



Luxembourg

The Network Readiness Index (NRI) is one of the leading global indices on the application and impact of information and communication technology (ICT) in economies around the world. In its latest version of 2023 the NRI Report maps the network-based readiness landscape of 134 economies based on their performances in four different pillars: Technology, People, Governance, and Impact. Each of these pillars is itself comprised of three sub-pillars (see Figure 1) that have been populated by a total of 58 variables.

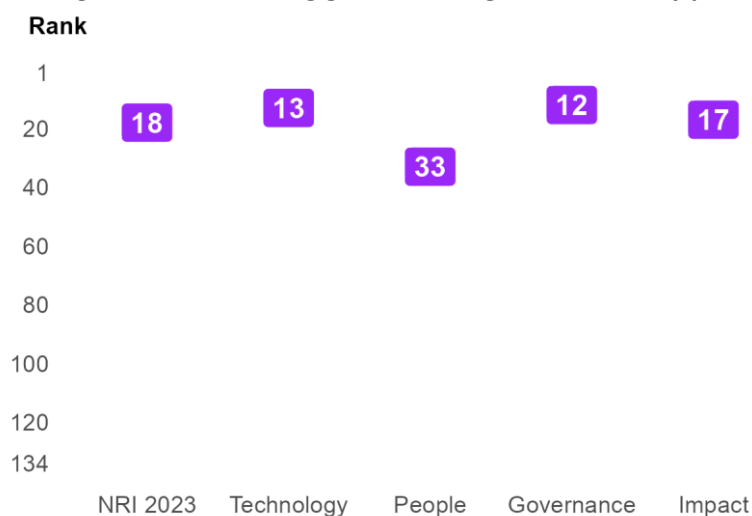
Figure 1: The NRI 2023 model



Global NRI position of Luxembourg

Luxembourg ranks 18th out of the 134 economies included in the NRI 2023 (Figure 2). Its main strength relates to Governance. The greatest scope for improvement, meanwhile, concerns People.

Figure 2: Luxembourg global ranking, overall and by pillar



Network Readiness Index 2023



Performance at sub-pillar level

When it comes to sub-pillars, the strongest showings of Luxembourg relate to Regulation, SDG Contribution and Future Technologies, among others (Table 1). More could be done, though, to improve the economy's performances in the Economy, Access and Individuals sub-pillars.

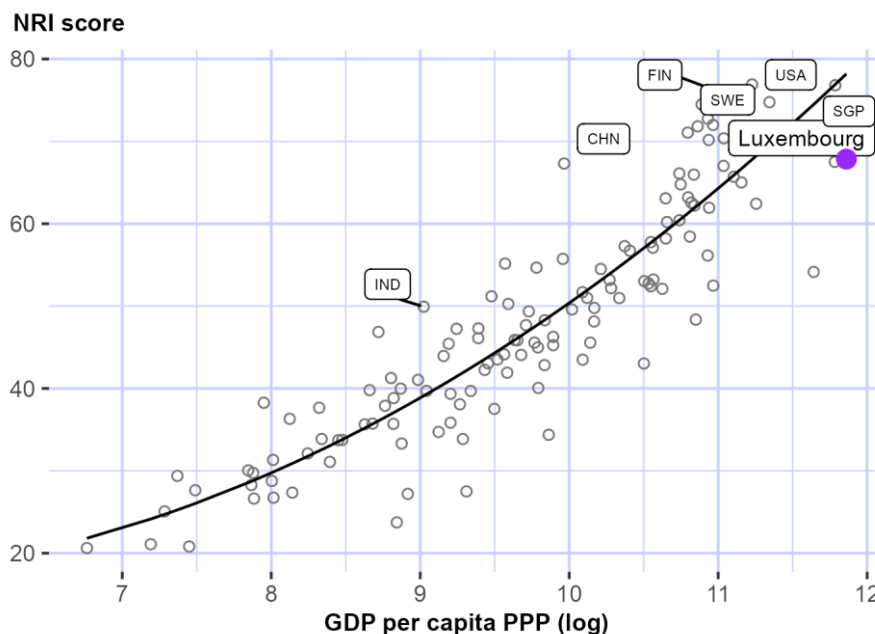
Table 1: Luxembourg rankings by sub-pillar

Sub-pillar	Rank	Sub-pillar	Rank
Regulation	1	Inclusion	18
SDG Contribution	7	Businesses	22
Future Technologies	9	Trust	23
Quality of Life	11	Economy	31
Content	14	Access	38
Governments	18	Individuals	109

NRI score and income

Figure 3 shows the position of Luxembourg in terms of both NRI score and GDP per capita (PPP). The trend line shows the expected NRI score given an economy's income level. As can be seen, Luxembourg is well below the trend line, which suggests that it is underachieving and that one would expect it could raise its network readiness in view of its income level.

