



Comparative Analysis of the Logistics Performance Index of European Union Countries: 2007-2023



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Abstract: Within the evolving landscape of modern business, a proficient logistics sector stands paramount in fostering regional and global competitive edges. A country's logistics performance, gauged aptly, can influence not just the business outcomes of individual enterprises but also shape the nation's holistic logistics efficacy. This study delves into an examination of logistics standards in European Union (EU) countries, viewed through the lens of the Logistics Performance Index (LPI) as reported by the World Bank. The primary focus is on the LPI data for 2023, with a subsequent exploration of the EU's performance trajectory from 2007 to 2018. The findings illuminate that specific EU countries consistently uphold superior logistics proficiency, while striving for advancements. Beyond these front runners, many EU countries manifest commendable logistics outcomes, positioning themselves favorably on the global stage.

Keywords: Logistics Performance Index (LPI); Evaluation criteria; Logistics environment; Logistics performance quality; Logistics competitiveness; LPI results; International transportation

1. Introduction

A robust logistics performance is pivotal in boosting international trade volumes. Conversely, countries grappling with underdeveloped logistics infrastructures and subpar logistics services often find themselves marginalized in the international supply chain. Such scenarios hinder their economic momentum, leading to potential stagnation. Therefore, it becomes imperative for nations to consistently monitor, measure, and compare their logistics performance against global counterparts to decipher avenues for improvement in logistics and associated services. Prior to formulating strategies or instigating policy changes – be it infrastructure augmentation or regulatory modifications – a thorough assessment of a country's logistics standing is necessary. This ensures that decisions are based on well-defined parameters reflecting logistics quality. A notable instrument for this evaluation is the LPI, which offers a comprehensive snapshot of global logistics conditions (Mešić et al., 2022; Miškić et al., 2023).

Kabak et al. (2018) underscore the significance for nations to grasp their logistics standing to craft policies enhancing trade and transportation engagements with global partners. For policymakers, insights into logistics performance serve as a comparative tool to discern their nation's relative positioning. Arvis et al. (2023) emphasize the escalating importance of understanding logistics performance, especially in light of significant global market shifts post-2018. The ramifications of the COVID-19 pandemic, which disrupted global supply chains, further accentuate this need. To navigate these tumultuous waters, nations must adopt an introspective lens towards their logistics performance while also surveying the global landscape. The LPI sheds light on disparities across countries, particularly in areas like customs protocols, logistics expenses, and infrastructure caliber for terrestrial and maritime conveyance (Martí et al., 2014). Enhancements in LPI facets can bolster a nation's trade dynamics. These aspects of the LPI are gaining traction, especially in regions like Africa, South America, and Eastern Europe, where logistics becomes a linchpin for international competitiveness. As emphasized by Jhawar et al. (2017), for

nations to carve a logistics edge, it's vital to evaluate and fine tune their existing logistics framework. This involves discerning which subsystems demand optimization, evolution, introduction, or outright elimination. Ojala & Çelebi (2015), meanwhile, advocate for comprehensive logistics analyses to augment freight transport efficiency and pinpoint synergistic partnerships with nations to bridge logistical gaps.

Strategically, countries endeavor to elevate their LPI score, thereby climbing the global rankings (Ulutaş & Karaköy, 2019). Such strategic pursuits often hinge on pinpointing LPI warranting keen focus. As observed by Sénquiz-Díaz (2021), for nations where mere transportation doesn't suffice, a well-orchestrated logistics strategy can become a game changer, enabling them to tap into global production networks. This, in turn, enhances their policy frameworks, subsequently elevating their populace's quality of life. The surge in global trade, coupled with production consolidation and economic fluctuations, underscores the salience of freight and logistics (Andrejić & Kilibarda, 2014). A nation's economic vitality is invariably intertwined with its logistics acumen. Superior logistics performance paves the way for seamless access to international markets, amplifying trade volumes. As Burity (2021) posits, logistics efficiency is integral to shaping customer experiences, influencing loyalty, retention, and overall satisfaction.

The methodological approach adopted in this study is segmented into four phases. The inaugural phase, grounded in literature reviews, underscores the essence of measuring and monitoring national logistics performance. As the narrative pivots to evaluate the LPI results of EU countries over the years, the requisite data was collated in the subsequent phase. The third phase delves into the 2023 LPI results for the EU, paving the way for the final phase where a retrospective comparison of the EU's LPI performance across preceding reports unfolds.

2. Analysis of the 2023 LPI Results of EU Countries

The LPI serves as a metric to evaluate the quality of a country's logistics environment. Data for the index are procured by the World Bank, primarily through surveys undertaken by global logistics operators. These operators, in turn, offer insights into logistics across the countries in which they operate. The 2023 edition of the LPI has provided results for 139 countries, ranking them according to six criteria: customs, infrastructure, ease of arranging shipments, logistics service quality, consignment tracking and tracing capabilities, and timeliness.

From the 2023 LPI report presented by the World Bank, a detailed assessment of the scores of EU member countries was conducted. Figure 1 the rankings of the EU countries for the aforementioned year, whereas Figure 2 depicts the LPI scores they garnered.

In the 2023 World Bank LPI report, Finland emerges as the top-performing EU country, securing the second rank globally with an LPI score of 4.2. Following Finland, Denmark, the Netherlands, and Germany the second best-ranked countries in the European Union with an LPI score of 4.1. The third place is taken by Austria, Belgium and Sweden (rank 7), and their LPI score is 4.0. The fourth place belongs to France and Spain (rank 13), which have a slightly lower value of the LPI score compared to the previous countries (3.9), while the fifth place is taken by Greece and Italy (rank 19, value of the LPI score is 3.7). The Czech Republic, Croatia, Malta, Slovakia and Slovenia are in the penultimate place (rank 43), with an LPI score of 3.3, while Bulgaria, Cyprus, Hungary and Romania have the worst results of all EU countries (rank 51, LPI score is 3.2), therefore, they also represent the last-ranked countries of this group. The Figure 1 below provides visual depictions of scores aligned with individual LPI criteria.

