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THE DIGITAL DEVELOPMENT OF EU MEMBER STATES AND ITS EFFECT ON ESPORT PERFORMANCE

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Abstract: The examination of sports performance in relation to various macroeconomic variables has long occupied researchers in the field of sports economics. Similar interest surrounds esports, which has become one of the fastest developing types of "new media" in recent years. In esports, as well as in the video game industry besides creative content production, technology and digitization play a decisive role. In our research, we draw a parallel between digitization, the economy and sports performance in an area researched by relatively few. Based on the Digital Society and Economy Composite Index (DESI) published annually by the European Commission, we examine the digitization of the Member States of the European Union and whether a link can be found between esports performance and the digital development of each Member State. In the first part of the research cluster analysis was used in order to map the pattern of digital development across the EU, where four main direction was found, based on which four groups, namely "digital winners", "digital laggards", "technology-" and "user focused" states were identified. After which regression analysis was used in order to examine whether digital development has any effect on esports performance.

Key words: EU, European Union, Digital development, digital divide, esport

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INTRODUCTION

The sporting achievements accessible at the Olympics, which are considered the pinnacle of traditional sports, have been receiving significant attention from researchers and analysts in sports economics for over four decades (Rosas et al., 2019; Andreff and Andreff, 2015; John Manuel and Fadal, 2011; Bernard and Busse, 2004; Vagenas and Vlachokyriakou, 2012; Bian, 2005). The early theories of research focusing on the comparison of nations' sporting performance were grounded in the premise that attainable medals, titles, podium finishes, etc. constitute a closed function, considering the fact that an increase in the number of medals obtained by one nation logically results in an equivalent decrease in the total number of medals that can be acquired by all other participating nations. Therefore, comprehending the sporting performance of a given nation must occur within these constraints, taking into account all participating nations (Andreff and Andreff, 2015).

Research on the subject paints a diverse picture, including the examination of factors such as a country's geographical location, average temperature, evolution of its religions, or even the development of its media landscape (Andreff, 2013; Kovács et al., 2017). During Parshakov's (2019) systematic literature analysis, for instance, over 25 variables were identified that have been studied in relation to sporting achievements over the years. The analysis of medal counts, which serves as a measure of success, mostly involves evaluating the participating countries' political, social, economic, and demographic profiles, both as explanatory and predictive factors. Nevertheless, the prediction of sporting performance is commonly examined along the lines of various macroeconomic indicators. This can be traced back to the theory proposed by Shughart and Tollison (1993), which posits that the issue of sporting achievements is economic in nature, assuming a balance between expected benefits (number of medals) and costs (sports financing). Therefore, the understanding of this phenomenon is best achieved through theoretical-based, moderately complex macroeconomic specifications (Stevens, 1996: 78; Studenmund, 2001: 167, 171). An example of such a moderately complex model is the approach developed by Andreff, et al. (2008), which successfully integrated population and per capita GDP with political regime, the effect of the host country or the "home advantage," and cultural differences among countries in various regions of the world.

In our research, we introduce a novel framework by combining these approaches that intertwine sporting performance and economic aspects, and examine the evolution of esports performance at the European Union level, drawing parallels between digitalization, economy, and sporting achievements. With a focus on the strong digital nature of esports, our preliminary hypothesis was as follows. Given that esports is fundamentally surrounded by robust technology and digitalization, the digital performance of specific countries, and consequently their digital advancement, impacts the development of esports, as well as the achieved successes in the realm of esports.

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Based on these considerations, our aim was to examine the digitalization of European Union Member States along the lines of the Digital Economy and Society Index (DESI), annually issued by the European Commission. We aimed to investigate whether a connection exists between esports performance and the digital performance and advancement of individual Member States. The relevance of this topic stems from the fact that, similar to traditional sports, the esports performance of a given nation significantly influences the international allocation of resources. A nation's success in esports can have substantial positive externalities on the development of domestic departments, clubs (and leagues), and potentially related industries (Sugden and Tomlinson, 1998; Hoffmann et al., 2002). Therefore, understanding how the digital societal and economic development of a nation affects esports performance holds paramount importance.

