The urban development and the National Plan for Recovery and Resilience in Romania

Daniela ANTONESCU[1*] and Ioana Cristina FLORESCU[2]

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Abstract. *Every major crisis offers opportunities for rethinking national systems of resilience and recovery. In order to capitalize on these opportunities, in the European Union, a joint instrument called the Recovery and Resilience Facility (RRF) was thought up, which aims to support the economies of the member states affected by the health crisis and to provide support for the reforms and investments that they propose. In Romania, the National Recovery and Resilience Plan of Romania (NRRP) aims to ensure an optimal balance between national priorities, investments and reforms. In this context, the local public authorities had a participative role, being involved in the creation of calls as well as in monitoring and assessing the plan. The purpose of this article is to identify and analyze the influence of NRRP investments on urban development. It will also try to identify the mechanisms and levers through which NRRP can put into practice the proposed reforms vis-à-vis the reality supported by statistical data, information and recent developments under the results of the health crisis, as well as the political-military conflict in the country's neighborhood.*

Keywords: *recovery, resilience, National Recovery and Resilience Plan, urban development, public investments*

JEL Classification*: R10, R50, R51, R58, R59*

1. Introduction

In the European Union, since the first signs of the global pandemic, discussions and questions regarding recovery and resilience have been launched and debated. As the EU economy recovers, the focus will shift from crisis management to transformational and inclusive recovery in the medium and long term. The Recovery and Resilience Facility was launched, which is the key tool for implementing the policy agenda in 2021-2022. Also, the 2022 European Semester cycle, which integrated the recovery with the resilience facility, aimed to support a transition to a "new normal", by resuming the issuance of country reports and development recommendations.

In the EU, the Recovery and Resilience Mechanism sum up grants' worth of 312.5 billion euros (2018 prices) or 338 billion euros (current prices), to which there are added loans worth of 360 billion euros (2018 prices) or 390 billion euros (current prices). According to this instrument, EU member states have drawn up their own National Recovery and Resilience Plans, which describe in detail the

[1] Institute of National Economy, Romanian Academy, Bucharest, Romania; *Corresponding author: daniela.antonescu25@gmail.com

[2] Institute of National Economy, Romanian Academy, Bucharest, Romania; ioanaflorescu2001@yahoo.com

plans for public investment and reforms they intend to implement with the support of this mechanism. These plans began to be implemented in the second part of 2021.

The national recovery and resilience plans differ from one member state to another, each from the perspectives of allocations, and especially of the structures by fields and reforms.

In Romania, the National Recovery and Resilience Plan (NRRP) is considered a coordinated response, targeting both country-specific problems and common European challenges: adopting the transition to the green and digital economy, and to strengthen the socio-economic resilience and cohesion on the Single Market. The National Recovery and Resilience Plan represents one of the essential instruments for supporting sustainable development at the territorial level, supported by coordinated efforts in key sectors targeted at modernizing and increasing the Romanian economy's potential in connection to the country's strategic goals and its impact on the digital transition and climate change.

The article aims to highlight the role and importance of the reforms and investments made within the NRRP on the growth of urban areas, in the first years after its approval (the current stage at the level of 2022).

2. Theoretical and conceptual approaches

In the last decade, in close correlation with the concerns related to climate change, but also with crises of different natures, the concept of resilience has increasingly made its way into the sphere of territorial planning concerns. It describes a reality in which processes within complex systems experience relatively wide variations under the effect of changes in context or other changes. Resilience targets disturbances and how the studied entities are affected (whether they have withstood or not).

The concept of resilience takes on different meanings depending on the scientific field. It appeared as a concept in a paper by C.S. Holling (1973), in which the distinction is made between stability and resilience in the evolutionary process of ecosystems under the predicted conditions of extinction of some species. Thus, Holling defines stability in correlation with the amplitude of differences (fluctuations), while resilience is influenced by the ability to maintain itself through self-organization processes.

The socio-ecological resilience is viewed as a "system property, which refers to the magnitude of change or disturbance that a system can withstand without moving into an alternative state, characterized by different structural and functional properties" (Resilience Alliance, 2010, p. 5).

In the case of socio-ecological systems, the adaptability of the human component and the way resources are managed becomes one of the most important aspects of resilience.

Extending the use of the term also to systems where the role of the human factor is decisive (urban regions) sought an adequate response to disturbances of various types while keeping intact the opportunity for future development.

The concept is assimilated with long-term flexibility through structural and functional adaptation and transformation. At the same time, there is an obvious difference between two types of response to disturbances:

1. one that ensures immediate recovery from a shock, and
2. another one involving a capacity that ensures long-term persistence and development.

Resilience at the territorial level can be approached from two perspectives: dynamic and static (Hamdouch et al., 2012). If the first implies a certain defensive capacity of the area to absorb shocks and adapt, the second implies the ability of an area to produce new resources, capabilities and values that lead to their transformation.

The conceptual approach to resilience by researchers in various fields of social science has been varied. Authors from the field of natural resource management emphasize the human-environment interdependence that this theory promotes in the study of regions (Folke et al., 2002), those from the field of economic geography support its usefulness for an evolutionary vision of the regional economy (Simmie and Martin, 2010).