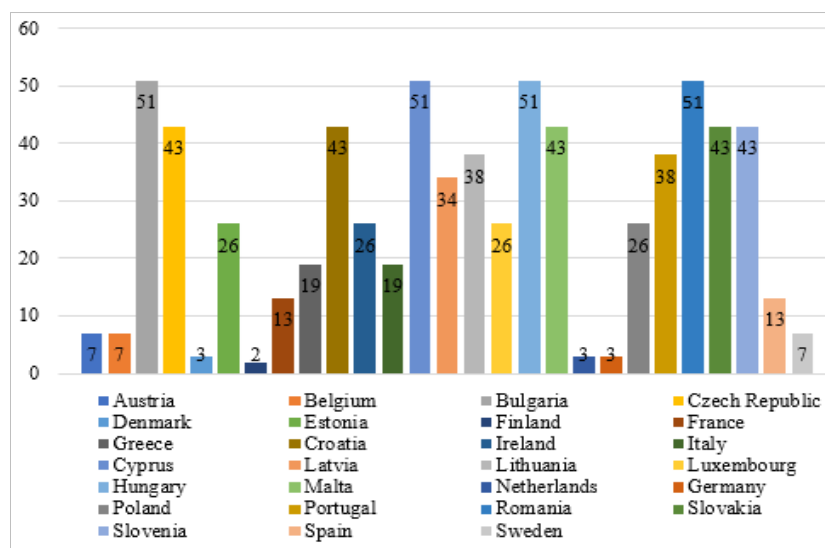


Figure 1. LPI rankings of EU countries in 2023

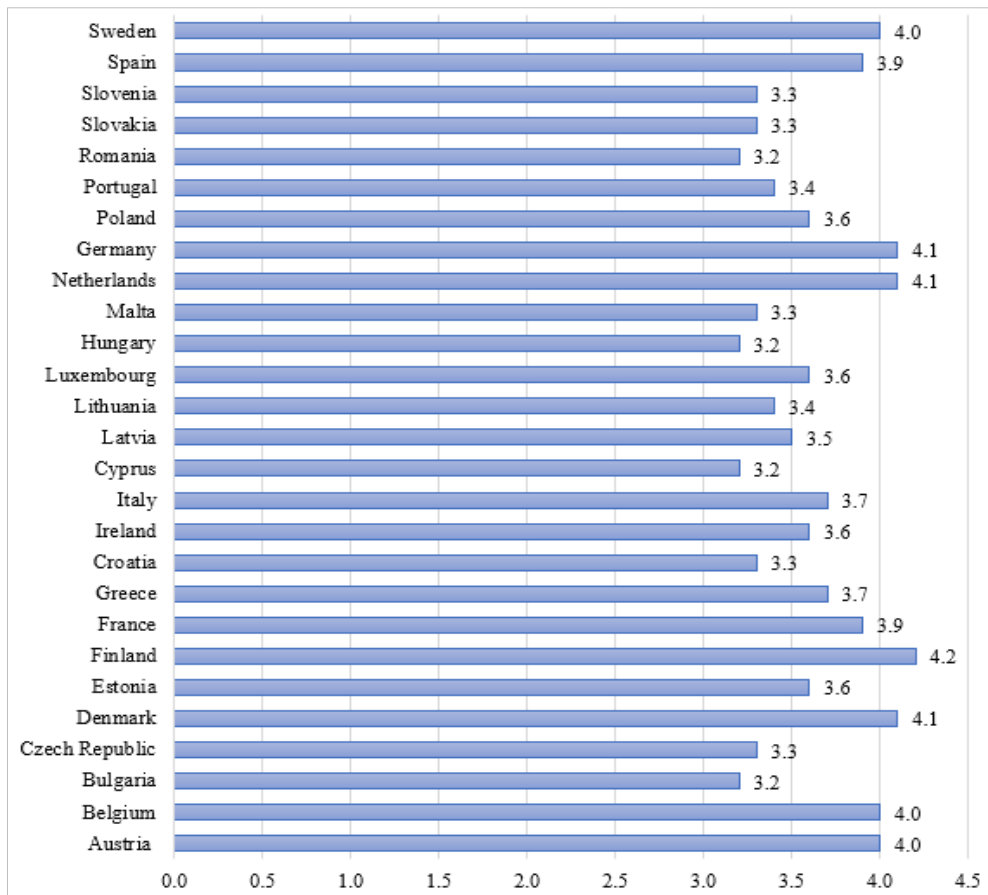


Figure 2. LPI scores of EU countries in 2023

Figure 3 visually illustrates scores pertaining to the first criterion considered in LPI computations – the efficiency of customs and border management clearance.

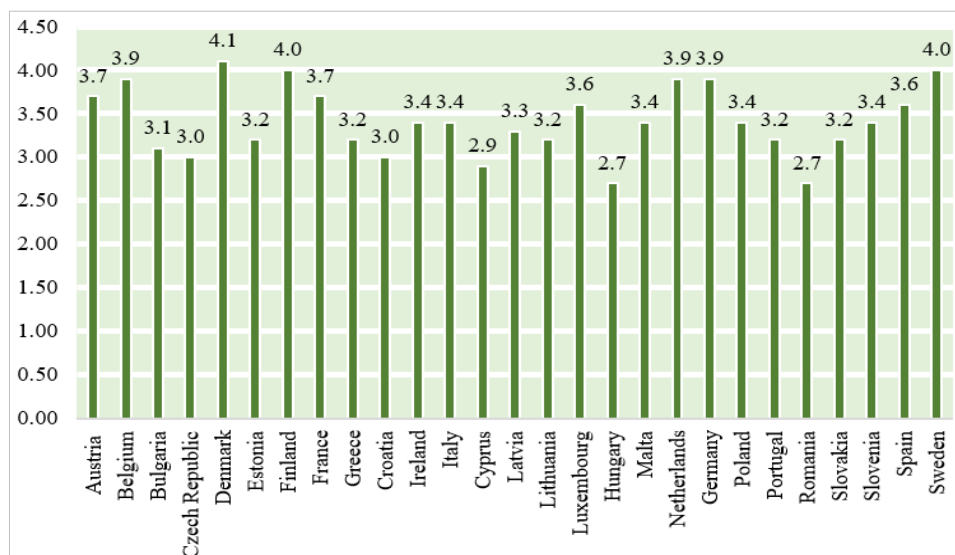


Figure 3. Criterion 1 of EU counties, customs efficiency

Figure 3 reveals Denmark standing out among its EU peers with the highest score in the customs criterion, recording a score of 4.1. Closely trailing are Finland and Sweden, each with a commendable score of 4.0. Belgium, the Netherlands, and Germany showcase a score of 3.9, while Austria and France notch 3.7. Luxembourg and Spain, along with a cohort comprising Ireland, Italy, Malta, Poland, and Slovenia, secure scores of 3.6 and 3.4

respectively. Nearing the lower end, Cyprus registers a score of 2.9. Hungary and Romania sit at the base of the ranking with a score of 2.7 in customs efficiency.

