PARADIGMS OF THE DIGITAL ECONOMY AND SOCIETY: A COMPARATIVE ANALYSIS OF LATVIA AND LITHUANIA

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Abstract
Digital progress in the European Union is a catalyst for economic development. The COVID-19 pandemic significantly accelerated the pace of digitalization, thereby creating not only challenges for the European Union but also new opportunities for economic development in Europe. The present research focuses on an analysis of digital economy and society index scores for Latvia and Lithuania, comparing the performance of both countries with the European Union average. The research aims to identify the critical areas that hinder digital progress in Latvia and Lithuania. Accordingly, the digital economy and society index was analysed for the period from 2018 to 2023. The empirical part of the research includes a sociological survey, and the survey data were analysed in order to identify population needs for and experience in using digital technologies in Latvia and Lithuania. The survey involved 146 respondents. The research results allowed us to identify the critical areas for Latvia and Lithuania to focus on for further digital progress. Latvia and Lithuania both show high scores, well above the EU average, in the 'digital public services' component, indicating that both countries have a high level of e-government users and widespread access to digital public services. The results of the sociological survey further confirm this, showing that a large majority of 84.25% of respondents in both Latvia and Lithuania use digital solutions in their daily lives.
Keywords: DESI, Digital society, Digital economy, Baltic States.

Introduction

The problem of interaction between digitalization and society has been relevant since the 1970s. Robert Wachal was the first author to use the term digitalization of society in his writings in 1971 (Sept, 2020). It could be said that the beginning of the 1970s was significant as the initial stage of the integration of information technology, while at the end of the 1990s, the increasing pace of information technology progress caused a global transformation (Česnauskė, 2019). It should be highlighted that the positive impact of digitalisation on the economy has been discussed in several forums in Europe. These included the Trade Union Advisory Committee in 2017, which focused on new technologies, knowledge and skills. The Stakeholders Forum, held in 2018, highlighted the need for Europe and industry to become digital in the future (Rivža *et al*., 2019).

Besides, the opportunities and challenges of digitalization constantly change. The COVID-19 pandemic created countless challenges, yet it also gave new opportunities to increase the pace of digitalization (Almeida, Duarte Santos & Augusto Monteiro, 2020). In addition, the digital progress in the European Union (hereinafter referred to as the EU) had high expectations for economic development. This means that the digital progress would accelerate digitization processes at the public and private level through combining resource and cost optimization. At the same time, it would increase the competitiveness of the economy and reduce public costs. Accordingly, Europe and the world could be expected to be marked by the development of advanced technologies in the future (Troitiño, 2022). Europe aims to move towards a sustainable and prosperous digital future. The Digital Decade path is a programme that contributes to the digital transformation in Europe and sets out four main policy areas for 2030: digital skills, company digital transformation, secure and sustainable digital infrastructure, public service digitalization (European Commission, 2023). Therefore, employing the digital economy and society index (hereinafter referred to as the DESI), the European Commission monitors the digital progress in the 27 Member States of the EU (European Commission, 2022). The DESI index allows assessing the digital competitiveness of the EU Member States. It aims to identify areas where additional investment is needed to digitalize the economy and society (Sevgi, 2021). It can be said that since 2014, the European Commission publishes annual reports on Member States' digital progress and detailed analysis of indicators covering internet usage, e-commerce usage, e-government, etc. (Brence, Gudele, & Rivža, 2022).

However, the main question is whether Latvia and Lithuania are ready for digital changes. The research aims to identify the critical areas that hinder digital progress in Latvia and Lithuania. Based on sociological research, identify the experiences and needs of the society in Latvia and Lithuania in using digital solutions.

Materials and Methods

The research employed the monographic and descriptive methods to identify relevant research studies and findings and make a theoretical discussion. Statistical data analysis was employed to achieve the research aim. DESI index scores for Latvia and Lithuania were qualitatively and critically analysed and compared with the EU average. The research identified critical areas in digital progress in Latvia and Lithuania. The research period was 2018-2023. The DESI index scores were analysed based on equal weights for 4 dimensions: human capital 25%, connectivity 25%, digital technology integration 25%, digital public services 25% (European Commission, 2022).