The estimation of resilience to economic crises based on the speed of return of some economic indicators to the pre-crisis situation was carried out within the Economic Crisis: Resilience of Regions project (ESPON Program, EU). It investigates how EU regions reacted to the economic crisis of 2007-

2009. The project analyzed the variation of the gross domestic product and employment during the pre-crisis period, in the time of the economic crisis and the following years, up to 2011. Based on the difference between the values from the pre-crisis period and the current ones, the European regions were classified as resilient, recovered, recovering, non-recovered and not on an upward trajectory (ECR2, 2014).

Another approach to resilience is carried out in the Building Resilient Regions – Harnessing the Power of Metropolitan Regions project (completed in 2013 and coordinated by the University of California, Berkeley, USA). The study investigates the extent to which certain attributes of metropolitan regions ensure increased resilience to possible economic and natural challenges.

Based on studies and analyses on territorial resilience, recommendations have been identified that can be included in long-term strategies aimed at resilience (OECD, 2013):

- Short-term decisions should not block long-term options. It is very important to think of a long-term strategy for the socio-economic reconstruction of the region as soon as possible after the disaster so that reconstruction actions do not sabotage future development;
- Identifying the economic base and the main social and economic factors specific to the region that can support its resilience could support the stimulation of development starting from local resources and capitals that can ensure a faster and more visible recovery of the region;
- Designing an integrated strategy for regional revitalization based on dialogue between the main stakeholders to identify the necessary reforms and increase the quality of the process for assessing decisions;
- Strategic decisions must be coordinated from the local level;
- The local crisis must be used to introduce national reforms and standards;
- Promoting public participation to support the decision-making process is very important because the recovery strategy should take into account the vision of the local community;
- Public deliberation must be an essential component of regional development strategy implementation as it helps monitor progress;
- Building trust, increasing support for adopted policies and improving administrative capacity is based on broad access to information, dialogue with the private sector and the civil society.

Implementing a strategy to increase territorial resilience involves an important collaborative effort between institutions and other stakeholders: research on the adaptive governance of complex social systems shows that increasing resilience in such systems is a difficult and complex activity that cannot be easily planned and controlled by a single government-type institution (Bristow and Healy, 2014, p.100).

3. Resilience in the European Union – tools and resources

In the EU, resilience is built on six pillars (Table 1):

1. The green transition
2. Digital transformation
3. Smart, sustainable and inclusive growth
4. Social and territorial cohesion
5. Health
6. Policies for future generations

According to EU Regulation no. 241 of February 12, 2021 (Article 3), the Recovery and Resilience Mechanism aims to promote an integrated and sustainable type of intervention, built on six pillars, thus:

Pillar 1. Green transition – supports reforms and investment in green technologies and capabilities, including building rehabilitation, biodiversity, circular economy, and energy efficiency, while spreading sustainable growth, creating jobs, and preserving energy security, all contribute to the Union's climate goals. This Pillar covers a number of 1,834 investments and 480 reforms.

Pillar 2. Digital transformation – contributes to increasing the EU's global competitiveness and increasing resilience and innovation by enhancing supply chain diversity. The investments and reforms

support the digitalization of services and infrastructure for digital and data, digital innovation clusters and hubs, and open digital solutions. The digital transition stimulates the digitization of SMEs. This pillar comprises 639 reforms and 1570 targets.

Table 1. Allocation of resources on the six pillars of the Resilience Mechanism, in the European Union (%)

Pillar	Green transition	Digital transformation	Total
The green transition	38.22%	11.67%	49.88%
Digital transformation	24.17%	4.67%	28.84%
Smart, sustainable and inclusive growth	13.53%	35.92%	49.45%
Social and territorial cohesion	9.90%	33.07%	42.97%
Health	6.74%	10.61%	17.36%
Policies for future generations	7.44%	4.06%	11.50%

Source: Own computation, European Commission.

Pillar 3. Economic cohesion, jobs, productivity, competitiveness, R&D&I, and a functioning internal market with strong small and medium-sized firms (SMEs) are all examples of smart, sustainable, and inclusive growth. Reforms and investments must encourage entrepreneurship, the social economy, and the growth of infrastructures and sustainable transport, industrialization and reindustrialization, and to reduce the economic impact of the COVID-19 crisis. It includes 1,053 measures, 950 reforms and 2,647 targets across all Member States.

Pillar 4. Cohesion on a social and spatial level. Social and territorial cohesion reforms and investments will reduce territorial disparities, increase quality of life and economic opportunities, combat poverty and unemployment, so that Member States' economies recover, leaving no one behind. Reforms and investments will lead to the creation of stable and high-quality jobs, contribute to the inclusion and integration of disadvantaged groups and strengthen the social protection and dialogue, infrastructure and services, as well as welfare systems. This pillar covers 968 measures, 2283 targets and 767 reforms.

Pillar 5. Health, as well as economic, social and institutional resilience, with the aim, among other things, of increasing the level of crisis readiness and response capability – Investments made will improve public services, accessibility and capacity of the efficiency of public administration and national systems, particularly health care systems by minimizing administrative burden, as well as the efficiency of legal systems, fraud prevention, and oversight of anti-money laundering. It covers 870 measures, 2,043 targets and 480 reforms.