Figure 4 graphically delineates the results of the second criterion — pertaining to the quality of transportation infrastructure.

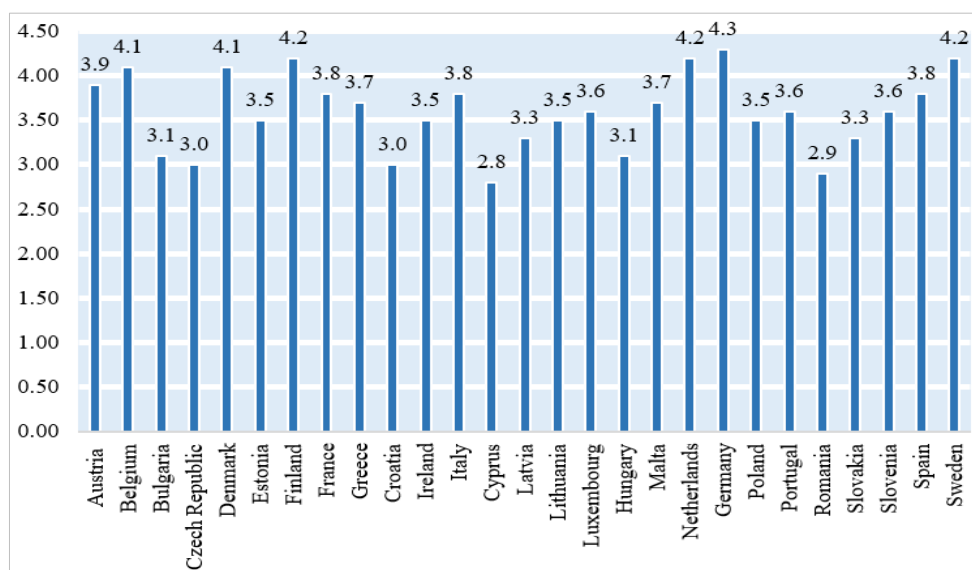


Figure 4. Criterion 2 of EU counties, quality of transportation infrastructure

Figure 4 depicts Germany at the pinnacle, boasting the premier infrastructure score of 4.3 among EU countries. In its wake, Finland, the Netherlands, and Sweden all give with an impressive score of 4.2. Belgium and Denmark are not far behind, each registering a score of 4.1. Austria tallies a score of 3.9, whereas France, Italy, and Spain each secure a commendable 3.8. Slightly trailing are Greece and Malta, both with a score of 3.7. Cyprus lingers at the bottom, recording the lowest score of 2.8 in the infrastructure domain.

Figure 5 shows a graphical assessment of the “ease of arranging competitively priced shipments” within the EU. Setting the benchmark, Finland emerges as the front-runner with an unparalleled score of 4.1 — the solitary EU nation surpassing the 4.0 threshold for this parameter. Followed by Austria, Belgium, and Greece, each clocking a score of 3.8. The subsequent cluster comprises France, the Netherlands, Germany, and Spain, each with a score of 3.7. Denmark, Croatia, Ireland, and Luxembourg follow, each marking 3.6. At the opposite end of the spectrum, Bulgaria, Malta, and Slovakia face challenges, tying for the lowest EU score of 3.0 in arranging competitively priced shipments.