At the same time, the research analysed the results of the sociological survey. The survey was conducted with the aim of identifying population needs for and experience in using digital technologies in Latvia and Lithuania. The survey period was September 2023 - December 2023, involving a total of 146 respondents. As a result, 83 respondents from Latvia and 63 respondents from Lithuania answered 9 questions in person, using both Likert scales and closed-ended multiple-choice questions from which one or more answers had to be selected. IBM SPSS (SPSS Inc., 2016) software and descriptive statistics were used to analyse the data, which revealed the respondents' experience in and their needs for using digital technologies. At the same time, the Cross tabulation tool was used to gain a deeper understanding of the survey results, parametric methods T-test, F-test were used to compare the samples.

Results and Discussion

To identify the critical areas in digital progress in Latvia and Lithuania, the research analysed DESI index scores for the 27 Member States and performed a component analysis.

As explained above, the DESI Index is a tool used since 2014 to measure and monitor the digital economy and society in Europe. It consists of 4 components focusing on the digital goals of the European Digital Decade (Kovács *et al.*, 2022).

The analysis of DESI index scores for EU Member States in 2022 (European Commission, 2022) revealed that among the 27 Member States, Latvia ranked 17th with a score of 49.7, which was lower than the EU average score of 52.3. At the same time, Lithuania ranked 14th with a score of 52.7, being at a higher position. Overall, the leader in digital progress, according to the DESI index 2022, was Finland, which ranked 1st with a score of 69.6, while Romania had the lowest score of 30.6.
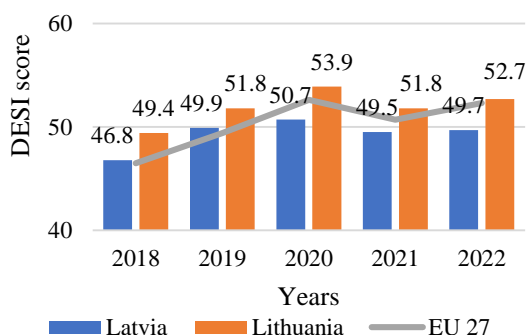

Figure 1. DESI index scores for Latvia, Lithuania and the EU-27 from 2018 to 2022.
Source: authors' construction based on European Commission, (n.d.).

The analysis of DESI index scores (European Commission, n.d.) for the period 2018-2022 'Figure 1' revealed that in 2022 compared with 2018, the DESI score increased by 6% for Latvia, 7% for Lithuania,

while the EU average increased by 12%. In addition, the largest decrease in DESI scores was observed during the COVID-19 pandemic, and in 2021 compared with 2020, the DESI score decreased by 4% for Lithuania, 2% for Latvia and the EU average decreased by 4%.

The analysis of DESI scores by component has revealed that the 'Human capital' component includes such indicators as digital skills at the basic level and above the basic level, ICT specialists and graduates, as well as companies that provide ICT training etc. (European Commission, 2022).

The analysis of performance (European Commission, n.d.) in the period from 2018 to 2022 'Figure 2' revealed that the 5-year average score was 40.12 for Latvia, 43.06 for Lithuania, and the EU average was 47.52.
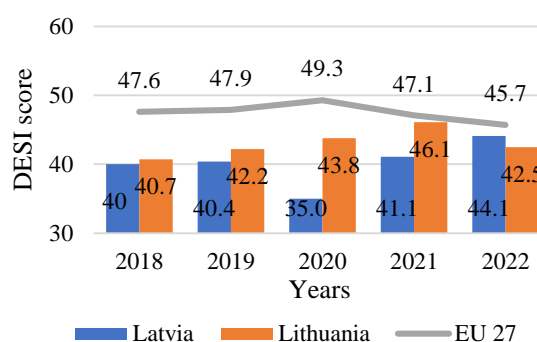

Figure 2. DESI index scores for the 'Human capital' component for Latvia and Lithuania and the EU-27 from 2018 to 2022.
Source: authors' construction based on European Commission, (n.d.).