Pillar 6. Youth and child policies, such those pertaining to education and skills - investments and reforms for the young and the next generation are crucial to advancing education and skills, particularly digital upskilling, retraining and reskilling active labor force, integration programs for the unemployed, policies to invest in access and opportunities for children and young people in education, health, nutrition, jobs and housing, and policies that bridge the generation gap, in accordance with the objectives of the child and youth guarantees. Such actions should be taken to prevent the COVID-19 crises' effects on the next generation of Europeans and to prevent the generation gap from widening.

The total allocation of financial resources is presented in Table 2 (grants and loans). Italy receives the most funds from the mechanism (32.98%), followed by Spain (19.61%), Poland (9.8%), France (7.92%) and Romania (7.76%).

Table 2. Total allocations for NRRP (Grants + Loans) - absolute values (billions of Euros)

Country	Green transition	Digital transformation	Smart growth	Social and territorial cohesion	Health	Policies for the next generation	Total
Austria	1.25	1.07	0.11	0.01	-	-	2.44
Belgium	2.66	1.09	0.45	0.34	0.04	0.08	4.66
Bulgaria	2.09	0.96	1.42	0.08	0.68	0.95	6.18
Croatia	2.10	0.64	0.42	0.20	0.30	0.59	4.25
Cyprus	0.09	0.09	0.43	-	0.17	0.09	0.87
Czech Republic	3.14	1.12	0.68	-	0.49	1.62	7.05

Country	Green transition	Digital transformation	Smart growth	Social and territorial cohesion	Health	Policies for the next generation	Total
Denmark	0.71	0.09		-	0.03	-	0.83
Estonia	0.41	0.24	-	-	0.34	-	0.98
Finland	0.63	0.03	0.43		0.33	0.03	1.46
France	7.97	5.20	3.74	2.63	4.05	4.46	28.06
Germany	2.52	2.80		0.50	0.80	0.73	7.34
Greece	0.99	1.77	2.53	0.70	0.64	0.81	7.43
Hungary	1.21	-	0.90	0.19	1.89	0.74	4.93
Ireland	0.45	0.15	0.03	-	-	0.04	0.67
Italy	54.88	14.76	15.67	10.92	5.44	15.22	116.9
Latvia	0.68	0.39	0.43	0.01	0.29	0.03	1.82
Lithuania	0.82	0.32	0.12	0.11	0.30	0.25	1.92
Luxembourg	0.04	-	0.01	0.02	0.00	-	0.07
Malta	0.19	0.06		-	0.06	0.04	0.34
Poland	20.63	4.90	4.70	-	4.54	-	34.77
Portugal	3.67	2.63	3.83	0.83	4.05	1.47	16.49
Romania	4.86	2.29	12.59	1.04	3.23	3.51	27.53
Slovakia	1.13	1.12	0.73	-	1.48	0.88	5.34
Slovenia	0.06	0.19	0.40	0.12	0.15	0.02	0.95
Spain	30.89	17.63	9.55	3.29	4.45	3.72	69.53
Sweden	1.17	0.02		-	0.45	-	1.64
Total	145.22	59.54	59.17	21.01	34.23	35.28	354.5

Source: Darvas et al., 2023

4. The Recovery and Resilience Plan in Romania

Romania's National Recovery and Resilience Plan is seen as a coordinated response, targeting both country-specific problems and common European challenges: adopting the transition to the green and digital economy, and to strengthen the socio-economic resilience and cohesion on the Unique Market. The National Recovery and Resilience Plan represents one of the primary tools for supporting sustainable development at the territorial level, supported by coordinated efforts in key sectors targeted at modernizing and increasing the Romanian economy's potential in regard to the country's strategic goals and its impact on climate change and the digital transition. The plan aims at the sustainable achievement of nominal convergence criteria and the significant improvement of real convergence, an economic growth based on investments and the reduction of internal and external deficits, the implementation of fiscal-budgetary reforms, the amplification of investments in sectors that are high on the priority list (transport infrastructure, education, health, and the environment), supporting access to financing for the business environment, improving the flexibility of the labor market by improving digital literacy, creating sector-specific regulations that result in improving competitiveness, etc.

The public investments included in the NRRP have the potential to generate new jobs and ensure economic recovery in the current global context. This potential is linked to the strategic importance of the financed infrastructure and to generate the development of other adjacent sectors. This includes investments in public building, transport, energy, water management, social and educational infrastructure, etc. Also, the support given to SMEs is another dimension that gives a potential to achieve resilience after the health crisis. Also, by increasing the areas of forests and those with forest vegetation in vulnerable areas, by preventing climate change, along with restoring habitats, the aim is to achieve resilience.

Investments accompanied by reforms can generate important systemic and institutional changes at the national and regional level. These reforms are elements that give a high potential to structural changes and modernization of the state by increasing the quality of public services offered, with an emphasis on digitization, simplification, predictability (Table 3).