Figure 3: NRI score and GDP per capita PPP (log)



Note: USA = United States (rank: 1), SGP = Singapore (rank: 2), FIN = Finland (3), NLD = Netherlands (4), SWE = Sweden (5), CHN = China (20), IND = India (61). Luxembourg belongs to the group of high-income countries, where the best performer is United States of America (USA). The top performer of its region-Europe-is Finland (FIN).

Network Readiness Index 2023

Performance against its income group and region

High-income countries

Luxembourg is ranked 18th in the group of high-income countries (Figure 4, left panel). In terms of pillar performance, it has a score higher than the income group average in three of the four pillars: NRI, Technology, Governance and Impact. At the sub-pillar level, it outperforms high-income countries in nine of the twelve sub-pillars: Content, Future Technologies, Businesses, Governments, Trust, Regulation, Inclusion, Quality of Life and SDG Contribution.

Europe

Luxembourg is ranked 12th within Europe (Figure 4, right panel). It has a score above the regional average in three of the four pillars: NRI, Technology, Governance and Impact. With regard to sub-pillars, it outperforms the average in Europe in ten of the twelve sub-pillars: Access, Content, Future Technologies, Businesses, Governments, Trust, Regulation, Inclusion, Quality of Life and SDG Contribution.

Figure 4: Performance of Luxembourg against its income group and region, overall and by pillar

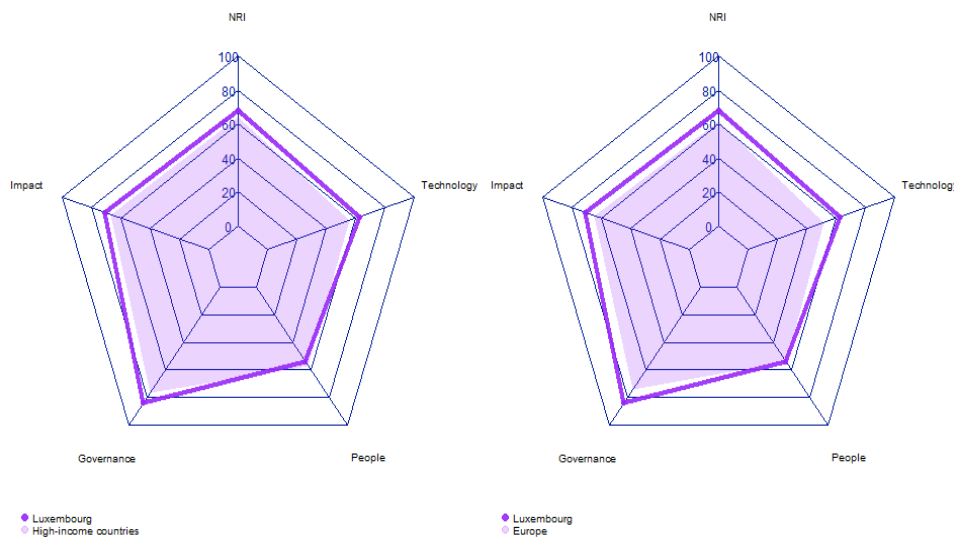


Table 2: Luxembourg scores vs. averages of its income group and region, overall and by pillar

Dimension	Luxembourg	High-income countries	Europe
NRI	67.84	64.07	61.25
Technology	62.47	55.76	51.90
People	53.87	56.99	54.16
Governance	84.23	76.81	74.33
Impact	70.79	66.73	64.61

Network Readiness Index 2023



PORTULANS
INSTITUTE



Strongest and weakest indicators

The indicators where Luxembourg performs particularly well include 1.1.4 Population covered by at least a 3G mobile network, 2.2.3 Knowledge intensive employment, and 3.2.3 Regulation of emerging technologies (Table 3). By contrast, the economy's weakest indicators include 1.1.3 FTTH/building Internet subscriptions, 1.2.4 AI scientific publications, and 2.1.1 Mobile broadband internet traffic within the country.