In this manuscript, we have undertaken a two-fold approach. Firstly, we analyzed and organized the pertinent secondary literature and key international models as part of a secondary research effort. This was done with the aim of establishing a logical correlation between various aspects of digitalization and esports performance. Secondly, employing the DESI composite index, we conducted a categorization of European Union member states into homogeneous groups. This categorization provided insight into the prevailing digital "power dynamics" and the current state of the "digital divide" within the EU, as well as patterns characteristic of individual member states and different groups. Subsequently, we examined the existence of a significant correlation between the two factors through a correlation analysis, specifically employing regression analysis. As mentioned before, in terms of existing literature it can be said that researches focusing on sports performance and their economic predictors paint a diverse picture. Interest regarding the subject still engages researchers. This is well illustrated by the multitude of studies conducted in recent years (Asadizadeh and Askarian, 2019; Andreff and Scelles, 2021; Makiyan and Rostami, 2021; Fahlevi et al., 2023). However, it is hard to compare these results to esports because of its distinction from traditional sports, and its intense digital and technological nature as well. In terms of esports, we found significantly less available body of work. Similar research was conducted by Parshakov and Zavertiaeva (2018) in which traditional economic and social predictors like GDP, population etc. was used. Researches focusing on digital development and its aspects winding in the different field of economy and society still case to exist.

MATERIALS AND METHODS

In the course of our research, following the conventional scholarly model, we relied on the research triad, encompassing theoretical grounding, data collection and observation (measurement), and subsequent data analysis (interpretation). As such, we employed both primary and secondary methods, enabling us to examine the extent, dimensions, and characteristics of digitalization in individual EU Member States. Thus, our research drew upon two pivotal sources of data. We analyzed the digital performance of European Union member countries for the year 2022, utilizing the scores of the Digital Economy and Society Index (DESI). The European Commission established the DESI in 2015 to originally measure the progress of the European Digital Agenda (though the initiative and data collection commenced in 2014), and since then, the Union has been annually releasing the digital performance indicators of member states (European Commission, 2022; Bajnai and Kakas, 2021). The reports include country profiles each year, aiding member states in identifying priority areas for action, as well as thematic chapters that provide EU-level analysis on key digital policy domains. In our research, the dimensions measured by the index, particularly focusing on the four major policy advance dimensions aligned with the "2030 Digital Compass," took central prominence (Table 1).

Table 1. The main dimensions of DESI (Source: Own edition, based on European Commission, 2022)

Dimension	Description
Human capital	Models the characteristics of internet users in a given country, encompassing fundamental digital competencies, internet user knowledge, advanced skills, as well as education in the field of Information and Communication Technology (ICT).
Connectivity	Measures the varying coverage of broadband and mobile broadband in member states, indicating the quality of network infrastructure, as well as the broadband coverage price index, which assesses the cost of utilization.
Integration of digital technology	Models the digital intensity of member states by measuring the presence and utilization of various technologies available to the business sector. This dimension also encompasses modeling various indicators of e-commerce.
Digital public services	The dimension categorizes the evolution of various electronic public services accessible to the population and classifies the proportion of their utilization per capita.

The DESI reports enable various analyses, including overall performance assessment, zooming-in, tracking progress, and comparative analysis. In our research, two of these play a significant role. Firstly, through the overall performance assessment, we aimed to examine the digital situation of member states. Secondly, within the framework of comparative analysis, we endeavored to categorize and compare member states according to their index scores and their corresponding levels of digital development. In order to comprehensively examine the relationship between digitalization and esports within their contexts, beyond measuring digital performance, we required a database that tracks data related to the esports performance of member states. For this purpose, the only such source available was the database found on the Esports Earnings website. Esports Earnings compiles and manages data from 57,634 tournaments, 123,430 players, and 1,690 teams across more than 600 games. In addition to game, league, team, and tournament-level statistics, the website also provides country-specific breakdowns (Esportsearnings.com, 2023), from which we analyzed the global esports scene based on 2022 data and rankings.

