the digital technologies driven a direct impact on business processes, increasing efficiency and productivity by automating the repetitive tasks and enabling

real time collaboration. Since digitalization wears a powerful impact on productivity and economic growth, it can also provide more efficiency through automation and data information, enforcing therefore businesses' capital to create more value and to represent assets with higher revenue. At the same time, digitalization, and its powerful instruments, such as devices connected to the Internet of Things, robots, use of big data analysis and the latest introduction of artificial intelligence, provides businesses the joker needed for development in the current digital environment (Mollins and Taskin, 2023).

Moreover, recent studies have confirmed the hypothesis that suggests that the adoption and the implementation of the latest digital technologies can also provide significant positive effects on labour productivity, since robots and digital tools can be used in the daily task of the employees, increasing their productivity and their accuracy on their duties (Horvat et al., 2019). Therefore, by increasing both individual productivity and business processes' efficiency, the implementation of the emerging digital technologies into business strategies and business activities, businesses can improve their performance into the current economic environment reshaped by the digital era.

2. *Global reach and market extension*

There is no secret that digitalization removes geographical barriers, allowing businesses to easily reach a global audience. Online platforms have been an important instrument in facilitating the international trade, marketing, and customer engagement, therefore opening new opportunities for businesses to expand their market. But it should be also taken into account that digitalization should be used together will the rest of the resources that a business relates on, in order to achieve the benefits of digitalization in market extension and in reaching their goals of global reach, especially since the indirect effects of digitalization and business capacity to manage its resources efficiently can lead to strong competitive advantages (Lee and Falahat, 2019).

3. *Data-driven decision making*

In the current environment of digital economy, digitalization provides businesses with a large amount of data, greater than ever before. Digitalization has redefined business processes and business strategies, while the implementation of the latest digital technologies allowed businesses to collect data in a more efficient way therefore enabling a better monitoring of data for a more valuable use, through a data-driven approach. Hence, by using analytics and business intelligence tools, companies can extract valuable insights, enabling informed decision-making and strategy development (Colombari et al., 2023).

4. *Improved customer engagement*

Digital channels, such as social media and online communication platforms have opened for business a fast direct and immediate channel to engage with customers, fostering stronger relationships, personalized services, and efficient customer support. Moreover, ongoing advantages of using the digital technologies has been showed during the movement limitations imposed by the pandemic environment, when social media platforms and e-commerce platforms created the social trade (Dissanayake et al., 2019) in which businesses and customers were able to create stronger relationships by direct communication and fast response to their needs, creating there the opportunity for brand loyalty and new partnerships to be established, therefore businesses were able to enlarge their network.

5. *Innovation and Development*

Digitalization, more than providing the tools for increasing business efficiency and productivity for gaining more revenue, has encouraged, and has established a new culture of innovation in which businesses can easily adapt to market changes and experiment with new business strategies while testing new digital technologies and the latest trends. Meanwhile, due to the wide diffusion of the

emerging technologies, the output of those tests and trials represents a platform developed in order to create more value based on the new match between the demand and the supply, focusing therefore on increasing their revenues (Agostini et al., 2019).