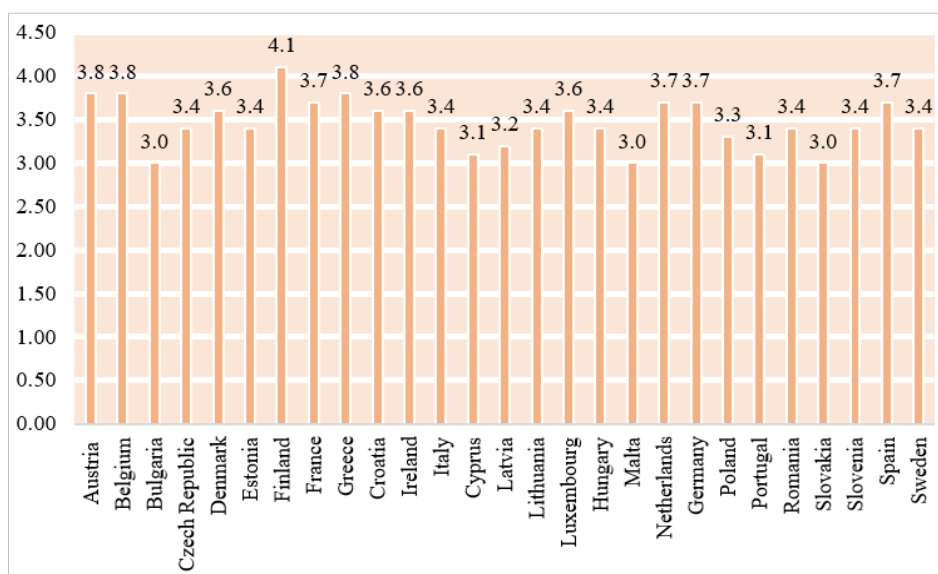


Figure 5. Criterion 3 of EU counties, ease of arranging shipments

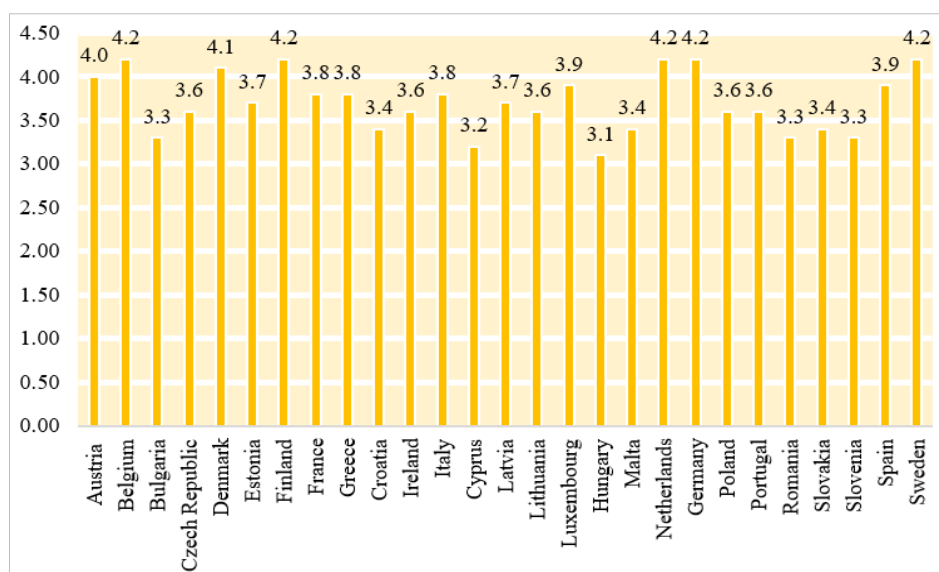


Figure 6. Criterion 4 of EU counties, quality of logistics services

Illustrated in Figure 6 is the situations of the quality in logistics services of EU counties. A quintet of nations – Belgium, Finland, the Netherlands, Germany, and Sweden – distinctly stand out, each with a score of 4.2, setting the standard in the region. Denmark closely follows this group, registering a score of 4.1. Austria, with its robust services, clinches a commendable score of 4.0. Luxembourg and Spain, although slightly trailing, still put forth a notable performance with a score of 3.9. France, Greece, and Italy each hold their own, each amassing a score of 3.8. However, on the opposite end of the spectrum, Cyprus and Hungary appear to grapple with challenges in this domain, recording scores of 3.2 and 3.1 respectively, making them the laggards within the EU bloc for this parameter.

Figure 7 offers a visual depiction of how proficient EU countries are in tracking and tracing consignments. Setting the benchmark, Denmark emerges as the unparalleled leader in this domain, registering a score of 4.3. Followed by Austria, Finland, the Netherlands, and Germany, each showcasing their capabilities with a score of 4.2. Spain and Sweden, not far behind, secure a score of 4.1. Holding their ground solidly in this arena are Belgium and France, both recording a score of 4.0. Meanwhile, Greece and Italy, closely tailed by Estonia and Poland, tally slightly lower scores of 3.9 and 3.8 respectively. At the other end, Slovenia faces evident challenges in this dimension, mustering a modest 3.0, thus marking it as the least proficient among its EU counterparts in this criterion.

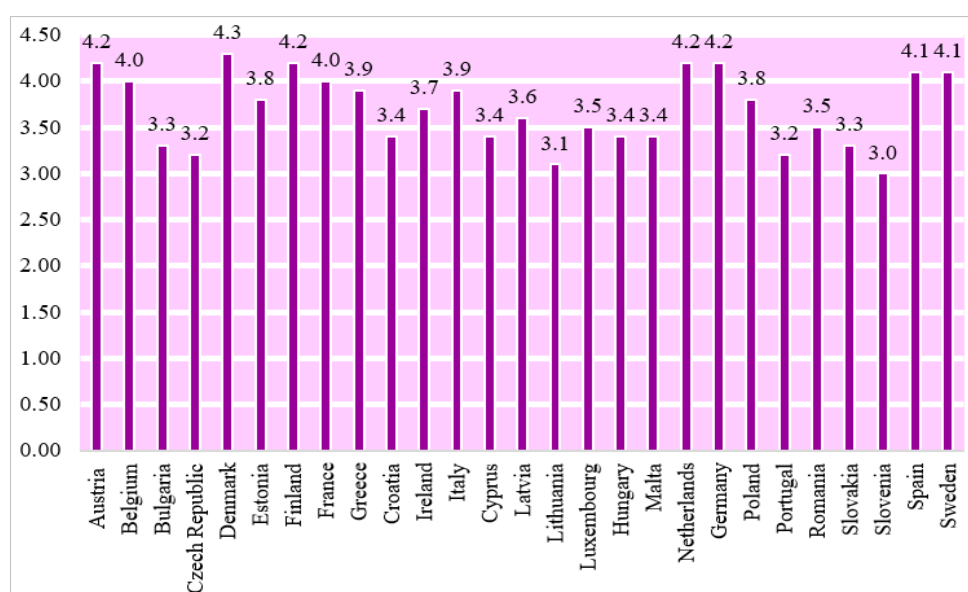


Figure 7. Criterion 5 of EU counties, tracking and tracing of consignments

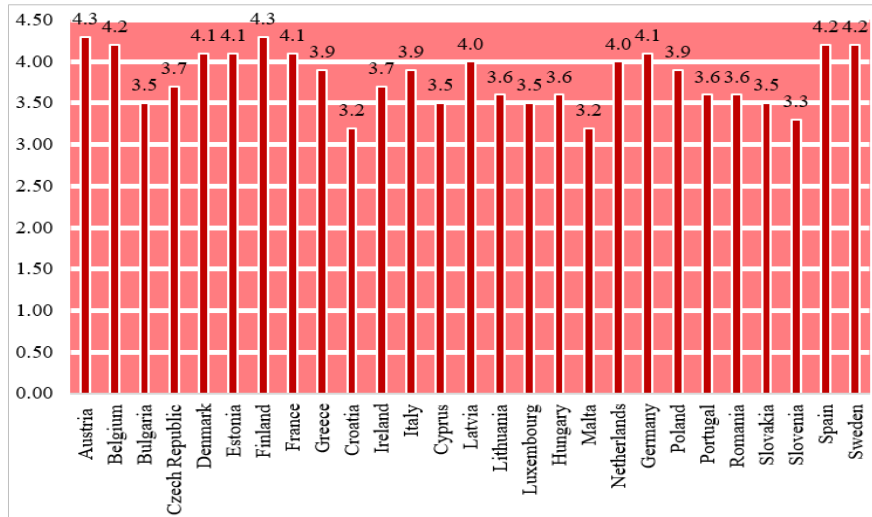


Figure 8. Criterion 6 of EU counties, timeliness

Delving into the essence of punctuality and reliability in the logistics sector, Figure 8 illustrates the performance of EU countries in ensuring timely deliveries. At the apex of this parameter are Austria and Finland, leading the EU pack with a score of 4.3. Chasing closely behind are Belgium, Spain, and Sweden, each reflecting robust timeliness with a score of 4.2. The middle-tier performers comprise Denmark, Estonia, France, and Germany, all of whom demonstrate commendable punctuality, as evidenced by their 4.1 scores. Latvia and the Netherlands, not lagging too far behind, secure a score of 4.0. However, some room for enhancement is discernible for Croatia and Malta, both of whom settle for a somewhat lower score of 3.2, indicating areas where improvements in timeliness can be made.