Our research can be divided into three significant pillars (Figure 1). The first and foremost segment involved reviewing domestic and internationally recognized theoretical models. This aimed not only to lay the foundation for subsequent stages of the research but also to identify and systematize factors influencing sports and esports performance and align them with

the relevant dimensions of DESI. This process aimed to demonstrate the potential correlations between the indicators and the evolution of esports performance. We accomplished this from three perspectives. We examined research focusing on factors influencing traditional sports performance, research investigating factors influencing esports performance, and research addressing digital development. In the second phase of our operational work, we employed multivariate statistical procedures to establish clusters based on the primary dimensions of DESI indicators. The aim was to group observation units (EU Member States) into as homogeneous clusters as possible, according to the variables we aimed to include. The correlation between dimensions was verified using Spearman's rank correlation coefficients (own result: r <0.786; recommendations: r <0.9 (Sajtos and Mitev, 2007; Hair et al., 2014)), leading us to incorporate all four dimensions into the analysis. Outliers were addressed using the Single Linkage method, resulting in the selection of Romania for removal.

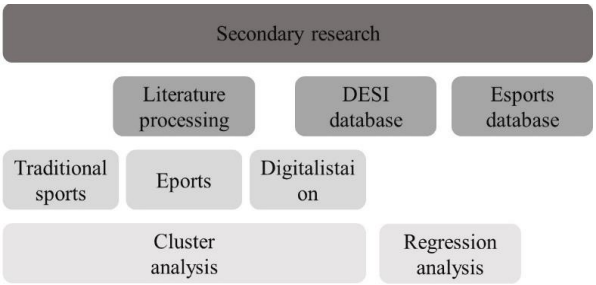

Figure 1. Research methodology (Source: Own editing, 2023)

According to the schema of cluster analysis, we have selected the distance measure used, which was the Square of the Euclidean Distance (SED). The reason for this choice stems partly from the fact that SED is one of the classical and commonly used methods for distance measurement. Because of the squaring, larger distances are emphasized more. Furthermore, both the Centroid and Ward methods among cluster methods require this distance measure (Sajtos and Mitev, 2007; Hair et al., 2014). Primarily, we have chosen the Ward method among cluster methods. The reason for this choice was to mitigate information loss during group mergers. The Ward method, as a space-preserving procedure, aims to carry out cluster mergers with minimal information loss (within-group variance) (Kovács and Balogh, 2007). The essence of the Ward method is to calculate the average for the observation units within a cluster, as well as the sum of their squared deviations from the average. It always merges the observation unit or cluster into the larger cluster formation with the smallest increase in the sum of squared deviations (Backhaus et al., 2006), thus striving to minimize the internal heterogeneity of the clusters.

To examine the reliability and validity of the established clusters, I conducted variations in cluster methods, distance measures, and cluster numbers (Ward; Complete; Centroid; K-means with cluster centers calculated based on Ward; 3-4-5 cluster solutions). After comparing the different approaches and considering professional criteria (e.g., elbow criterion based on coefficients), I ultimately selected the solution with four clusters created using the Ward method. In the final phase of the research, the investigation of the actual relationship between digitalization and esports performance was conducted, employing correlation studies, specifically Linear Regression Analysis, to examine the possible relationship within this context. This was done, after ensuring that all assumptions for the use of linear regression analysis were fulfilled (no outlier in the sample, the model has no autocorrelation as the value of the Durbin-Watson statistic was 1.87, no multicollinearity was detected in the sample, and homoscedasticity was given as the value of the Breusch - Pagan test was Sig. 0.119).

RESULTS AND DISCUSSION

1. Relevant Variables

Human capital and digital skills. This dimension of DESI encompasses sub-dimensions and indicators that measure the internet usage skills and digital competencies of a country's population. This includes assessing basic to advanced digital skills, as well as professionals within the IT field. Additionally, it measures educational and training performance within the IT sector. The significance of this dimension can be traced to the simple fact that the adaptation of digitalization and confident, seamless integration of it into our daily lives assume at least a basic level of digital literacy (Hsieh and Rai, 2008). This narrative is also emphasized by several studies that draw parallels between lower levels of skills and knowledge and the lag in the adoption and utilization of digitalization and ICT (Hargittai, 1999; Kiiski and Pohjola, 2002; Pohjola, 2003; Chinn and Fairlie, 2007; Dewan et al., 2009; Chinn and Fairlie, 2010; Happ and Horváth, 2020).