It should be mentioned that in 2020 Latvia shows a significant decline in the component of indicators such as digital skills at and above the basic level, ICT specialists. Lithuania, on the other hand, shows moderate progress in the component since 2018, but in 2022 there is a drop in the indicators at least basic digital skills and above basic digital skills. The scores for the 'Human capital' component in 2022 (European Commission, 2022) show that Latvia with 44.1 and Lithuania with 42.5 did not reach the EU average of 45.7. Latvia ranked 18th and Lithuania was 20th among the 27 Member States. A detailed analysis of scores in 2022 revealed that Latvia had a higher score of 51 than Lithuania with 49 but lower than the EU average of 54 for the indicator 'digital skills at the basic level'. The indicator 'ICT specialists' had the same score for both Latvia and Lithuania at 3.8%. However, it was lower than the EU average of 4.5%. In the indicator 'companies that provide ICT training', Latvia with a score of 17 was ahead of Lithuania with a score of 14, which was a much lower performance compared with the EU average of 20. Although Latvia and Lithuania had higher scores than the EU average for the indicators 'ICT graduates' and 'ICT specialists', the overall score for the 'Human capital' component did not reach the EU average level in 2022.

An analysis of DESI index scores for the 'Connectivity' component has revealed that it includes such sub-components as fixed broadband take-up, 5G coverage, mobile broadband take-up etc. (European Commission, 2022). The analysis of performance for the period from 2018 to 2022 'Figure 3' revealed that the 5-year average score (European Commission, n.d.) for Latvia was higher at 55.02 than for Lithuania at 45.9, while the EU average was 48.96. Although Latvia had a score well above the EU average and Lithuania showed an upward trend in 2020, the year 2021 decreased the scores for both countries. The analysis of scores for the 'Connectivity' component in 2022 (European Commission, 2022) revealed that Latvia had a higher score of 50.1 than Lithuania with 49.4; however, both countries did not reach the EU average of 59.9. Among the EU-27, Latvia had 20th position, Lithuania had 23rd position. A detailed analysis of the indicator 'at least 1 Gb/s take-up' revealed that Latvia had a score of <0.01, Lithuania had a score of 0.72, which were critically low compared with the EU average of 7.58. At the same time, Latvia had a critically low score of 0 for '5G coverage', while Lithuania had a much higher score of 33, which however did not exceed the EU average score of 66. It should be noted that Lithuania with a score of 5 was significantly behind the EU average of 56 for the indicator '5G spectrum', which was less challenging for Latvia.
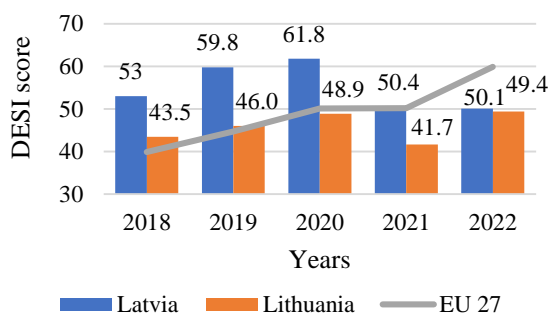

Figure 3. DESI index scores for the 'Connectivity' component for Latvia and Lithuania and the EU-27 from 2018 to 2022.

Source: *authors' construction based on European Commission, (n.d.).*

The analysis of the 'digital technology integration' component of the DESI index has revealed that it includes such sub-components as digital transformation of small and medium enterprises (hereinafter referred to as SMEs) at the basic level, SMEs using e-commerce, cloud services etc. (European Commission, 2022). The analysis of performance for the 'digital technology integration' component in the period from 2018 to 2022 'Figure 4' revealed that the 5-year average score (European Commission, n.d.) for Latvia was 26.04, 44.28 for Lithuania and the EU average was 38.54. The scores for 2022 showed that Latvia had a score of 25.8, which was significantly lower than a score of 37.2 for Lithuania and the EU average of 36.1. Lithuania ranked 13th and Latvia 23rd among the EU-27. A

detailed analysis revealed that Latvia had low scores in almost any sub-component, including 'SMEs with digital intensity at least at the basic level'; Latvia had a score of 38, compared with the EU average of 55 and a score of 57 for Lithuania. In Latvia 15% used e-invoices, 27% in Lithuania, and 32% on average in the EU. It could be said that Latvia with a score of 14 has a problem with 'SMEs selling online', while Lithuania had a score of 32, which was much higher than the EU average of 18%.
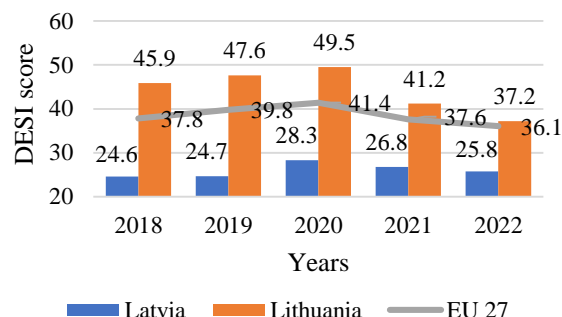

Figure 4. DESI index scores for the 'digital technology integration' component for Latvia and Lithuania and the EU-27 from 2018 to 2022.