Table 3. NRRP – pillars, components, indicators

Pillars	Components	Selected indicators
I. Green transition	C1. Water management	Deliverables: 2 reforms and 7 investments • Investments: 1630 km of water networks in localities with over 2000 inhabitants; 2,000 km of sewerage networks in towns with over 2,000 inhabitants and 470 km of sewerage networks in towns with less than 2,000 inhabitants; of 100,000 homes with access to sewage and water networks through the National Program *First connection to water and sewage*; realization of the water cadaster.; • Realization of the water cadaster.
	C2. Forests and biodiversity protection	Deliverables: 4 reforms and 14 investments • Investments: 45,000 ha. New forest; updating management plans for 250 protected natural areas; 10,000 hectares of restored natural habitats.
	C3. Waste management	Deliverables: 2 reforms and 3 investments • Investments: development of the monitoring and control capacity of the Environmental Guard, 550 air pollution monitoring equipment; 15 modernized county waste management systems
	C4. Sustainable transport	• highways (434 km of highway built – currently there are 920); • linear forest curtains along newly built highways 625 hectares; • 45% of road safety black spots removed; • railway: 311 km of modernized railway; • railway with ERTMS 2 system (311 km); • of electrified railway (110 km); • 2,534 km of railway on which commercial speed increases by 15% through renewal works; • railway with modern centralization system (206 km); • Metro Line: 15.6 km of new metro network; 15 new stations; 30 frames.
	C5. The Renovation Wave	Deliverables: 8 reforms and 10 investments • energetically rehabilitated blocks (1,000 -1,500 blocks) • rehabilitated public buildings (2,000 buildings)
	C6. Energy	Deliverables: 7 reforms and 7 investments The development of electrical capacities from renewable sources: • Wind: +1,581 MW additional installed capacity in 2025 compared to 2020; • Solar: +2,031 MW additional installed capacity in 2025 compared to 2020.
II. Digital transformation	C7. Digital transformation	Deliverable: • Government cloud - connecting all ministries and government agencies in one network and one interoperable database; • 5 million citizens possessing the electronic identity card; • 30,000 civil servants digitally trained; 100 libraries funded as Lifelong Learning and Digital Skills Development HUBs; 65 structures supported in the field of cyber security.
III. Smart, sustainable and inclusive growth	C8. Tax reform and pension system reform C9. Support for the private sector, RDI.	Tax reform: • Limitation of special pensions; • A new system based on a stable benefit formula and automatic indexation of pensions; • Reforms in fiscal policy; RDI - Deliverables: 4,000 financing contracts for the digitization of SMEs; 280 financing contracts to help Romanian companies in the process of listing on the stock exchange; a Fund of Funds created for digitalization, climate change, as well as other topics of relevance; portfolio guarantee for Climate Action; 10 research institutes funded for excellence, through a pilot project; reform of state companies.
	C10. The local fund built	Deliverable:

Pillars	Components	Selected indicators
		- legislation for functional metropolitan areas, for Romania's urban policy, new national housing strategy - projects for green mobility (electric buses, cycle paths, dedicated lanes, charging stations) and for digitalization in localities; - social housing and youth program - 3,000 kilometers of pan-European cycling routes
IV. Social and territorial cohesion	C11. Tourism and culture	Deliverable: • 12 cultural routes (trails) developed and marked; • 8 museums built/rehabilitated and enhanced; • 20 green tourist destinations will be certified; • 15 million Romanian tourists and 4 million foreign tourists will visit the country annually.
V. Social, institutional, and economic resilience, as well as health	C12. Health C13. Social reforms C14. Good governance	*Health:* Deliverables: 3 reforms and 2 investments • 30 expanded/renovated hospitals • 200 community centers built or renovated, which have new facilities and staff; • 3,000 family doctors' offices will be equipped; • 10 equipped neonatal intensive care units, including an ambulance transporting newborns (for regional centers), *Good governance: Deliverables: 8 reforms and 7 investments*; -a New National Anti-Corruption Strategy, adopted by the end of 2021; - a New Strategy regarding the development of the judicial system for the period 2022-2025; - Adoption of "Justice Laws"; - Reviewing and updating the legislation on the integrity framework; - An increase of approximately 50% in the value of assets seized and administered by the National Agency for the Administration of Seized Assets; - Implementation of approximately 70% of the measures provided for in the new anti-corruption strategy by December 31st, 2025; - The legal framework in the field of integrity, updated until 2024. *Social:* Deliverables: day care centers for the prevention of family abandonment; the minimum inclusion income; the ticket system for the formalization of work.
VI. Policies for the new generation	C15. Education	Deliverable: 6 reforms and 17 investments; • 2400 students will benefit from support between dual study programs; • 50 new, energy-neutral schools; • 2,000 green minibusses for the transport of students; • 83,000 classrooms equipped with furniture; • for secondary and high school education, 1150 SMART Labs were purchased; • 6,000 schools that received resources and technology to equip computer labs and conduct virtual learning; • 130 nurseries built and operationalized.

Source: processing by the authors based on the information from the NRRP.

NRRP presents 14 components, each with a specific weight in total: water management - 5%, biodiversity -4%, waste management - 4.2%, transport - 26%, renovation wave -5%, energy - 5.6%, digital transformation – 6.5%, fiscal reform – 1.6%, support for the private sector, CD - 8.8%, Local Fund – 7.2%, tourism and culture – 1.5%, health – 8.4 %, social reform – 0.7%, good governance – 0.6%, education – 12.4%.