If we seek the point of connection between research endeavors examining dimensions of digital competencies and those modeling athletic achievements, including esports performance, the most direct approach is to identify it primarily through the population as an influencing factor. Indeed, the literature indicates that alongside GDP, population serves as a significant explanatory variable for the success of countries in traditional sports. This is due to the fact that it reflects the demographic strength of a given nation and, consequently, the number of potential athletes (Lozano et al., 2002; Rathke and Woitek, 2007; Wu et al., 2009). This viewpoint is also emphasized in the study by Emrich (2012), wherein the argument is made that population is a fundamental determinant of Olympic success. A large population expands the pool of potential athletes and talents. The resultant highly competitive selection process implies that athletes from larger countries (measured by population) tend to achieve more success in international competitions, such as the Olympic Games.

Although esports is not closely tied to physical fitness, we cannot disregard the fact that a larger population size enhances the likelihood of identifying talented esports players within a given country. Returning to the dimension of the DESI that measures digital competencies, it is essential to mention that due to the robust technological and digital nature of esports, the confident and consistent application of digital knowledge and skills significantly augments the number of users who engage in esports activities. Consequently, this enlarges the community of individuals active in esports who have the potential to emerge as competitive talents on an international scale.

At this juncture, we would also like to underscore Green's (2005) theory of sports systems, in which she highlights that alongside improving the quantity and quality of competitive opportunities for athletes, a fundamental aspect of

sports systems' development is the substantial increase in the number of participants (Shilbury et al., 2008). Connectivity or internet access. In this dimension, as implied by its name, we encounter the scores of sub-dimensions and indicators that model various forms of wired and mobile broadband coverage with different speeds and capacities. Additionally, the methodology includes the broadband price index, reflecting the cost of access. The percentage of households using the internet and the extent of broadband coverage are the most common variables in research assessing digital development and the digital divide (Cuervo and Menéndez, 2006; Cilan et al., 2009; Vicente and López, 2010; Chinn and Fairlie, 2010; Brandtzæg et al., 2011). Having adequate digital user skills is not sufficient. The availability of appropriate infrastructural conditions would play a determining role in increasing the number of potential users and, consequently, competitive talents. These variables express the levels of a country's connectivity in terms of ICT infrastructure.

In addition to coverage, it is important to consider internet costs, as literature concurs that this factor exhibits a strong negative correlation with the level of digital development (Kiiski and Pohjola, 2002; Unwin et al., 2009; Dewan et al., 2009). These assertions are comprehensively summarized by Dewan et al. (2009), who draw attention in their research to the substantial lag of developing countries in the process of digital development. Nevertheless, with facilitation of computer and internet access, coupled with cost-reduction policies and the establishment of fundamental infrastructural prerequisites, the digital development process could be significantly accelerated.

Research examining factors influencing traditional sports delves into these training methods, more advanced sports facilities, and the array of sports equipment available to athletes. This is manifested along the axis of more sophisticated infrastructure and sports apparatus, as they result in enhanced preparation and consequently improved performance, whether in football or the multitude of sports encompassed by the Olympic program (Hoffmann et al., 2002; Bernard and Busse, 2004; Yamamura, 2009; Emrich et al., 2012). This logic is echoed in the research spotlighting esports performance by Parshakov and Zavertiaeva (2018). Their study attributes the growth of technological and digital infrastructure, alongside accessibility, to an increase in users and thereby potential talents, leading to more effective preparation and superior performance. It is equally noteworthy that the development of digital infrastructure reflects resources that can be utilized for athlete training, acquisition, and maintenance of facilities and equipment that facilitate their training regimen, and additionally, for the development of novel training approaches aimed at enhancing performance (Rathke and Woitek, 2007).