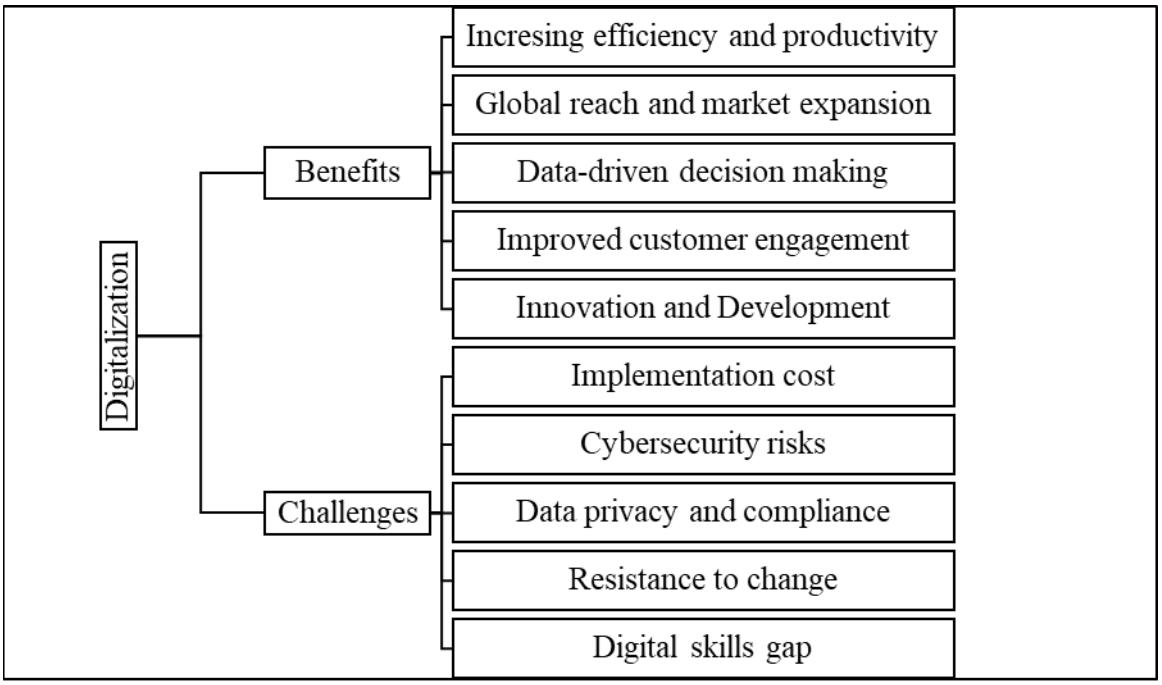

Figure 1. Benefits and Challenges of Digitalization over the business environment

Source: Author's own research.

Challenges of digitalization

1. *Implementation cost*

It is no longer a secret that digitalization offers long term benefits by the implementation of the latest digital technologies. But at the same time, the adoption of the emergent technologies into business processes, strategies and models requires the initial cost of implementation, upgrading the infrastructure, and employees' training for integrating and using the digital technologies into their daily work activities. Therefore, in the current era of digital economy in which big organizations and companies are more able to rapidly adopt digitalization into their operations, due to their financial power, for small and medium enterprises, the costs might represent a substantial part of their financial capital. Hence, small, and medium enterprises will tend to create low-cost digitalization models that might have a higher chance of not providing the expected return value of the investment, which is a major challenge for the current economic environment (Vuković et al., 2022).

2. *Cybersecurity risks*

During the previous years, the reliance on digital system has been continuously increasing. Hence, businesses have been more exposed to cybersecurity threats, such as: data breaches, digital attacks, and informational hacking. Due to those facts, protecting sensitive information and maintaining the integrity of digital assets becomes a critical challenge for businesses which have implemented the digital technologies into their activities, especially in a context where cybernetic attacks have become more frequently and represents a real threat for business when data and information become more valuable than other assets, such as money, gold, or stocks (Moșteanu, 2020).

Therefore, besides the implementation cost, businesses should also allocate financial resources in creating, adopting, and implementing security system that can prevent the possibility of a digital attack, regarding the form in which it might be happening.

3. Data privacy and compliance

Taking into account the big data that is nowadays used by the digital business systems that have been increasing in popularity in the past several years, data privacy and compliance represents barriers and challenges of digitalization, that might be really difficult to overpass. With the collection and storage of vast amounts of customer data, businesses are vulnerable to face real challenges in ensuring compliance with data protection regulations. Most important, mishandling the personal data of consumers can lead to legal consequences and damage to organizations' reputation, which will be impacting on the long run also the share of the market and the customers' perception about the organization as an economic entity, which can be easily translated in revenue loss and a decrease in business' profit. Hence, a good protection step, for beginning will be the compliance with the law and regulations determined by the digitalization framework, ensuring an overlay for avoiding the risk of criminal and civil liability (Habrat, 2020).