5. Public investment - its importance and utility in the urban development process

5.1. General aspects

Sustainable urban development requires capital investment in infrastructure projects and ensuring a high standard of living. In low-income economies, local public investments are limited because of their financial capacity, which causes a decrease in the quality of basic public infrastructure; therefore, it impacts the viability levels of the social and economic characteristics of these cities.

Many cities fail to attract enough investment, and the results are obvious: for many, inadequate living circumstances for residents and significant degrees of informality in both employment and housing. Housing issues and inadequate infrastructure make the city less appealing to business investment, putting off the production of desperately needed jobs. The task for policymakers is to establish conditions that completely fulfill cities' potential as places to live and work.

Nowadays, smart cities are frequently talked about, which are developing rapidly adding fresh procedures and services with a significant influence on planning and policy making. Regional planning refers to a human activity's setting and structure in a given space, weighing the need for money as well as the natural resources that are available. Regional planning in a residential area is particularized by urban planning. The government's policy frameworks for regional and urban planning both reflect the desire to use and develop sustainable land in each space for a limited timeframe (Campbell, 1996; Handy et al., 2002; Kiernan, 1983; Koutsopoulos and Siolas, 1998). Planning takes into account multiple factors including population, population density, and financial cohesiveness and transport networks and other public services.

The low rate of EU funds' absorption has been the main topic of discussion regarding the impact of the EU recovery fund. However, this is simply an illusion. EU funds are spent rather slowly, resulting in a current absorption rate for the current long-term EU budget that is less than 50%. However, in the end, most of the funds from the previous multi-annual budget were absorbed. The real problem, which also explains the variations across nations, and if timely project generation qualifies for EU funding.

Unlike the Structural and Cohesion Funds, the Recovery and Resilience Facility is an instrument for temporary recovery of losses caused by the pandemic crisis. This makes it possible for the Commission to allot money to support Member States in making investments and reforms that are consistent with EU priorities.

5.2. Romanian’s urban policy and NRRP

Romania's urban development strategy mainly targets the most thriving urban agglomerations and metropolitan areas, which are more successful at drawing clients and resources (investments, funds, etc.). The dynamics of urban areas is reflected in commuting patterns, which are the basis of the concept of a functional urban area (FUA - consisting of a core city and neighboring localities from where at least 15% of the workforce commutes to the respective urban center).

Functional or metropolitan urban areas cover both cities with a formal associative structure (such as ADI - Intercommunity Development Association) and those that do not have such a form of territorial cooperation established at a formal level. The Functional Urban Area is a technical concept while a Metropolitan Area presupposes the existence of an inter-jurisdictional administrative collaboration framework.

As stipulated in the NRRP, Romania had to draft a Law on metropolitan areas, which was adopted on July 20, 2022 (Law no. 246/2022). The law stipulates that the metropolitan development policy represents the set of policies developed, with the consultation of interested socioeconomic partners, for the purpose of the coherent and sustainable development of some integrated urban and rural territorial areas in the vicinity of the capital of Romania, of the county seat municipalities and of municipalities other than the seat by county. The application of the metropolitan development policy is consistent with Romania's general development objectives and priorities, as well as with the objectives in the field of urban and regional development and economic and social cohesion assumed by Romania as a member state of the European Union. The application principles are: local autonomy, cooperation and partnership.

The overall goals of the metropolitan development policy in Romania are the following: a) reducing economic, social and regional disparities by strengthening urban-rural and center-periphery links; b) increasing economic competitiveness and the ability of regions to prosper in a global economy; c) increasing the coherence of the administrative act and ensuring better local governance; d) ensuring and improving the access of all citizens to services of general interest. Metropolitan areas are not administrative-territorial units.

Investments made within the metropolitan area belong to public or private property, associations between UATs, being part of their inventory. The development objectives of the metropolitan areas are expressly provided for in the association's statute and can be pursued:

a) an integrated and sustainable territorial planning;

b) the development of infrastructure and development objectives of common interest to ensure mobility within the metropolitan area;

c) technical-building infrastructure;

d) educational and health infrastructure;

e) modernizing, developing, interconnecting and improving public service efficiency;

f) the joint provision of public services of local interest;

g) the integrated and sustainable development of the territory of all administrative-territorial units that make up the metropolitan area;

h) developing human resources and human capital, increasing the employment rate and combating exclusion and social imbalances for all social categories;

i) housing management and the integrated approach to the issues specific to vulnerable groups and marginalized communities, including informal settlements;

j) reducing socioeconomic imbalances;

k) other objectives that are circumscribed to the general objectives of the metropolitan development policy.

Metropolitan development in Romania is funded by national programs that the state budget funds on an annual basis or from other sources, being provided separately in the budgets of the relevant ministries, based on pre-established performance criteria.

Metropolitan areas can be supported by counties through county or local development programs, financed annually from the county budget or from other sources, including by ensuring their financing from the local budget of the administrative-territorial unit.

Metropolitan areas can be eligible as an applicant or partner in funding programs, regardless of their type or source, when any of the territorial and administrative divisions that are members of the association are among the categories of eligible applicants of the respective funding programs.