The integration of digital technologies encapsulates sub-dimensions that express the digital intensity of EU Member States or the digital technologies accessible and utilized by businesses. The indicators of this dimension follow the logic derived above, albeit from different perspectives. The level of digital development within specific countries is not solely manifested in individuals' digitization and technology adoption, but also in the extent of integration of digital technologies within the economic and societal landscape. It can be asserted that countries characterized by a more digitally intensive environment, based on penetration and exposure, not only reinforce digital competencies and everyday usage but also yield appropriate infrastructural foundations. Hence, the level of integration of digital technologies within specific countries can be an important indicator for forecasting esports performance. The last major dimension of the DESI index encompasses indicators measuring digital public services. The elevation of these indicators in research is crucial, as they provide an opportunity to extract additional information beyond the mere adoption of ICT by assessing how we utilize these advanced services. Therefore, the dimension offers the potential to gain insights into individual usage patterns (Hsieh et al., 2008). As a result, the percentage of the population utilizing digital public services has also been incorporated into the analysis.

In this phase of our research, our aim was to explore international literature models and approaches in the domains of both traditional sports and e-sports, as well as digital development. By acquainting ourselves with these models, we further aimed to draw parallels along the trajectory of digital development between research examining factors influencing traditional sports performance and the evolution of esports. Guided by this framework, we can assert that theoretically, a logical correlation can be posited between digitalization metrics and the requisite condition framework for esports development and success. This places a direct emphasis on investigating the existence of a real relationship.

1. Digital Map of the European Union

We complemented the method of processing relevant literature with cluster analysis to gain initial insights into the digital dynamics of European Union member states before delving into correlation examinations. The aim of cluster analysis was to categorize the member states into relatively homogeneous groups based on the main dimensions of the DESI. In conducting the clustering and determining the number of clusters, we strived to

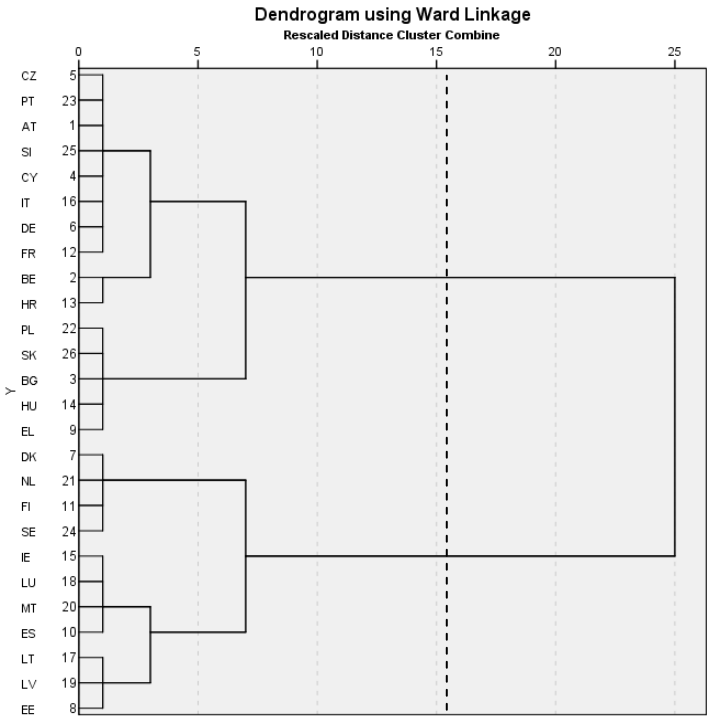

Figure 2. The dendogram of the Ward method (Source: Own editing, 2023)

consider the "trade-off" effect. This involves finding an optimal quantity of clusters that reduces the complexity of our data structure while maintaining homogeneity within each group, thus ensuring that merging distant observational units does not compromise intra-group cohesion (Malhotra, 2001). As a result, we successfully delineated four clusters, which were formed based on the index scores of the main dimensions of DESI as follows. The dendrogram of the Ward's method, as depicted in Figure 2 below, reveals that at an appropriate level, four well-defined clusters emerged.

Furthermore, for the purpose of labeling cluster assignments, an additional variable was saved. Subsequently, we analyzed the group means obtained as a result of the conducted trial concerning the examined variables (Table 2).