4. Resistance to change

Implementing digitalization into business activities, processes, strategies, and models is not an easy step for businesses' organizational structure. Therefore, management and employees may act resistant to the adoption of new digital processes and technologies due to fear of job displacement, unfamiliarity, or concerns about the learning curve. Hence, the most important aspect of overcoming the present challenge is to overcome the resistance by fostering a digital-friendly culture in the internal environment of the organization. The digital-friendly culture might be fostered by a bottom-up approach while implementing the digital technologies, training initiatives towards successful implementation and use of the emergent technologies, and by creating work teams to learn together how to adopt and benefit from using digitalization in achieving the organizational goals (Sen and Gupta, 2020). But it is well known that behaviors can not be changed easily, so the resilience will be overcome only by time when employees will be aware of the fact that the implementation of the latest digital technologies do not represent a threat for their job security.

5. Digital skills gap

The current rapid pace of technological advancement often outpaces the development of digital skills among the workforces. Hence, businesses might be struggling to find employees with the necessary skills to effectively and efficiently navigate the instruments provided by the implementation of digital technologies. At this point, it is necessary for businesses to consider ongoing training programs for bridging the digital skills. Or at macroeconomic level, policies should be implemented in order to facilitate digital skills learning and to reduce the discrepancy between the workers qualified and trained for the same job opportunities (Lyons et al., 2019).

Methodology

As both DESI (Digital Economy and Society Index) and EIBIS (European Investment Bank Investment Survey) contains numerous data, the data that was relevant for formulating an answer to the research question has been selected by the author from DESI 2022 and EIBIS 2023, as an overview of the European Union.

The second step of the methodology was to summarize the selected data into Tabel 1 and to use the Data Analysis framework from Microsoft Excel to run correlations between the significant

factors that can determine the level of investments of business environment into the latest digital technologies for adapting their business models and business activities to the nowadays economic paradigm, reshaped by the development of the digital economy.

Therefore, the qualitative research conducted in the creation of literature review will be supported by the quantitative analysis run in order to identify the possible correlations.

Results and discussions

In order to facilitate the correlation between the data selected by the author has been summarize in Table 1. The data has been collected as following: **EU State** – as enrolled by the DESI composed index; **DESI score** – the score obtained by every EU State for DESI 2022; **Internet usage –** ; **Big Data -** enterprises analysing big data from any data source; **Use of AI -** enterprises using any AI technology; **Use of Cloud -** enterprises purchasing at least one of the following cloud computing services: hosting of the enterprise's database, accounting software applications, CRM software, computing power; **Basic level of digital infrastructure** – the score obtained in EIBIS 2023; **Firm investment -** the data collected in EIBIS 2023; **Single technology investment -** the data collected in EIBIS 2023; **Multiple technology investment -** the data collected in EIBIS 2023.

Table 1. Summary of the database

EU State	DESI score	Internet usage	Big Data	Use of AI	Use of Cloud	Basic level of digital infrastructure	Firm investment	Single technology investment	Multiple technology investment
AT	54.70	90.46	8.7	8.8	28.8	67.3	88%	25.76%	54.77%
BE	50.30	93.04	22.9	10.3	46.9	77.1	94%	20.30%	56.21%
BG	37.70	78.97	6.3	3.3	9.9	47.2	70%	33.50%	22.91%
CY	48.40	89.22	6.2	2.6	42.2	70	83%	26.06%	33.01%
CZ	49.10	89.68	9.1	4.5	40	68	73%	19.43%	60.16%
DE	52.90	89.88	17.8	10.6	31.8	77.3	85%	32.29%	40.81%
DK	69.30	96.44	27	23.9	62.2	88.8	90%	23.99%	50.68%
EE	56.50	90.13	9.9	2.8	50.5	66.9	86%	22.94%	40.24%
EL	38.90	81.89	12.9	2.6	15.2	41.2	77%	24.99%	36.04%
ES	60.80	92.94	9	7.7	27	67.5	86%	22.00%	53.75%
EU27	**52.30**	**88.59**	**14.2**	**7.9**	**34**	**69.1**	**84%**	**27.08%**	**41.29%**
FI	69.60	94.82	21.6	15.8	66.3	89.5	94%	27.99%	52.55%
FR	53.30	89.87	21.7	6.7	25.3	63.5	83%	34.27%	22.26%
HR	47.50	80.65	13.6	8.7	34.6	57.8	91%	34.11%	31.88%
HU	43.80	88.13	7	3	20.6	51.7	76%	26.33%	28.50%
IE	62.70	95.27	22.7	7.9	47.4	84.5	82%	30.89%	44.77%
IT	49.30	82.94	8.6	6.2	51.9	69.9	85%	27.71%	39.54%
LT	52.70	86.8	10.5	4.5	27.7	63.7	79%	30.92%	34.20%
LU	58.90	95.23	18.7	13	29	66.2	81%	33.61%	33.53%
LV	49.70	90.26	8.5	3.7	22.2	52.3	76%	20.16%	36.64%
MT	60.90	91.03	30	10.2	47.5	77.9	79%	23.01%	45.13%
NL	67.40	94.4	27.2	13.1	60.2	80.1	93%	22.86%	55.10%
PL	40.50	85.71	8.5	2.9	19.2	61	79%	28.40%	31.75%
PT	50.80	83.25	10.6	17.3	29	70.3	85%	24.28%	32.37%
RO	30.60	84.05	5.1	1.4	11.3	52.5	70%	30.54%	34.62%
SE	65.20	95.75	19.2	9.9	69.2	86.9	93%	22.06%	54.06%
SI	53.40	87.73	6.6	11.7	37.6	67.1	93%	23.42%	54.99%
SK	43.40	87.67	5.6	5.2	30.8	60.2	84%	39.41%	34.47%