3. Comparison of 2023 LPI Results of EU Countries with Results from Previous Years

Figures 9 and 10 illuminate the trajectory of the EU countries' LPI spanning from 2007 to 2023. The data unfurls the dominance of Germany in the realm of logistics performance within the EU. Germany's logistic prowess is evident, clinching the top spot globally in 2010 (LPI 4.11), 2014 (LPI 4.12), 2016 (LPI 4.23), and 2018 (LPI 4.20). Its commendable performances continued with a third-place rank in 2007 and 2023 (LPI 4.10), and a brief dip to the fourth position in 2012 (LPI 4.03).

Parallely, the Netherlands emerges as a consistent high-performer across the board. While it never clinched the pinnacle spot, its resilience and consistency are laudable. The country achieved a runner-up position in 2007 and 2014, boasting LPI scores of 4.18 and 4.05, respectively. In the recent 2023 report, the Netherlands took the third position (LPI 4.10), gracefully oscillating to the fourth rank in 2010 (LPI 4.07) and 2016 (LPI 4.19). Its placements in 2012 and 2018 were slightly lower, ranking fifth and sixth with scores of 4.02 respectively. This narrative paints a picture of the ever-evolving dynamics of logistics performance in the EU.

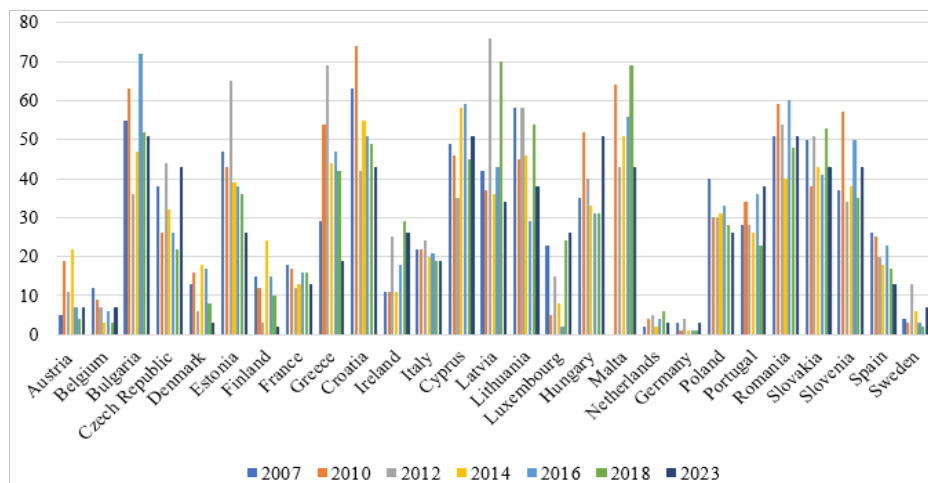


Figure 9. Rankings of EU countries (2007-2023)

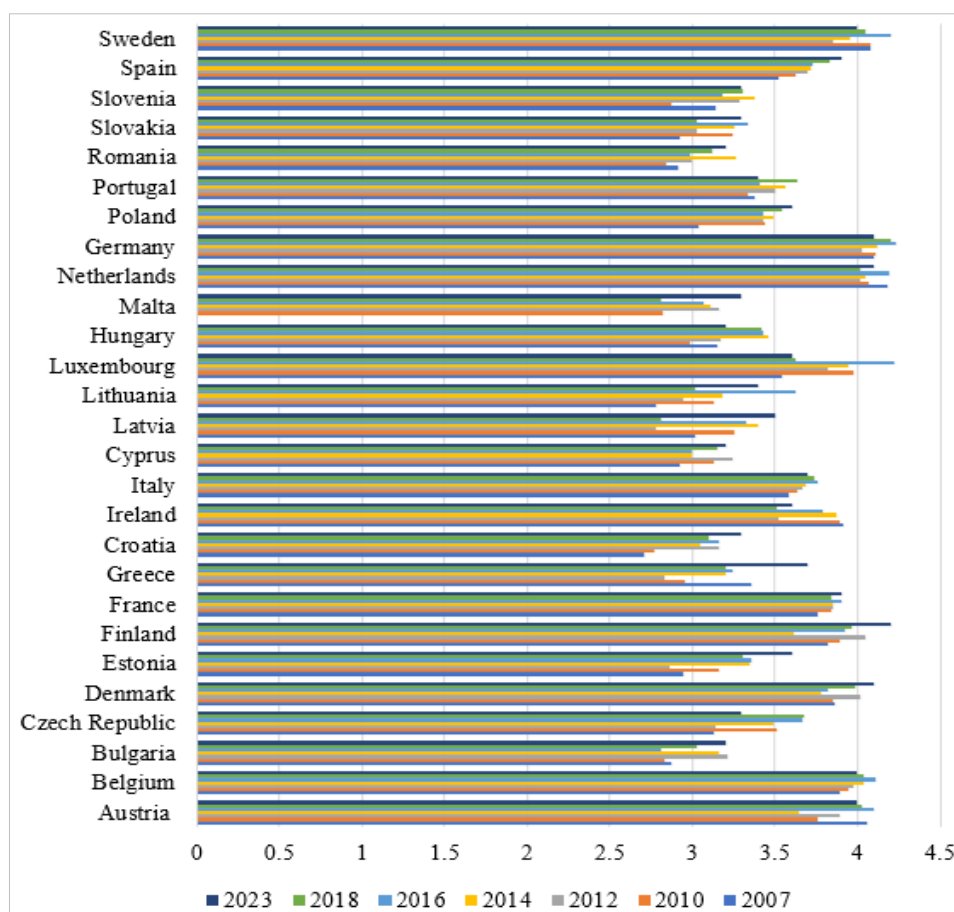


Figure 10. LPI scores of EU countries (2007-2023)

The LPI results from 2007 to 2023 unfolds a diverse tapestry of performance among EU countries, with certain nations struggling to maintain pace. In 2007, Croatia lagged the most, sitting at rank 63 with an LPI of 2.71. Croatia's challenge persisted into 2010, when it descended further to rank 74 (LPI 2.77). Subsequently, Latvia found itself at the rear in 2012 with rank 76 (LPI 2.78). As the years rolled on, various countries experienced this challenging position—Cyprus in 2014 (rank 58, LPI 3.0), Bulgaria in 2016 (rank 72, LPI 2.81), and Malta in 2018 (rank 69, LPI 2.81). 2023 presented an anomalous situation, with four countries—Bulgaria, Cyprus, Hungary, and Romania—jointly occupying the bottom rank of 51 with an LPI score of 3.2.