Table 2. Cluster Analysis Group Means by Variables(Source: Own editing, 2023)

Cluster	Human capital	Connectivity	Integration of digital technology	Digital public services
(n=10; 38%)	(-) 0,115110	(**0**) 0,140010	(**0**) 0,094750	(-) 0,159760
(n=5; 19%)	(--) 0,096160	(--) 0,127120	(--) 0,057240	(--) 0,128220
(n=4; 15%)	(++) 0,159800	(++) 0,167500	(++) 0,140875	(++) 0,210675
(n=7; 27%)	(+) 0,131729	(-) 0,138371	(**0**) 0,094457	(+) 0,209957
Total (n=26; 100%)	0,122815	0,141319	0,094554	0,175042

0: Around average; -- Well below average; - Slightly below average; ++ Well above average; + Slightly above average

Based on the above results, it can be concluded that the Member States belonging to Cluster 1 (n=10) performed slightly below average in two dimensions, "*Human Capital*" and the area of "*Digital Public Services*" accessible and used by citizens. They demonstrated average performance in the dimensions of "*Connectivity*" and "*Integration of Digital Technologies*". It is evident that rather than focusing on users, this group is characterized by technological development. Therefore, this group was labeled as the cluster of "Technology-oriented" Member States. Countries belonging into this cluster are: Austria, Belgium, Cyprus, Czech Republic, France, Croatia, Germany, Italy, Portugal, Slovenia (Figure 3). For Cluster 2 (n=5), according to cluster averages, it is apparent that they significantly underperformed in all four dimensions of digital development. Thus, the members of this cluster are facing substantial shortcomings in their digital performance across all areas, resulting in the categorization of this cluster as "Digital Laggards". Countries belonging into this cluster are: Greece, Bulgaria, Poland, Hungary, Slovakia (Figure 4). Based on the DESI index score and digital performance, Romania, previously treated as an outlier and excluded, would also belong to this group, thus constituting a contiguous Eastern bloc. This Eastern lag is not a surprising result, considering the fact that multiple studies emphasize the significant presence of the "digital divide" in Eastern European countries (Cruz-Jesus et al., 2012; Quintá and Arce, 2013). Furthermore, the existence and impact of economic asymmetry also support this observation (Billon et al., 2008; Vicente and López, 2011; Campos, 2016).

Figure 3. "Technology oriented" Member States
(Source: Own editing, 2023)

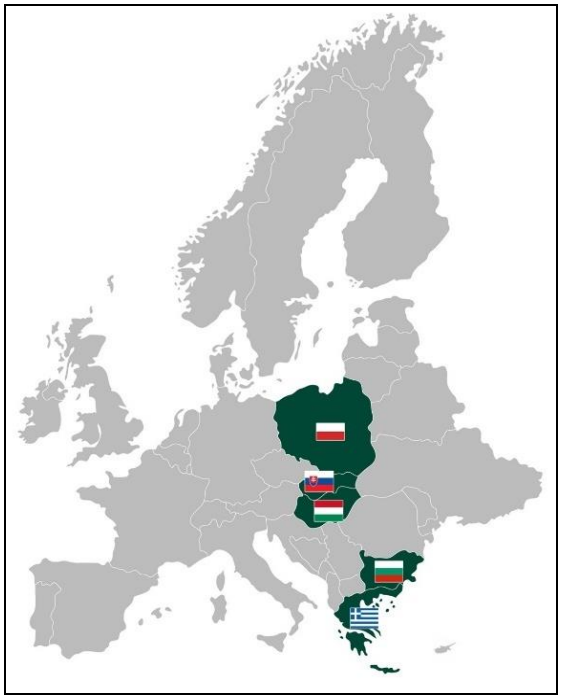

Figure 4. "Digital Laggard" Member States
(Source: Own editing, 2023)

Upon further examination of the results, Cluster 3 (n=4) significantly outperformed the average in all four main areas, portraying a balanced, all-encompassing digital development. These observational units constitute the group of "Digital Powerhouses". Countries belonging into this cluster are: Finland, Denmark, Netherlands, Sweden (Figure 5.). This outcome aligns with international research that highlights the pioneering role of Northern European countries in the digital realm (Cruz-Jesus et al., 2012; Marti and Puertas, 2023). Correspondingly, a connection can also be observed with the findings of studies emphasizing the more effective innovation capabilities (GII) of these countries, enabling faster digital adaptation

(Aytekin et al., 2022). In the case of Cluster 4 (n=7), they performed above average in two dimensions ("*Human Capital*"; "*Digital Public Services*"), while achieving around average performance in "*Integration of Digital Technologies*" and below-average performance in "Connectivity." States within this cluster appear to be more advanced from the user perspective compared to the Technology-oriented cluster. As a result, they were named the "User-centric" cluster.

