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DIGITAL TRANSFORMATION OF CENTRU REGION – ROMANIA. NEEDS ASSESSMENT

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Abstract:

Competitiveness represents a never-ending moving target for any institution/entity, no matter the level of analysis (micro – companies / public administrations, mezzo – industries / national regions, or macro – countries / world regions); but its determinants (or key success factors) are changing, as ages go by, asking for continuous watch and strategic flexibility. With digital technology nowadays disrupting (almost) every aspect of human life, while framing a new age – of digitalization being both a source of competitiveness (for the industry leaders – whatever the “industry” might be), and (just) a prerequisite for survival (or doing business) for almost everyone else, the European Commission’s political priority for 2019-2024 “A Europe fit for the digital age” and the EU’s digital strategy aiming for a “digital transformation that will benefit everyone” are of great interest (accentuated by the new pandemic context) for all the EU regions and their institutions/entities. Within this framework, the paper (which is part of a bigger research) aims to perform an overview scan of Centru Region-Romania (mainly by comparison with Romania’s other Development Regions and with EU benchmarks) in order to broadly identify its needs for digital transformation, while setting the backgrounds for a more systematic, focused and applied analysis to follow.

Key words: *Centru Region-Romania; digital transformation; (digital) innovation; (digital) competitiveness; innovation performance*

1. Introduction

The needs assessment aimed to identify the imperatives of digital transformation for Centru Region-Romania – in line with the Region’s strategic directions (<http://www.adrcentru.ro/dezvoltare-regionala-cat/pdr-centru-2021-2027/>) and in order to connect the Region to the requirements of Digital Europe (<https://ec.europa.eu/digital-single-market/en/content/european-digital-strategy>). Aspiring to identify as accurately as possible (based on evidence) the gaps between the existing status and the desired one as concerns the practice and/or adoption of digital innovation

among businesses and public administrations in Centru Region-Romania, the process of needs identification and needs assessment embraced a **holistic approach** – able to capture from multiple perspectives and sources, and then to cross-sectionally integrate and synthesize the (sometimes contradictory) information gathered.

The endeavor of needs identification was built on the analysis of the **complementary perspectives** the complex category "needs for digital transformation in Centru Region-Romania" develops: **(1) normative** needs – against the targets strategically set at regional (Smart Specialization Strategy, Regional Development Plan 2021-2027 and Regional Operational Plan 2021-2027), national and EU level; **(2) comparative/relative** needs – revealed by the comparative statistical analysis (Centru Region-Romania, Romania, and EU) of relevant indicators; **(3) perceived** needs – by businesses and administrations – according to their own understandings and perceptions on the potential benefits capitalizing on digital technologies may bring to their organizations; **(4) expressed** needs – in terms of financial resources businesses and administrations are willing to commit for investments in the field; and **(5) future/latent** needs – having the potential to become perceived needs as organizations, through their managers, internalize that digital transformation and/or innovation is becoming a prerequisite for survival and development in the smart society of the future.

As part of a bigger research, this paper focuses only on the **comparative / relative perspective** of the category "needs for digital transformation in Centru Region-Romania"; therefore, the remainder of the paper is organized as follows: section 2 makes a brief description of Centru Region-Romania, section 3 investigates Romania's Digital Competitiveness (compared to the EU countries), section 4 examines Centru Region's Innovation Performance (compared to Romania and EU), while section 5 looks over Centru Region's Regional Competitiveness (compared to Romania and EU countries); the paper ends with conclusions.

2. Centru Region-Romania. Brief Description

Centru Region-Romania is one of Romania's eight Development Regions – along with: Nord-Est (North-East), Sud-Est (South-East), Sud Muntenia (South Muntenia), Sud-Vest Oltenia (South-West Oltenia), Vest (West), Nord-Vest (North-West), and Bucuresti-Ilfov; thanks to its location, Centru Region is bordered by six out of the other seven development regions of Romania (Bucuresti-Ilfov being the exception). Representing 14.3% of Romania's territory, while gathering 11.94% of Romania's population, Centru Region is composed of six counties – Alba, Braşov, Covasna, Harghita, Mureş and Sibiu (<http://www.adrcentru.ro/wp-content/uploads/2019/12/Analiza-socioeconomica-a-Regiunii-Centru.pdf>). Table 1 (based on most recent available data on Eurostat) provides a concise statistical profile of Centru Region-Romania – by placing it against the best and the worst performers / regions in the country, given the statistical domains and their main indicators.