Source: Author's own research.

For identifying the possible correlations, the Correlation analysis provided by the Add-ons on Microsoft Excel has been used. The result of the analysis that has been run on the collected data can be observed in Table 2.

Table 2. Results of correlation analysis

EU State	DESI score	Internet usage	Big Data	Use of AI	Use of Cloud	Basic level of digital infrastruc-ture	Firm investmen t	Single technology investment	Multiple technology
DESI score	1								
Internet usage	0.814008492	1							
Big Data	0.710379274	0.621710804	1						
Use of AI	0.711513645	0.488920453	0.633532606	1					
Use of Cloud	0.803410474	0.641396484	0.606021327	0.568173174	1				
Basic level of digital infrastructur e	**0.846718617**	0.750072767	0.681246462	0.701502665	0.873964415	1			
Firm investment	0.665081843	0.465949929	0.437594001	0.637236519	0.716526476	0.670600733	1		
Single technology investment	-0.303671996	-0.321950667	-0.131045432	-0.146139993	-0.355325244	-0.250380567	-0.18824292	1	
Multiple technology investment	0.586957239	0.600421498	0.337497712	0.424636833	0.633363102	0.628271316	0.541658111	**-0.640796296**	1

Source: Author's own research.

As can be observed in the Table 2, the strongest correlation at 0.846718617 appears between the DESI score and the Basic level of digital infrastructure, but this is not a result that might be unknown to most scholar, since digitalization level is one component part of the DESI composed index. At the same time, the weakest correlation at -0.640796296 can be identified between the Single technology investment and the Multiple technology investment, which is also explain by the fact that the business environment has to make a decision between the two of them in the moment when they are deciding to direct their investment into digital technologies.

Conclusion

The output of the benefits of digitalization are too great to be ignored. By implementing digital technologies into their activities, business will improve their connection while creating a dynamic, real-time optimized business environment, increasing their efficiency and their revenues in the long run. But at the same time, businesses might still be hesitant in the beginning to start to adopt the digital tools into their processes, considering the financial and structural effort that should be involved in order to provide a facile environment for implementing the emergent digital technologies into business operations (Mohamed, 2018).

Moreover, implementing the digital technologies is strongly connected to a series of costs, from implementation to operation and maintenance, but also for increasing organizational protection in the current digital environment. Therefore, the biggest challenge for businesses to overpass the frontiers of digitalization is to find the balance that will provide the equilibrium between input (cost, resources, effort) and output (the returns on investment and the new created

value), because only then, digitalization will be consider a starting point for new business strategies.

At the same time, it should be taken into consideration that the initial hypothesis that aims that the lower the DESI score position a country on the EU hierarchy, the lower the investments in digital technologies are is a valid hypothesis, and that the EU states with a higher DESI composed index score are more likely to invest more in the implementation of the emerging technologies since their return on investment might be higher, so they can contribute again with higher returns on investments.

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