In the case of projects with European funding, the provisions of national and European legislation on the management of European funds are applied, as well as the procedural documents specific to the implementation of the operational programs that ensure the financing of the types of targeted interventions.

Regarding financing from European funds, between 2021 and 2027, Romania can benefit from European funds in the amount of 79.9 billion euros, broken down as follows: from the Multiannual Budget 2021–2027, 46.4 billion euros and the Economic Recovery Package, 33.5 billion euros (16.8 billion euros in grants and 16.7 billion euros in loans),.

The architecture proposals for the 2021-2027 Operational Programs are:

1. The Regional Operational Program (ROP) 2021-2027 is among the programs that Romania accesses European structural and investment funds from the European Regional Development Fund (ERDF), during the current programming period.
2. Just Transition Operational Program (JTOP)
3. Sustainable Development Operational Program (SDOP)
4. Transport Operational Program (TOP)
5. Smart Growth, Digitization and Financial Instruments Operational Program (SGDFIOP)
6. Health Operational Program (HOP)
7. Education and Employment Operational Program (EEOP)
8. Inclusion and Social Dignity Operational Program (ISDOP)
9. Technical Assistance Operational Program (TAOP).

In addition to the programs presented above, there is a wide variety of national strategies developed by the central authorities in a number of 44 planning documents, which have an impact on urban development and therefore on the Urban Policy of Romania 2035.

It should be noted that several plans and strategies presented below were developed for a period of time ending in 2020. In this regard, depending on the position of the legislative and executive branches, some of the documents could be renewed or extended for the period of future programming and were therefore included in the analysis.

In Romania, the strategies and legislation related to urban development focus mainly on the built environment and spatial planning. However, national urban policy falls within a strategic and legislative environment that is largely cross-sectoral.

Currently, the municipalities are in the phase of preparing their strategic planning documents for urban development, for the programming period 2021-2027. Although the greatest interest is given to the National Recovery and Resilience Plan (NRRP), we cannot overlook the reality that there are already guidelines (draft) for the operational programs.

For the urban area, the main source of funding remains the Regional Operational Program (ROP) 2021-2027, which municipalities can use to finance the following categories of plans: mobility, urban regeneration, action for energy efficiency and climate, etc. The funds allocated through the 2021-2027 ROP for urban development are 1 billion euros.

Alongside the ROP, we find the National Recovery and Resilience Plan, a financial tool provided in the form of loans and grants to promote national reforms and investments, including urban development. It aspires to lessen the pandemic's negative economic and social effects and improve European economies and communities by making them more robust, sustainable, and ready for the opportunities and challenges of the green and digital transitions. (Table 4).

Table 4. Comparative analysis of ROP (2014-2020) with NRRP (2021-2027)

ROP AXIS	NRRP Components	NRRP PILLARS
Priority axis 1: Promotion of technological transfer	C9. Assistance with the business sector, R&D, and innovation C7. Digital transformation	Smart, sustainable and inclusive economic growth Digital transformation
Priority axis 2: Improving the competitiveness of small and medium enterprises	C9. The support of the private sector, R&D, and innovation	Smart, sustainable and inclusive economic growth
Priority axis 3: Assisting in the shift to a low-carbon economy	C3. Waste management C6. Energy	The transition to a green economy
Priority axis 4: Supporting sustainable urban development	C1. Water management	The transition to a green economy
Priority axis 5: Improvement of the urban environment and preservation, protection and sustainable exploitation of cultural heritage	C2. Forests and biodiversity protection C5. The Renovation Wave	The transition to a green economy
Priority axis 6: Improving road infrastructure of regional importance	C4. Sustainable transport	The transition to a green economy
Priority axis 7: Diversification of local economies through the sustainable development of tourism	C11. Tourism and culture	Social and territorial cohesion
Priority axis 8: Development of health and social infrastructure	C8. Fiscal reform and pension system reform C12. Health	Smart, sustainable and inclusive economic growth
Priority axis 9: Supporting the economic and social regeneration of disadvantaged communities in the urban environment	C14. Good governance	The transition to a green economy
Priority axis 10: Improving the educational infrastructure	C15. Education	Children, young people, education and skills

Priority axis 11: Geographical expansion of the property registration system in the cadaster and land register	C10. The local fund	Social and territorial cohesion
Priority axis 12: Technical assistance		

Source: authors' elaborations.

The NRRP funds' investments and reforms must assist in achieving the digitalization objective in proportion to 20%, together with the achievement of the objective regarding climate change, in proportion to 37%. Hence, the projects' digital components, which is the foundation for the idea of a smart city, additionally to the green component, will be advantages for the projects' eligibility as they are developed in the Integrated Urban Development Strategies.

Categories of urban investments financed by NRRP

a. The public investments in water management refer, in particular, to the water distribution networks that have been created and are in use as well as the sewage networks that have been built and are in use in agglomerations that have been given priority by the Accelerated Plan for compliance with European legislation.

The main investments intended for urban development are:

1. extension of sewage and water systems in urban areas larger than 2,000 equivalent inhabitants (600 million euros);
2. assisting with the low-income community's integration into the water and sewerage systems already in place (168 million euros).