Table 1. Centru Region-Romania – Statistical Profile – compared to the best and the worst performers/regions in Romania

Statistical domains	Indicators	Lowest Region	Centru Region	Highest Region
Population	Population, total persons, 2019	1777474 Vest	2318272	3198564 Nord-Est
Economy	GDP (PPS per inhabitant), 2018	12800 Nord-Est	19200	46800 Bucuresti-Ilfov
Education	Young people neither in employment nor in educational training (% of population aged 15-24), 2018	7.9% Bucuresti-Ilfov	23.9%	23.9% Centru
Health	All causes of death (crude death rate), 2016	1114.2 Bucuresti-Ilfov	1198.02	1438.2 Sud-Muntenia
Labor market	Employment rate, from 20 to 64 years, 2018	63.9% Centru	63.9%	78.1% Nord-Est
Tourism	Nights spent in tourist accommodation (per 1000 inhabitants), 2017	681.5 Sud-Muntenia	2500.3	2500.3 Centru
Agriculture	Livestock farming, bovine animals (1000 heads of livestock), 2018	5.3 Bucuresti-Ilfov	345.7	486.5 Nord-Est
Transport	Motorization rate (passenger cars per 1000 inhabitants), 2017	227 Nord-Est	309	518 Bucuresti-Ilfov
Science and technology	Human resources in science and technology (%of labor force), 2018	16.9 Nord-Est	29.1	50.8 Bucuresti-Ilfov

Source: <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.labourmarket&lang=en>

As Table 1 reveals, Tourism (expressed in Nights spent in tourist accommodation per 1000 inhabitants) is a relative strength of Centru Region compared to the other regions in Romania, while Education (expressed as percentage of young people aged 15-24 neither in employment nor in educational training) and Labor market (expressed through employment rate from 20 to 64 years) seem to be Centru Region's relative weaknesses. By referring to people that are not "forced by circumstances" (school and/or work) to address the challenges of digitalization in a consistent manner, both these latter dimensions are critical – not only as regards the current status of digital transformation in Centru Region, but also considering the evolution towards digital maturity in the region; on the other hand, tourism has the potential of being capitalized as "digital" strength in the region – as tourism "was a consistent early adopter of new technologies and platforms" (<https://www.unwto.org/digital-transformation>).

In terms of **Digital economy and society** (Table 2) – the most relevant statistical domain for this paper – the indicators reveal no particular strength(s) and/or weakness(es) for Centru Region compared to the other development regions in Romania – considering neither the individuals' access (to internet / broadband) nor their Internet use (for different purposes: banking, civic or political participation, selling of goods/services, social networks, interactions with public authorities, ordering goods/services for private use).

Table 2. Digital economy and society – Centru Region

Indicators	Centru Region	Romania Range
1. Households with internet access (% of private households), 2019	84%	79-91 %
2. Households with broadband access (% of private households), 2019	80%	77-91 %
3. People who never used a computer (% of people aged 16-74), 2017	28%	10-37 %
4. People using the internet during the last three months (% of people aged 16-74), Frequency of internet access: daily, 2019	57%	49-65 %
5. People using the internet during the last three months (% of people aged 16-74), Internet use: Internet banking, 2019	12%	4-14 %
6. People using the internet during the last three months (% of people aged 16-74), Internet use: civic or political participation, 2017	8%	4-12 %
7. People using the internet during the last three months (% of people aged 16-74), Internet use: selling goods or services, 2019	3%	1-4 %
8. People using the internet during the last three months (% of people aged 16-74), Internet use: participating in social networks (creating user profile, posting messages or other contributions to Facebook, Twitter, etc.), 2019	57%	54-68 %
9. People using the internet during the last three months (% of people aged 16-74), Internet use: never, 2019	18%	8-25 %
10. People using the internet in the last 12 months for interaction with public authorities (% of people aged 16-74), 2019	13%	8-21 %
11. People using the internet in the last 12 months to order goods or services for private use (% of people aged 16-74), 2019	27%	18-31 %

Source: <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.infosoc&lang=en>

But all these data, in order to be relevant and meaningful, need to be: **(a).** put in **context** – the **digital economy and society** index (DESI), which is a “composite index that summarizes relevant indicators on Europe’s digital performance and tracks the evolution of EU Member States in digital competitiveness” (<https://ec.europa.eu/digital-single-market/en/desi>); and **(b).** analyzed considering their **impact** – **on innovation** – as “key driver of competitiveness” (Dobrinsky, 2008) – and **(regional) competitiveness** – viewed as “the ability of a region to offer an attractive and sustainable environment for firms and residents to live and work” (Annoni & Dijkstra, 2019).