Diving into specific criteria:

Figure 11 shows EU countries' performance on the customs aspect of the LPI score from 2007 to 2023. In 2007, the Netherlands topped with 3.99, while Croatia lagged at 2.36. By 2010, Luxembourg was in the lead with 4.04, trailed by Germany at 4.0, but Romania was at the bottom, mirroring Croatia's previous score. Two years later, in 2012, Finland and Germany scored 3.98 and 3.87 respectively, Greece fell behind at 2.38. By 2014, Germany climbed to the top with 4.10, but Bulgaria struggled, hitting the bottom at 2.75. The Netherlands and Germany jointly held the lead in 2016, both scoring 4.12, but Bulgaria again faced challenges, scoring a mere 2.40. In 2018, Germany was back on top with 4.09, with Malta finishing last at 2.70. By 2023, Denmark took the lead with 4.10, but both Hungary and Romania shared the lowest score of 2.70.

Figure 12 lays out how EU countries fare on the transport infrastructure quality, another key factor in the LPI score. In 2007, the Netherlands led with a score of 4.29. From then on, through 2023, Germany consistently topped the chart with scores ranging from 4.26 to 4.44. Both the Netherlands and Germany consistently surpassed a score of 4.0 across all reports. Sweden also stood out, clocking in high scores like 4.27 and 4.20. Over time, while many countries improved, some still struggle with their transport infrastructure. Countries like Bulgaria, Croatia, Cyprus, Latvia, Lithuania, and Romania often score below 3.0, highlighting room for improvement.

Figure 13 displays the scores of EU countries based on how easy it is for them to get competitively priced shipments, another key LPI factor. The Netherlands topped the list in 2007 with a score of 4.05, trailed by Austria at 3.97 and Germany at 3.91. By 2010, Sweden led at 3.83, with Austria (3.78) and Ireland (3.70) close behind. Sweden stayed on top in 2012 with a score of 3.86, followed by Finland's 3.85 and Spain's 3.68. Luxembourg grabbed the lead in both 2014 and 2016, scoring 3.82 and 4.24 respectively. By 2018 and 2023, Belgium took the top spot, scoring 3.99 and 3.80, the latter being a three-way tie with Austria and Greece.

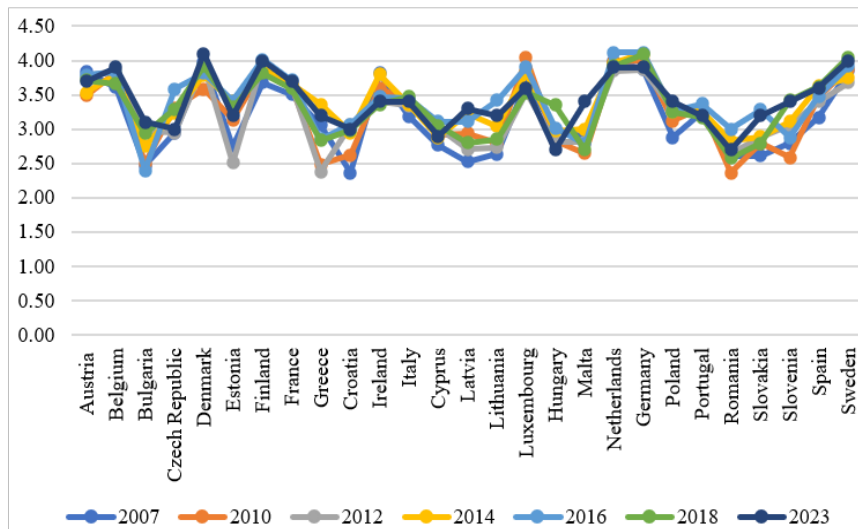


Figure 11. Results for the criterion "customs" (2007-2023)

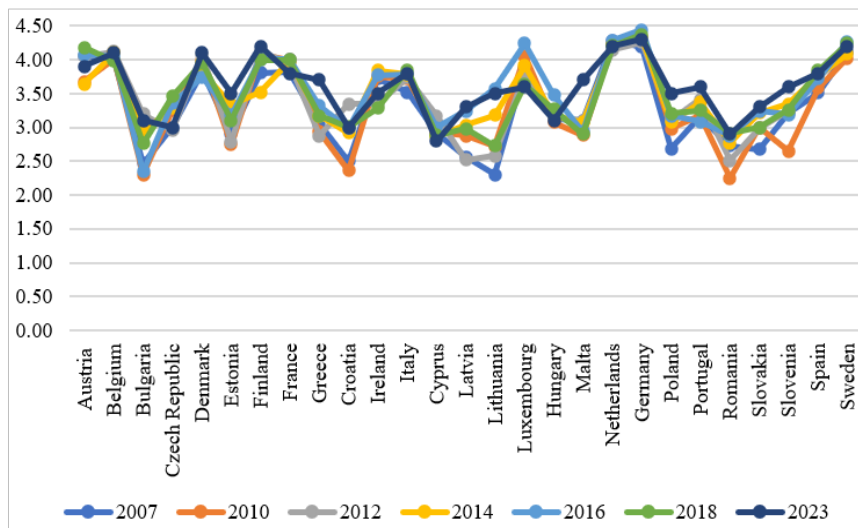


Figure 12. Results for the criterion "infrastructure" (2007-2023)