Summarizing, in the water management component, a budget of 1 billion euros is allocated to the construction of 1,600 km of water networks, 2,500 km of sewage networks in localities with more than 2,000 equivalent inhabitants and 400 km in localities that have fewer than 2,000 inhabitants equivalent, and furthermore there could be funded 13,000 individual systems or other suitable systems, that would be built and be operational in smaller localities of less than 2,000 inhabitants equivalent. The investments of the component regarding the expansion of water delivery systems in localities with more than 2,000 equivalent inhabitants consider the expansion of the existing water distribution network and of the wastewater network together with the rehabilitation of the wastewater network to reduce infiltration.

The allocation for these categories of investments is 780 million euros (extension of water distribution networks, sewerage and rehabilitation of sewerage networks).

The analysis of the current situation of the drinking water distribution network shows that in Romania, in total, there are 90,352.4 km, the urban environment owning 34.9% of the total. The 2,000 km of network financed by NRRP represents 2.21%. The urban area with the largest water network is in the Bucharest-Ilfov region, which has 3,130 km of water distribution network (75.3%), followed by the West (41.3%) and the Center (40.8%). In the regional total, the South and North West regions hold 17.2% and 15.9%, respectively. In the urban environment, the North West and Center regions have the urban areas with the highest density of the drinking water distribution network.

The water sewerage networks will be built in localities with over 2,000 equivalent inhabitants and in towns of less than 2,000 equivalent inhabitants. In Romania there are 821 localities with less than 2,000 inhabitants, representing 25.8% of the entire number of localities (3,181 localities). The population in localities with less than 2,000 inhabitants is 1,172,509, i.e. 5.34% of the total population (by residence – total of 21,942,721 inhabitants).

a. Waste management

The investments will consist of 565 voluntary collection centers established and operational, in accordance with the National Waste Management Strategy/County Waste Management Strategy and the Waste Management Strategy of the City of Bucharest.

Voluntary collection centers are expected to serve communities with approximately 50,000 inhabitants. The centers will be situated outside of the territorial administrative entity or at the border.

b. Sustainable transport

This important target of NRRP includes:

- 315 km. modernized railway lines with 30% increased capacity and with ERTMS 2 installed (ERTMS/ETCS railway signaling system);
- 110 km. of electrified and renewed railway lines, with a 15% increase in speed (average speed reaching at least 100 km/h);
- 2,426 km. (2,163 km total length for "quick wins" type railway projects + 198 km redevelopment of the section Bucharest - Pitesti + 65 km renewal of the section Reșita - Voiteni) of renewed railway lines with a speed increase of 15% (speed average reaching a minimum of 100 km/h). The aim is the distance in kilometers (km) of new and upgraded railway lines that will be finished with the contracting authority's declaration of acceptance and put into operation in compliance with TEN-T and TSI requirements.
- Modernization, electrification, ERTMS - Arad – Timișoara – Caransebeș section;
- Modernization, electrification, ERTMS - Cluj-Napoca - Bihor Diocese section.

For the above two projects, the work includes the full introduction of ERTMS as a railway facility and the completion of the necessary certification for European rail interoperability concurrently with the investment itself.

- Renewal and electrification: Constanța - Mangalia and Videle - Giurgiu.

Investments in the renovation process cover the following lines:

- Bucharest - Pitesti - inclusion in TEN-T;
- Reșița - Voiteni - connection with the TEN-T central network corridor.

The investment will include "quick wins" projects to remove restrictions and speed limits on the following sections:

- Bucharest – Craiova;
- Arad – Oradea;
- Sibiu – Copșa Mică;
- Oradea – Satu Mare – Halmeu;
- Apahida – Dej – Baia Mare – Satu Mare;
- Dej – Beclean – Ilva Mică;
- Adjud – Siculeni;
- Filiași – Tg. Jiu – Petroșani – Simeria;
- Pitești – Slatina – Craiova;
- Coșlariu – Teiuș – Cluj-Napoca;
- Tecuci – Bârlad – Vaslui – Iași.

To ensure compliance with the Technical Guidelines on the application of the "do not significantly harm" principle, proof of adherence to the environmental impact assessment permission processes in accordance with Directive 2011/92/EU will be supplied (EUR-lex, a, 2021). The relevant water bodies' good ecological status and ecological potential shall be achieved/maintained in compliance with the Water Framework Directive's criteria (EUR-lex, b, 2000) and this shall be demonstrated on the basis of the most recent relevant supporting data. It is necessary to certify the ERTMS track system for interoperability throughout Europe.

c. Digital transformation

According to the guidelines outlined in the milestone, this component will provide funding for at least 30 public institutions to be completely connected and utilize the government cloud. Public institutions will use the government's cloud infrastructure to exchange data.

d. The local fund

Within the framework of urban mobility in the Local Fund Component, the following investment targets are pursued:

1. fleet renewal for public transportation (purchase of non-polluting vehicles);

2. additional zero-emission vehicles (number of buses, trams, minibusses and trolleybuses with zero-emission engines or with batteries);

3. increasing the share of trips in administrative-territorial units with local public transport services that use zero-emission vehicles (buses, trolleybuses with zero-emission engines or batteries, trams) compared to 2019;

4. provision of ICT infrastructure;

5. administrative-territorial entities with advanced/extended operational systems, including e-ticketing and other ICT infrastructures and intelligent transportation systems;
6. building charging points for electric vehicles;
7. extra electric vehicle charging stations;
8. additional number of charging points for electric vehicles;
9. investment in bicycle infrastructure at local/metropolitan level;
10. tracks for operational cyclists (km) at local/metropolitan level;
11. operational cycling tracks at local/metropolitan level (km);

An important investment for urban development is the creation of bicycle paths that should reach 1,091 km (from 546 km) at the end of 2026 (quarter II).