Source: *authors' construction based on European Commission, (n.d.).*

The 'digital public services' component includes such sub-components as open data, e-government users, e-health etc. (European Commission, 2022). An analysis of performance for the component 'digital public services' in the period from 2018 to 2022 'Figure 5' revealed that the 5-year average score (European Commission, n.d.) for Latvia was 79.64, 79.44 for Lithuania and the EU average was 67.24. It should be noted that in 2022, Latvia with 78.8 and 11th position and Lithuania with 81.8 and 10th position showed a similar performance among the EU-27, which was higher than the EU average.
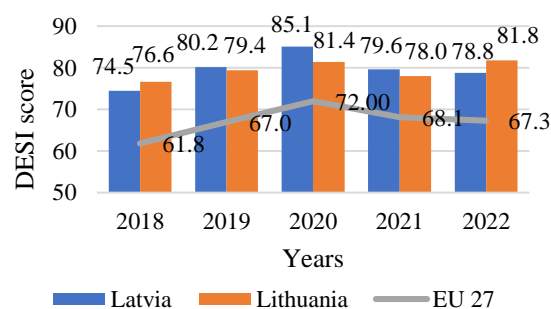

Figure 5. DESI index scores for the component 'Digital public services' for Latvia and Lithuania and the EU-27 from 2018 to 2022.

Source: *authors' construction based on European Commission, (n.d.).*

The scores for the component in 2022 showed that Lithuania had significantly higher scores of all the indicators, while the performance of Latvia was slightly

poorer but remained well above the average. A more detailed analysis revealed that Lithuania had a score of 70 for the indicator 'e-government users', while Latvia had a score of 84. Lithuania had a higher score of 93 than Latvia with 86 for the indicator 'digital public services for companies'. However, Latvia had a higher score of 87 than Lithuania with 82 for the indicator 'digital public services for individuals'.

The 2023 Digital Decade report should be considered to draw conclusions about digital progress in Latvia and Lithuania. According to the report, Latvia had high scores for the indicators 'digital public services' and 'fixed connectivity'. It should be stressed that there was insufficient growth in 5G coverage, as well as in business digitalization. Lithuania, however, had high scores for 'digital public services', while digital skills have increased significantly. To achieve the goals of the Digital Decade, according to the report, the scores of indicators of the 'connectivity' component must be higher (European Commission, 2023).

It should be mentioned that in the period from 2014 to 2018, the DESI index scores for both Latvia and Lithuania increased, Lithuania had a higher DESI than the EU average, whereas Latvia had a lower DESI. Accordingly, progress was observed in the areas of connectivity, internet usage and digital public services. In relation to this, J. Česnauskė pointed out that the Baltic States, including Latvia and Lithuania, did not fully use the potential of digital technologies (Česnauskė, 2019).

To make effective business decisions, organizations conduct research in several ways, including finding out the opinions of the public about the services and the products sold. It could be said that one of the most reliable and effective research methods is a survey (Questionpro, n.d.). Accordingly, a sociological study was conducted in Latvia and Lithuania to identify population needs for and experience in using digital technologies. A total of 146 respondents participated in the survey: 83 from Latvia and 63 from Lithuania, aged between 18 and 65, incl. 101 women and 45 men. The survey established that most of the respondents, 84.25%, used digital solutions and technologies daily, 9.59% used them several times a month, while 6.16% used them rarely. Analysing the answers to the question how often you use digital solutions and technologies in your daily life, it was found that based on the results of cross-tabulation analysis, it can be said that the vast majority of respondents in Latvia 79.5% and Lithuania 90.5% use digital technologies on a daily basis and only 13.3% respondents in Latvia, 4.8% in Lithuania use digital technologies only several times a month. However, 7.2% of respondents in Latvia and 4.8% in Lithuania answered that they rarely use digital technologies. Based on the chi-square test results the authors found that since $\chi^2 = 3.56 < \chi^2_{0.05} = 5.99$, df=2, Sign=0.16 n=146, there are no statistically significant differences between the answers to the given question in Latvia and Lithuania. The answers to a question of which digital solutions and technologies offered by the municipality they used