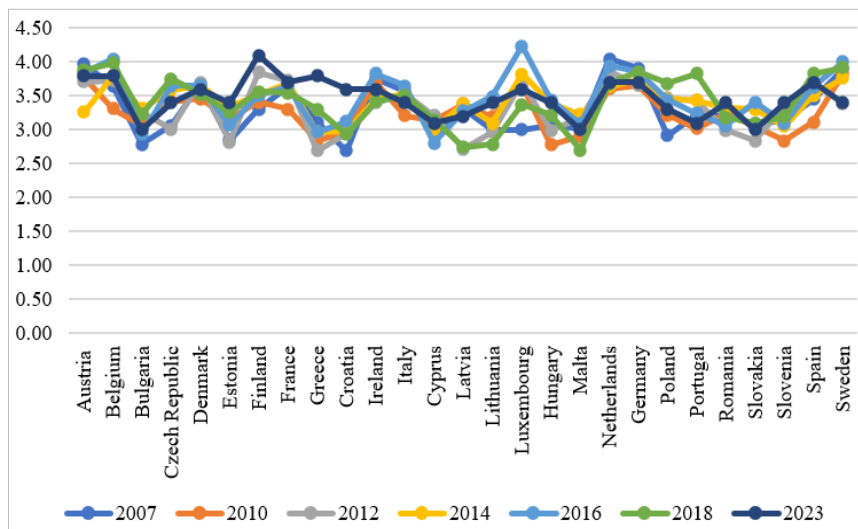


Figure 13. Results for the criterion "the ease of arranging shipments" (2007-2023)

Figure 14 visually illustrates the rankings for quality of logistics services among EU countries. In 2007, the Netherlands led with a score of 4.25, closely followed by Germany's 4.21. Austria and Sweden also stood out that year, scoring 4.13 and 4.06 respectively. By 2010, Sweden climbed to the top at 4.22, with the Netherlands, Germany, and Belgium right on its heels, posting scores of 4.15, 4.14, and 4.13 respectively. Finland outperformed in 2012, recording a score of 4.14, with Austria a close second at 4.10. The Netherlands regained its lead in 2014 with a score of 4.13. However, Germany showcased consistent excellence, ranking highest in both 2016 with a 4.28 and in 2018 with a 4.31. In the most recent 2023 data, five EU countries—Belgium, Finland, the Netherlands, Germany, and Sweden—all shared the spotlight, each scoring a notable 4.20.

Figure 15 presents the rankings of EU countries based on their ability to track and trace consignments. In 2007, Sweden led with a 4.15 score, closely followed by the Netherlands at 4.14. Sweden held the top spot in 2010 with a score of 4.22, but by 2012, Finland took the lead with 4.14. Germany shone in 2014, reaching 4.17, while Sweden climbed back to the top in 2016 with an impressive 4.38. Germany reclaimed its lead in 2018 with a score of 4.24, and by 2023, Denmark was at the forefront with a score of 4.30. On the lower end, Croatia in 2007, Malta in 2010, Lithuania in 2012, Bulgaria in 2014, Cyprus in 2016, Latvia in 2018, and Slovenia in 2023 recorded the lowest scores, with respective values of 2.46, 2.56, 2.73, 2.88, 2.54, 2.79, and 3.0.

Figure 16 illustrates the performance of EU countries from 2007 to 2023 regarding timeliness, the final factor in determining the overall LPI score. In 2007, Austria led with a 4.44 score, closely followed by Sweden at 4.34, with the Netherlands, Germany, and Belgium also scoring high with 4.38, 4.33, and 4.25, respectively. By 2010, Poland was at the forefront with 4.52. Germany took the lead in 2012 with 4.32, and in 2014, Belgium and Denmark jointly held the top spot with 4.39. By 2016, Germany and Sweden shared the lead with 4.45, and Belgium and Denmark again tied in 2018, each scoring 4.41. In the latest 2023 report, Austria and Finland emerged as the top performers, both achieving a score of 4.30.

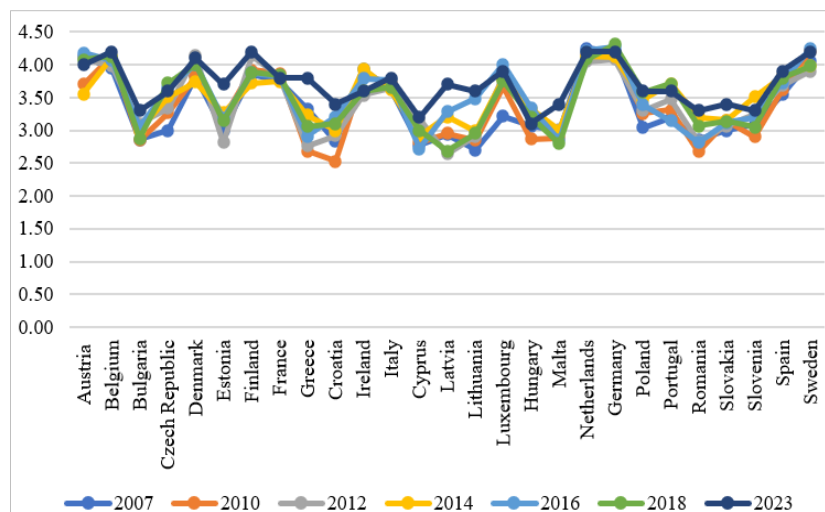


Figure 14. Results for the criterion "quality of logistics services" (2007-2023)

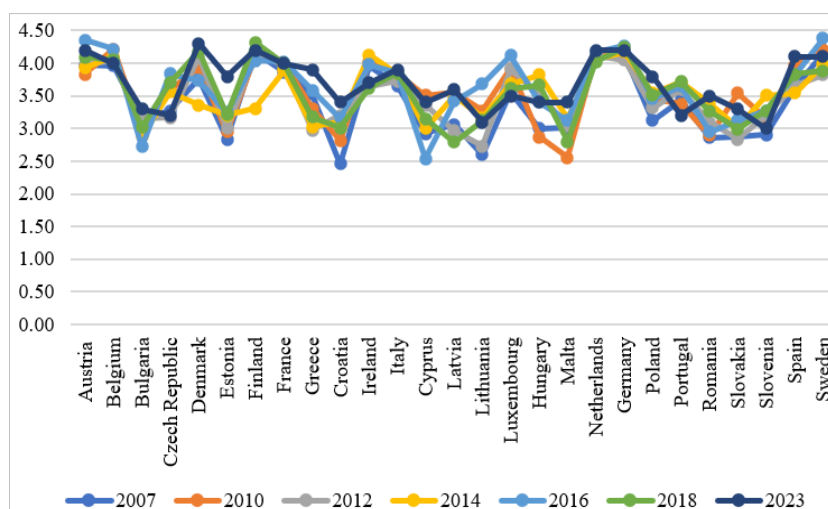


Figure 15. Results for the criterion "tracking and tracing consignments" (2007-2023)