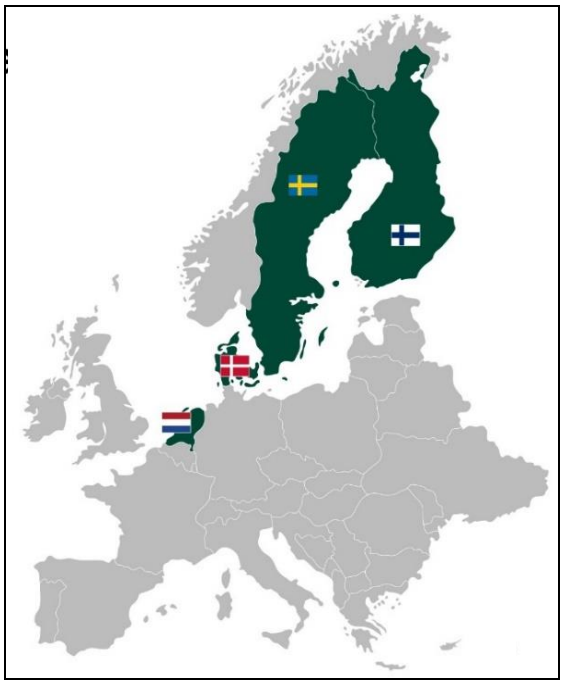

Figure 5. "Digital Powerhouse" Member States
(Source: Own editing, 2023)

Figure 6. "User-centric" Member States
(Source: Own editing, 2023)

Based on the results of the cluster analysis, it can be asserted that beyond the "Digital Powerhouses," which represent the Member States with the most advanced digital development in all four dimensions, and the "Digital Laggards," who significantly lag behind in digital development across all areas, two other significant trends emerge on the European Union's digital map. Firstly, there is a group of Member States excelling in the integration of digital technologies, internet, and various broadband coverage areas—these are primarily characterized by a Technology-oriented digitalization approach. Secondly, there is a cluster of Member States demonstrating lower technological advancement but showcasing better performance in human factors. Thus, they are more User-centric in nature.

2. The relationship between digital development and esports performance

In the final phase of our research, we examined the association between the two variables, namely the DESI (Digital Economy and Society Index) scores modeling the digital development of member states and the esport performance of these states. It's important to highlight that for the DESI scores, we utilized the aggregated value of the four main policy areas or dimensions (Human Capital, Connectivity, Integration of Digital Technologies and Digital public services) in other words, the main DESI scores of each member state, which represents the highest dimension of the composite index. Once we ensured that the assumptions for conducting linear regression were met, we proceeded with the analysis. After running the regression, it can be stated that the linear regression model investigating the impact of digital development on esport performance during the 2022 period yielded reliable results. The model's explanatory power is acceptable ($R=0.42$; $r^2=0.179$; Sig. = 0.032). As part of the overall examination of the models, we also determined the Durbin-Watson value, which is 1.87.