daily (multiple answers were possible), the majority (78.08%) admitted that they used e-services, 66.44% used social media accounts, 64.38% used e-commerce websites offering online purchase of goods and services from local producers, 54.79% had digital cards, while 50.68% admitted that they used e-education services daily. According to the results of the cross-tabulation analysis, the respondents in the two countries have different answers to the question what digital solutions and technologies are used in their municipality. In Latvia, the largest majority of respondents, 79.5%, indicate that they use e-services in their daily work, while in Lithuania the result is 76.2%. In Lithuania, the largest majority of 77.8% of respondents use municipal social media accounts, while the Latvian result is 57.8%. Based on the chi-square test results, the authors found that since $\chi^2 > \chi^2_{0.05}$, the null hypothesis can be rejected and the answers to the question differ significantly between Latvia and Lithuania.

The respondents were asked to rate on a scale from 1 (unimportant) to 10 (very important) the importance of digitalization in their municipalities. In Latvia, the average rating was 9.01, variance - 2.01, in Lithuania - 9.11, variance - 1.42. The variances of ratings are statistically different in Latvia and Lithuania, as indicated by the results of the F-test (see Table 1.): F = 0.707 > F Critical = 0.670, Sign = 0.077.

Table 1
F-Test: Two-Sample for Variances

	LT-5	LV-5
Mean	9.111	9.012
Variance	1.422	2.012
Observations	63	83
df	62	82
F	0.707	
P(F<=f) one-tail	0.077	
F Critical one-tail	0.670	

Source: *author's construction based on survey results.*

On the other hand, there is no statistically significant difference between the average ratings, as indicated by the results of the t-test (see Table 2): t = 0.457< t Critical = 1.976, Sign = 0.647.

Table 2
T-Test: Two-Sample Assuming Unequal Variances

	LT-5	LV-5
Mean	9.111	9.012
Variance	1.422	2.012
Observations	63	83
Hypothesized Mean Difference	0	
df	142	
t Stat	0.457	
P(T<=t) one-tail	0.323	
t Critical one-tail	1.655	
P(T<=t) two-tail	0.647	
t Critical two-tail	1.976	

Source: *author's construction based on survey results.*

The survey results showed that 84.25% of the 146 respondents in Latvia and Lithuania use digitalsolutions and technologies on a daily basis. In addition, with a mean value of 9.1 (on a scale of 1 to 10), respondents consider digitisation in municipalities to be of high importance.

Conclusions

1. Digital developments are raising high expectations for economic development. In Europe, digital transformation is taking place in four key areas: digital skills, digital transformation of businesses, secure and sustainable digital infrastructures, and digitisation of public services.

2. The results of the study show that the DESI index score in 2022 compared to 2018 has increased by 6% in Latvia, by 7% in Lithuania and by 12% on average in the EU Member States. Latvia and Lithuania are only partially exploiting their digital potential.

3. Latvia has had a challenging COVID - 19 period. The 2020 results show a significant weakening of the 'human capital' component indicators such as digital skills, ICT specialists. 2021 weakened Latvia's score in the component 'connectivity'.

Thus, a critically low indicator for Latvia is 5G coverage, at least 1 Gbps take-up. Latvia scores critically low in the component 'integration of digital technologies', which has a significant impact on the digitalisation of business.

4. Lithuania has improved its score in the 'human capital' component on digital skills since 2018, but in 2022 the score has dropped significantly and is below the EU average. In 2021, Lithuania's score in the component 'connectivity' weakened. Thus, the low score for Lithuania is 5G spectrum, at least 1 Gbps take-up.

5. Latvia and Lithuania both show high scores, well above the EU average, in the 'digital public services' component, indicating that both countries have a high level of e-government users and widespread access to digital public services. The results of the sociological survey further confirm this, showing that a large majority of 84.25% of respondents in both Latvia and Lithuania use digital solutions in their daily lives. In addition, respondents in both Latvia and Lithuania rated the development of digitalisation in municipalities as very important.

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