3. Romania’s Digital Competitiveness – Identifying the Gaps

According to the most recently released **Digital Economy and Society Index** – DESI 2020 – Romania ranks 26th out of the 28 EU member states (including the UK) (Figure 1) (<https://ec.europa.eu/digital-single-market/en/desi>).

Figure 1. DESI 2020 – Romania compared to the EU countries and the EU average

Source: <https://ec.europa.eu/digital-single-market/en/desi>

Thus, Romania's relative performance considering DESI is well below the European average, especially as concerns the dimensions Digital Public Services and Use of Internet Services – on which Romania is positioned the last among the EU countries; as concerns Human Capital and Integration of digital technology, Romania occupies the penultimate place in the EU. Only the Connectivity dimension places Romania above the EU average (11th place in the EU) – which is a good prerequisite if considering the (imperative) need for accentuating digitalization, intensifying digital transformation and increasing competitiveness in the era of the 4th Industrial Revolution.

Although the last three (chronologically speaking) DESI reports reveal a slight increase in Romania's overall score (from 35.1 in 2018 to 40.0 in 2020) – based on the improvements registered by all the five dimensions of DESI (Table 3 and Figure 2) – compared to the dynamics registered by the EU countries it was not enough for Romania to improve its ranking among the EU countries; therefore, Romania has maintained its antepenultimate position among the EU countries.

Table 3. DESI 2018-2020 score – Romania versus EU

DESI	Romania		EU
	Rank	Score	Score
DESI 2020	26	40.0	52.6
DESI 2019	26	36.5	49.4
DESI 2018	26	35.1	46.5

Source: https://ec.europa.eu/romania/news/20200611_raport_rezilianta_digitala_ro

Figure 2. DESI, by Main Dimensions of the DESI 2015-2020 – Romania

Source: <https://ec.europa.eu/digital-single-market/en/desi>

Despite the fact that the evolution of Romania's DESI components reveals increasing trends (for each one of them), the structural analysis of Romania's DESI in 2020 brings to light significant gaps – compared to the EU countries and/or the EU average (https://ec.europa.eu/romania/news/20200611_raport_rezilienta_digitala_ro); thus, as concerns: **(1) Connectivity**: Romania has three indicators above the EU average (At least 100 Mbps fixed broadband take-up, Fixed Very High Capacity Network (VHCN) coverage, and Broadband price index), four indicators below the EU average (Overall fixed broadband take-up, Fast broadband (NGA) coverage, 4G coverage, and Mobile broadband take-up), and one indicator at the EU average (5G readiness); **(2) Human Capital**: Romania has one indicator above the UE average (ICT graduates), while five indicators are below the UE average (At least basic digital skills, Above basic digital skills, At least basic software skills, ICT specialists, and Female ICT specialists); **(3) Use of Internet Services**: Romania has two indicators above the EU average (Video calls, and Social networks), while nine indicators are below the EU average (People who have never used the internet, Internet users, News, Music, videos and games, Video on demand, Doing an online course, Banking, Shopping, and Selling online); **(4) Integration of digital technology**: all the seven indicators are placing Romania below the EU average (Electronic information sharing, Social media, Big data, Cloud, SMEs selling online, e-Commerce turnover, and Selling online cross-border); **(5) Digital public services**: Romania has one indicator above the EU average (e-Government users), and four indicators below the EU average (Pre-filled forms, Online service completion, Digital public services for businesses, and Open data).

Against this background, it is essential for Romania to reduce the digital economy and society related gaps – in order for the country to increase its innovation-based competitiveness (following digital transformation), as well as its contribution to Europe's evolution as global (digital) innovation (and competitiveness) pole.