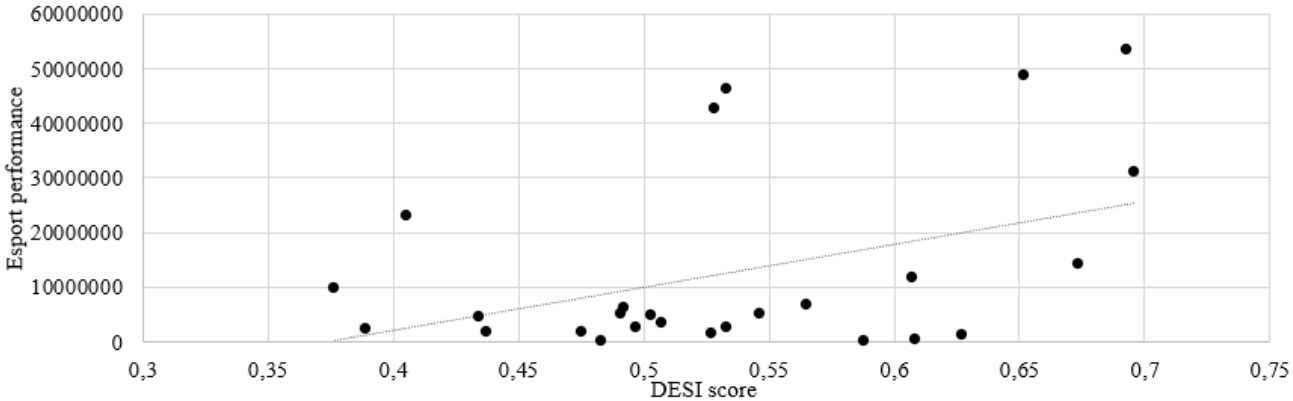

Figure 7. Results of the linear regressions (Source: Own editing, 2023)

Based on these results it can be said, that the regression line can account for 17.9% of the total variation, implying that various aspects of digital development contribute to 17.9% of the differences in member states' esport performance. This result is not surprising, as similar to traditional sports, where factors like a country's average temperature can influence performance, a multitude of factors can affect esport performance as well. Nevertheless, the significance of the F-test (Sig. 0.032) confirms the presence of a relationship. Additionally, the significance of the slope determined in the t-test (Sig. 0.032) also indicates that digital development influences esport performance.

CONCLUSION

Similar to traditional sports, the esports performance of a given nation significantly influences the international allocation of resources. A nation's success in esports can have substantial positive externalities on the development of domestic departments, clubs (and leagues), and potentially related industries (Sugden and Tomlinson, 1998; Hoffmann et al., 2002). Therefore, understanding how the digital societal and economic development of a nation affects esports performance holds paramount importance. Based on these considerations, our aim was to examine the digitalization of European Union Member States along the lines of the Digital Economy and Society Index (DESI), annually issued by the European Commission. We aimed to investigate whether a connection exists between esports performance and the digital performance and advancement of individual Member States.

Based on these, our research was built upon three major segments. In the first phase, using various international theoretical models, we aimed to find logical connections between traditional sports performance, esports performance, and digital development. This provided evidential support for the potential existence of a relationship. After examining the four main dimensions of the DESI along these relationships, the second segment of the research focused on investigating the prevailing digital power dynamics within the European Union, which helped outline four defining directions. The group of “Digital Powerhouses” was identified, comprising Member States, mainly from the Northern part of the EU that excel in all four dimensions of the DESI. This group is complemented by the “Digital Laggards” from the Eastern part of the EU, who perform well below average in all four areas. Additionally, two other directions emerged: Member States emphasizing technology and those focusing on user-friendliness, or user-centric approaches.

In the third and most crucial phase of our research, we examined the actual connection between digital development and esports performance. The results of the statistical analysis we conducted supported our preliminary proposition, confirming a significant relationship between the two variables. This current study provided only a glimpse into a larger and more significant investigation. Going forward, it is worthwhile to consider the various levels of DESI and delve deeper into the different axes (technology-oriented, user-centric). Additionally, a more in-depth examination of the different directions may yield valuable insights. Moreover, it could be beneficial to incorporate the factor of time into the research and analyze the progression of member states' development over time.

Limitation of the research

It is important to highlight that our research encounters limitations from various perspectives, which can be categorized into two main strands.

Firstly, it's essential to acknowledge that we are examining aggregated performance in the context of countries. For the research's purposes, investigating individual and team performances could prove valuable and insightful in the future. Additionally, results might differ between online and offline games, as well as across different types of games.

Secondly, comparing the research results directly with studies on traditional sports is challenging, given that the most relevant indicator of esport success is the share of prize money rather than the number of medals, titles, or rankings. Therefore, the proportion of won tournaments may not adequately reflect a country's performance. In this regard, the ideal solution would involve the availability of a publicly accessible and verified database that tracks not only the amount of money earned by different countries but also the achieved podium placements, which could be equated to medals per podium placement (first place gold, second place silver, third place bronze medal).

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