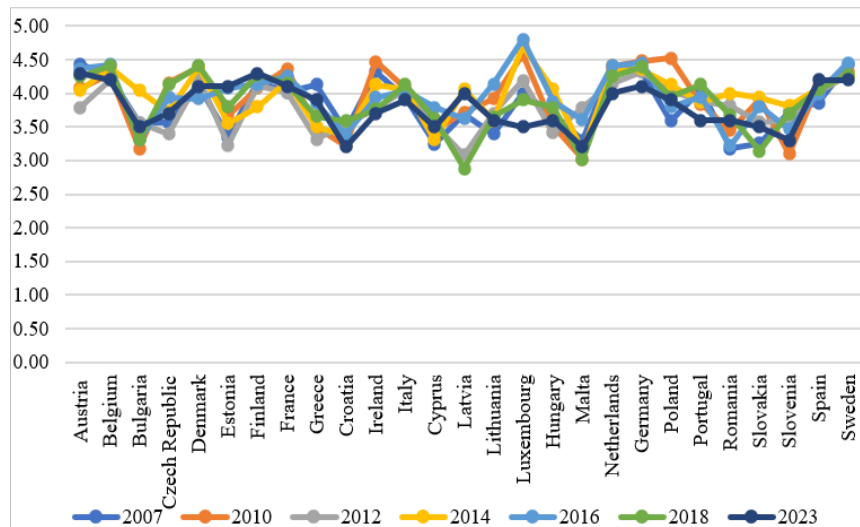


Figure 16. Results for the criterion "timeliness" (2007-2023)

4. Conclusion

Logistics undoubtedly plays a pivotal role in the economic fabric of nations globally. The ripple effect of an efficient logistics system is palpable across economic and financial sectors. Consequently, nations are keen on enhancing their logistics prowess. This drive for improvement demands rigorous scrutiny, benchmarking, and refinement, a task capably addressed by the LPI.

Upon analyzing the LPI metrics, which encapsulates both aggregate scores and individual parameter readings, one discerns that the EU stands tall on the global logistics landscape. For instance, the 2007 report spotlighted four EU countries — the Netherlands, Germany, Sweden, and Austria — among the world's top five. Fast forward to 2010, and the EU's representation remained robust with Germany leading the charts and Sweden, the Netherlands, Luxembourg, and Belgium making it to the top ten. This trend of EU dominance persisted through 2012, 2014, 2016, and 2018, with Germany often clinching the top spot.

By 2023, the dynamics saw a slight shift. Germany slid to the fourth position, yet the EU's presence in the top echelons remained unyielding with Finland, Denmark, the Netherlands, Austria, and Belgium featuring prominently.

In retrospection, certain EU countries emerge as stalwarts in logistics excellence, consistently registering top-notch LPI scores. While countries like Germany, the Netherlands, and Sweden consistently rank high, the broader EU collective also showcases commendable logistics performance. Even when considering the lower-tiered performers within the EU, their standings remain competitive on a global scale. Latvia, with its 76th rank in 2012, represents the lowest an EU country has ranked across the studied timeline.

In summation, the European Union, buttressed by its leading nations, establishes itself as a beacon of logistics efficiency. This steadfast performance underscores the EU's commitment to refining and advancing its logistics machinery.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

References

- Andrejić, M. & Kilibarda, M. (2014). Global Logistics Efficiency Index. *In 8th International Quality Conference*, Kragujevac, Serbia, May 27, 2014, pp. 857–862.
- Arvis, J. F., Ojala, L., Shepherd, B., Ulybina, D., & Wiederer, C. (2023). *Connecting to compete 2023: Trade logistics in the global economy: The Logistics Performance Index and its indicators*. World Bank. <https://lpi.worldbank.org/>
- Burity, J. (2021). The importance of logistics efficiency on customer satisfaction. *J. Market. Dev. Compet.*, 15(3),

- 26-35. <https://doi.org/10.33423/jmdc.v15i3.4537>.
- Jhawar, A., Garg, S. K., & Khera, S. N. (2017). Improving logistics performance through investments and policy intervention: A casual loop model. *Int. J. Prod. Qual. Manag.*, 20(3), 363-391. <http://doi.org/10.1504/IJPQM.2017.082638>.
- Kabak, Ö., Ülengin, F., & Ekici, S. Ö. (2018). Connecting logistics performance to export: A scenario-based approach. *Res. Transp. Econ.*, 70, 69-82. <https://doi.org/10.1016/j.retrec.2018.05.007>.
- Martí, L., Puertas, R., & García, L. (2014). The importance of Logistics Performance Index in international trade,” *Appl. Econ.*, 46(24), 2982-2992. <https://doi.org/10.1080/00036846.2014.916394>.
- Mešić, A., Miškić, S., Stević, Ž., & Mastilo, Z. (2022). Hybrid MCDM solutions for evaluation of the logistics performance index of the Western Balkan countries. *Economics*, 10(1), 13-34. <https://doi.org/10.2478/eoik-2022-0004>.
- Miškić, S., Stević, Ž., Tadić, S., Alkhayyat, A., & Krstić, M. (2023). Assessment of the LPI of the EU countries using MCDM model with an emphasis on the importance of criteria. *World Rev. Intermodal Transp. Res.*, 11(3), 258-279. <http://doi.org/10.1504/WRITR.2023.10056767>.
- Ojala L. & Çelebi, D. (2015). The World Bank’s Logistics Performance Index (LPI) and drivers of logistics performance. In *International Transport Forum: Logistics Development Strategies and their Performance Measurements*, Querétaro, Mexico, March 9-10, 2015.
- Sénquiz-Díaz, C. (2021). Transport infrastructure quality and logistics performance in export. *Economics*, 9(1), 107-124. <https://doi.org/10.2478/eoik-2021-0008>.
- Ulutaş A. & Karaköy, Ç. (2019). An analysis of Logistics Performance Index of EU countries with an integrated MCDM model. *Econ. Bus. Rev.*, 5(4), 49-69. <https://doi.org/10.18559/ebr.2019.4.3>.