4. Centru Region's Innovation Performance compared to Romania and EU

The European Commission **Regional Innovation Scoreboard (RIS)** 2019 – which is “assessing the innovation performance of European regions” (https://ec.europa.eu/growth/industry/policy/innovation/regional_en) – certifies Centru Region-Romania (RO12) as a “**modest innovator**” – whose innovative performance has fallen compared to 2011 by (-10,8%) (Table 4). Given its overall innovative performance (relative to EU), Bucuresti-Ilfov – which is “performing more than 3.6 times as well as the lowest performing region, Sud-Vest Oltenia” (Hollanders, Es-Sadki, & Merkelbach, 2019) – is the only Development Region in Romania which qualifies as a moderate innovator. Withal, Romania is a modest innovator, with the lowest score in EU – well below 50% of EU's average (34.4 overall score in 2019); at the other end of the spectrum are the innovation leaders – with innovative performance above 120% of the EU average, where Sweden (153.12 overall score) has the lead (Hollanders, Es-Sadki, & Merkelbach, 2019).

Table 4. Regional Innovation Scoreboard 2019 – Performance groups

		"2011" - score relative to EU 2011	"2019" - score relative to EU 2011	"2019" - score relative to EU 2019	Performance group
EU28	EU28	100,0	104,7	100,0	--
RO11	Nord-Vest	40,8	31,1	29,7	Modest -
RO12	Centru	39,4	28,6	27,3	Modest -
RO21	Nord-Est	41,5	22,5	21,5	Modest -
RO22	Sud-Est	42,7	23,1	22,1	Modest -
RO31	Sud - Muntenia	36,1	19,3	18,4	Modest -
RO32	Bucuresti - Ilfov	62,0	54,1	51,6	Moderate -
RO41	Sud-Vest Oltenia	31,4	15,0	14,3	Modest -
RO42	Vest	40,0	34,3	32,8	Modest -

Source : https://ec.europa.eu/growth/industry/policy/innovation/regional_en

By components, the radar graph (Figure 3) – Centru Region's Regional Innovation Index (RII) relative to Romania (the orange line) and to EU (the blue line) – and the full data table (Figure 4) – capturing all the indicators for all of the Romania's Development Regions – reveal **Employment in medium and high-tech manufacturing and knowledge-intensive services** (102.74 score) as relative strength (although other regions in Romania – Vest and Bucuresti-Ilfov – are performing better than Centru Region) – on one hand, and **Innovative SMEs collaborating with others** (3.24 score) and **R&D expenditures in the public sector** (14.04 score) as absolute weakness – on the other hand.

Figure 3. Centru Region – Regional Innovation Profile 2019 – compared to Romania and EU

Source: <https://ec.europa.eu/docsroom/documents/35937>

Figure 4. Romania – Regional Profiles according to RIS 2019

Source: https://interactivetool.eu/RIS/RIS_2.html#d

Both the decreasing of the innovation performance and the (relatively) low values of all the Centru Region's innovation related indicators (Population with tertiary education, Lifelong learning, International Scientific co-publications, Most-cited publications, R&D expenditure public sector, R&D expenditure business sector, Non-R&D innovation expenditures, Product or process innovations, Marketing or organizational innovations, SMEs innovating in-house, Innovative SMEs collaborating with others, Public-private co-publications, PCT patent applications, Trademark applications, Design applications, Employment in medium and high-tech manufacturing and knowledge-intensive services, and Sales new-to-market / firm innovations) – ask for a turnaround innovation strategy (built on the region's strengths and capitalizing on its opportunities, while addressing the weaknesses and mitigating the threats) – able to stimulate and increase the pace of innovation at micro level (businesses / public administrations) – through consistent / strategic endeavors towards innovation – in order to close the innovation gaps and to better connect Centru Region to the realities and trends of nowadays.