Table 3: Highlight of Strengths and Opportunities for Luxembourg

Strongest indicators	Rank	Weakest indicators	Rank
1.1.4 Population covered by at least a 3G mobile network	1	2.2.4 Annual investment in telecommunication services	92
2.2.3 Knowledge intensive employment	1	2.1.4 Tertiary enrollment	100
3.2.3 Regulation of emerging technologies	1	2.1.1 Mobile broadband internet traffic within the country	108
3.2.4 E-commerce legislation	1	1.2.4 AI scientific publications	111
4.3.3 SDG 5: Women's economic opportunity	1	1.1.3 FTTH/building Internet subscriptions	113
3.2.1 Regulatory quality	2		
1.1.1 Mobile tariffs	3		
2.3.3 Government promotion of investment in emerging technologies	3		
3.2.5 Privacy protection by law content	4		
1.2.2 Internet domain registrations	5		
1.3.1 Adoption of emerging technologies	7		
4.2.1 Happiness	8		
4.3.1 SDG 3: Good Health and Well-Being	8		

Note: For the full list of strengths and weaknesses, see At-A-Glance table.

Network Readiness Index 2023



PORTULANS
INSTITUTE



NRI 2023 At-A-Glance: Luxembourg

Network Readiness Index

Rank: 18 (out of 134)

Score: 67.84

Pillar/sub-pillar	Rank	Score	Pillar/sub-pillar	Rank	Score
A. Technology pillar	13	62.47	C. Governance pillar	12	84.23
1st sub-pillar: Access	38	72.33	1st sub-pillar: Trust	23	77.03
2nd sub-pillar: Content	14	52.27	2nd sub-pillar: Regulation	1	95.03
3rd sub-pillar: Future Technologies	9	62.80	3rd sub-pillar: Inclusion	18	80.65
B. People pillar	33	53.87	D. Impact pillar	17	70.79
1st sub-pillar: Individuals	109	30.30	1st sub-pillar: Economy	31	39.40
2nd sub-pillar: Businesses	22	66.44	2nd sub-pillar: Quality of Life	11	86.63
3rd sub-pillar: Governments	18	64.87	3rd sub-pillar: SDG Contribution	7	86.34

The Network Readiness Index in detail

Indicator	Rank	Score	Indicator	Rank	Score
A. Technology pillar	13	62.47	C. Governance pillar	12	84.23
1st sub-pillar: Access	38	72.33	1st sub-pillar: Trust	23	77.03
1.1.1 Mobile tariffs	3	98.99	3.1.1 Secure Internet servers	16	85.48
1.1.2 Handset prices	23	74.83	3.1.2 Cybersecurity	18	97.36
1.1.3 FTTH/building Internet subscriptions	113	6.67	3.1.3 Online access to financial account	17	66.56
1.1.4 Population covered by at least a 3G mobile network	1	100.00	3.1.4 Internet shopping	35	58.71
1.1.5 International Internet bandwidth	19	81.15	2nd sub-pillar: Regulation	1	95.03
1.1.6 Internet access in schools	NA	NA	3.2.1 Regulatory quality	2	92.87
2nd sub-pillar: Content	14	52.27	3.2.2 ICT regulatory environment	38	88.82
1.2.1 GitHub commits	24	50.42	3.2.3 Regulation of emerging technologies	1	100.00
1.2.2 Internet domain registrations	5	83.98	3.2.4 E-commerce legislation	1	100.00
1.2.3 Mobile apps development	30	74.11	3.2.5 Privacy protection by law content	4	93.44
1.2.4 AI scientific publications	111	0.57	3rd sub-pillar: Inclusion	18	80.65
3rd sub-pillar: Future Technologies	9	62.80	3.3.1 E-Participation	25	74.42
1.3.1 Adoption of emerging technologies	7	92.18	3.3.2 Socioeconomic gap in use of digital payments	15	96.82
1.3.2 Investment in emerging technologies	10	79.50	3.3.3 Availability of local online content	17	86.54