5. Regional Competitiveness of Centru Region compared to Romania and EU

The **Regional Competitiveness Index** (RCI) – measuring the major factors of competitiveness (through 74 indicators, grouped into 11 pillars organized into three sub-indexes: basic, efficiency and innovation factors of competitiveness) – makes it possible for all the EU regions to assess and compare (both in time and in space) the fundamentals of their competitiveness, while suggesting intervention areas for policy makers (<https://cohesiondata.ec.europa.eu/stories/s/Regional-Competitiveness-Index-2019/363v-4uq6/>). As regards the most recent RCI (2019), Centru Region ranks the 249 out of the 268 EU regions – with a 13.18 score, which is quite below Romania's average RCI score (17.84) and far away from the EU28 RCI 2019 score (60.3) (Table 5, Figures 5-6); moreover, the dynamics of Romania regions' RCI z-score – and particularly of Centru Region (Figure 7) – are not encouraging.

Table 5. RCI – Centru Region compared to Romania and EU (2019) – values

Pillars, Sub-indexes, & RCI	RO12: Centru	RO	EU28
01 Institutions	16,09	14,60	49,5
02 Macroeconomic Stability	48,61	48,61	61,7
03 Infrastructure	0,63	8,79	50,1
04 Health	22,10	23,92	70,9
05 Basic Education	0,00	0,00	54,9
06 Higher Education and Lifelong Learning	26,87	30,73	58,5
07 Labour Market Efficiency	57,89	60,58	69,1
08 Market Size	39,06	43,37	65,1
09 Technological Readiness	15,60	19,50	65,1
10 Business Sophistication	5,37	7,05	41,4
11 Innovation	17,33	17,17	49,2

12 Basic Sub-index	2,31	4,56	57,2
13 Efficiency Sub-index	38,26	42,98	68,1
14 Innovation Sub-index	8,40	10,51	55,8
15_RCI 2019	13,18	17,84	60,3

Source of data: <https://cohesiondata.ec.europa.eu/Other-RCI/European-Regional-Competitiveness-Index-2019-index/if3f-yweu>

Figure 5. RCI – Centru Region compared to Romania and EU (2019) – radar chart

Source: https://ec.europa.eu/regional_policy/en/information/maps/regional_competitiveness/#4

Figure 6. RCI – Centru Region compared to all Romania's regions (2019) – values

Source of data: <https://cohesiondata.ec.europa.eu/Other-RCI/European-Regional-Competitiveness-Index-2019-index/if3f-yweu>

Figure 7. RCI – Centru Region compared to all Romania's regions – time evolution

Source: <https://cohesiondata.ec.europa.eu/stories/s/Regional-Competitiveness-Index-2019/363v-4uq6/>

On the other hand, when compared to its peer (European) regions (Peloponnisos; Kujawsko-pomorskie; Opolskie; Calabria; Kriti; Lubuskie; Východné Slovensko; Jadranska Hrvatska; Zachodniopomorskie; Kentriki Makedonia; Guyane; Nord-Vest; Mazowiecki regionalny; Sicilia and Thessalia), Centru Region-Romania: **(a)**. is not overperforming them regarding none of the 11 pillars of competitiveness; **(b)**. is similar to them regarding three basic dimensions (Institutions, Macroeconomic stability, Health), all of the efficiency dimensions (Higher Education and lifelong learning, Labor Market Efficiency, Market size), and two innovation dimensions (Technological Readiness and Innovation); **(c)**. is underperforming them on two basic dimensions (Infrastructure and Basic education), and one innovation dimension (Business sophistication) (https://ec.europa.eu/regional_policy/sources/docgener/work/rci2019_scorecards.pdf).

6. Conclusions

Fitting Europe for the digital age – through “digital transformation that will benefit everyone” – is quite a challenging and ambitious strategic EU goal, as the disparities and gaps existing amongst Europe's countries and regions are significant – in terms of both levels of digital maturity and resources to be allocated for this endeavor. The good news is that all the six European Commission's priorities – A European green deal, A Europe fit for the digital age, An economy that works for people, A stronger Europe in the world, Promoting our European way of life, and A new push for European democracy (https://ec.europa.eu/info/strategy/priorities-2019-2024_en) – have the vocation of complementing each other (thus generating ripple and network effects); though, the not so good news is the possibility for some of the national EU actors – companies / public administrations – not to be aware that digital transformation is needed (to different degrees and in different forms) at their level. Considering the brief analysis made for

Centru Region-Romania, the needs for digital transformation are more than obvious and stringent – in order for the region (and consequently the country) to align to the imperatives of the digital age; not covering the gaps will not only result in efficiency related losses (higher costs), but also in uncertainties regarding the future of a specific company/entity.

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