Network Readiness Index 2023



PORTULANS
INSTITUTE



Indicator	Rank	Score	Indicator	Rank	Score
1.3.3 Robot density	NA	NA	3.3.4 Gender gap in Internet use	47	69.21
1.3.4 Computer software spending	78	16.73	3.3.5 Rural gap in use of digital payments	17	76.25
B. People pillar			D. Impact pillar		
<i>1st sub-pillar: Individuals</i>			<i>1st sub-pillar: Economy</i>		
2.1.1 Mobile broadband internet traffic within the country	108	1.31 ○	4.1.1 High-tech and medium-high-tech manufacturing	NA	NA
2.1.2 ICT skills in the education system	40	59.34	4.1.2 High-tech exports	70	10.77
2.1.3 Use of virtual social networks	76	58.06	4.1.3 PCT patent applications	8	65.38
2.1.4 Tertiary enrollment	100	11.12 ○	4.1.4 Domestic market size	90	43.34
2.1.5 Adult literacy rate	NA	NA	4.1.5 Prevalence of gig economy	50	50.29
2.1.6 AI talent concentration	23	21.67	4.1.6 ICT services exports	36	27.24
<i>2nd sub-pillar: Businesses</i>			<i>2nd sub-pillar: Quality of Life</i>		
2.2.1 Firms with website	17	82.33	4.2.1 Happiness	8	90.68 ●
2.2.2 GERD financed by business enterprise	25	63.43	4.2.2 Freedom to make life choices	17	89.97
2.2.3 Knowledge intensive employment	1	100.00 ●	4.2.3 Income inequality	40	74.37
2.2.4 Annual investment in telecommunication services	92	74.30 ○	4.2.4 Healthy life expectancy at birth	12	91.48
2.2.5 GERD performed by business enterprise	40	12.14	<i>3rd sub-pillar: SDG Contribution</i>		
<i>3rd sub-pillar: Governments</i>			4.3.1 SDG 3: Good Health and Well-Being	8	95.29 ●
2.3.1 Government online services	29	81.42	4.3.2 SDG 4: Quality Education	35	58.23
2.3.2 Publication and use of open data	NA	NA	4.3.3 SDG 5: Women's economic opportunity	1	100.00 ●
2.3.3 Government promotion of investment in emerging tech	3	94.93 ●	4.3.4 SDG 7: Affordable and Clean Energy	13	83.02
2.3.4 R&D expenditure by governments and higher education	39	18.26	4.3.5 SDG 11: Sustainable Cities and Communities	11	95.15

NOTE: ● a strength and ○ a weakness.

Network Readiness Index 2023



PORTULANS
INSTITUTE



Sources

- Dutta, S., & Lanvin, B. (eds.) (2022). *The Network Readiness Index 2022: Benchmarking the Future of the Network Economy*. Washington DC: Portulans Institute.
- Berry, B. (2019). *berryFunctions: Function Collection Related to Plotting and Hydrology*. R package version 1.18.2. URL: <https://CRAN.R-project.org/package=berryFunctions>
- Dutta, S., & Lanvin, B. (eds.) (2019). *The Network Readiness Index 2019: Towards a Future-Ready Society*. Washington DC: Portulans Institute.
- Dutta, S., & Lanvin, B. (eds.) (2020). *The Network Readiness Index 2020: Fostering Digital Transformation in a post-COVID Global Economy*. Washington DC: Portulans Institute.
- Dutta, S., & Lanvin, B. (eds.) (2021). *The Network Readiness Index 2021: Shaping the Global Recovery. How digital technologies can make the post-COVID world more equal*. Washington DC: Portulans Institute.
- Gohel, D. (2019). *officer: Manipulation of Microsoft Word and PowerPoint Documents*. R package version 0.3.6. URL: <https://CRAN.R-project.org/package=officer>
- Gohel, D. (2019). *flextable: Functions for Tabular Reporting*. R package version 0.5.6. URL: <https://CRAN.R-project.org/package=flextable>
- Milton Bache, S. & Wickham, H. (2014). *magrittr: A Forward-Pipe Operator for R*. R package version 1.5. URL: <https://CRAN.R-project.org/package=magrittr>
- Nakazawa, M. (2019). *fmsb: Functions for Medical Statistics Book with some Demographic Data*. R package version 0.7.0. URL: <https://CRAN.R-project.org/package=fmsb>
- R Core Team (2018). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL: <https://www.R-project.org/>.
- Slowikowski, K. (2019). *ggrepel: Automatically Position Non-Overlapping Text Labels with 'ggplot2'*. R package version 0.8.1. URL: <https://CRAN.R-project.org/package=ggrepel>
- Wickham, H. (2007). Reshaping Data with the reshape Package. *Journal of Statistical Software*, 21(12), 1-20. URL: <http://www.jstatsoft.org/v21/i12/>.
- Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag. New York.
- Wickham et al., (2019). Welcome to the tidyverse. *Journal of Open Source Software*, 4(43), 1686, URL: <https://doi.org/10.21105/joss.01686>