Regarding the quantity of electric vehicle charging stations in operation, they will have to reach 13,200 (from 6,600).

e. Tourism and culture

Investments will target:

– Creation of a digital framework for financing cultural activities;
– Speeding up the conversion of filmmaking and distribution to digital technology.

f. Health

The investments will target at least 30 ambulatory healthcare units that will be modernized, rehabilitated, expanded (including by building brand-new structures) and outfitted. Depending on their maturity level, the selection will also take into account the list of projects that are on the reserve list for the request for projects from the Regional Operational Program (2014–2020). At least 20 ambulatory healthcare units are going to be in less developed areas or localities (where GDP/capita <75% of the EU-27 average) (Eurostat, 2023).

The investments will consist of:

– upgrading, expanding, and equipping the current ambulatory infrastructure;
– making the area more easily accessible for medical services and entrances;
– the installation of new general and/or upgraded utilities, including utility connections at the location of the investment target.);
– the acquisition of equipment for ambulatory infrastructure.

6. Methodology

In order to demonstrate the importance of the NRRP funding and the digitalization of the eight development regions of Romania, we also used econometric modeling. The purpose of the study is to examine the effects of the broadband internet infrastructure, and of the e-commerce users, both measured in percentages on GDP per capita (euro/inhabitant) in all the regions involved in the panel, in the 2010-2021 timeframe. As it can be observed from the proposed goal, both the broadband internet and the e-commerce indicators will be considered the independent variables and the GDP per capita, the dependent one.

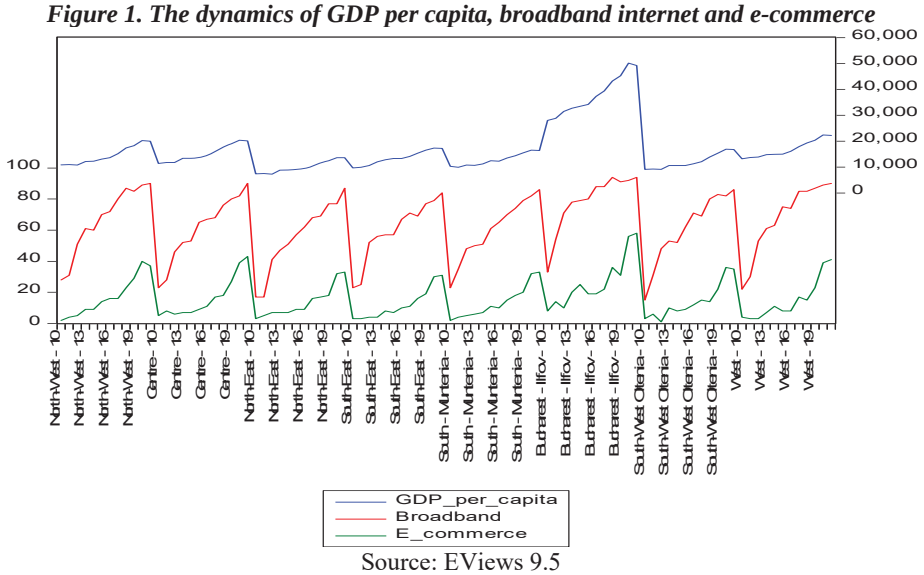
The data series on GDP per capita, broadband and e-commerce dynamics are shown in Figure 1. The graph suggests a non-stationary evolution for the value of GDP per capita and e-commerce and stationary for the broadband internet. The ADF test was applied in order to differentiate the series (Table 5).

Table 5. The ADF root unit test for GDP per capita, broadband internet and e-commerce

Series	ADF test value		Probability attached to null hypothesis		Conclusion
	Series at level	Series at differences	Series at level	Series at differences	
GDP per capita	2.64500	-4.32558	0.9959	0.0000	I(1)
Broadband Internet	-11.3947	-	0.0000	-	I(0)
E-commerce	9.88528	-6.20213	1.0000	0.0000	I(1)

Source: EViews 9.5

Figure 1. The dynamics of GDP per capita, broadband internet and e-commerce



Source: EViews 9.5

The results in Table 6 also revealed the hypothesis of non-stationarity at the level of the mentioned series, but after differentiating at the first level I(1), both GDP per capita and E-commerce became stationary.

For the statistical analysis of the relationship between the three indicators, the least squares model was used, which proved that the model is econometrically correct (Table 6).

Table 6. The analysis model of GDP per capita dynamics based on the dynamics of broadband internet and e-commerce

Dependent Variable: D(GDP_PER_CAPITA)
Method: Panel Least Squares
Sample (adjusted): 2011 2021
Periods included: 11
Cross-sections included: 8
Total panel (balanced) observations: 88
White diagonal standard errors & covariance (d.f. corrected)

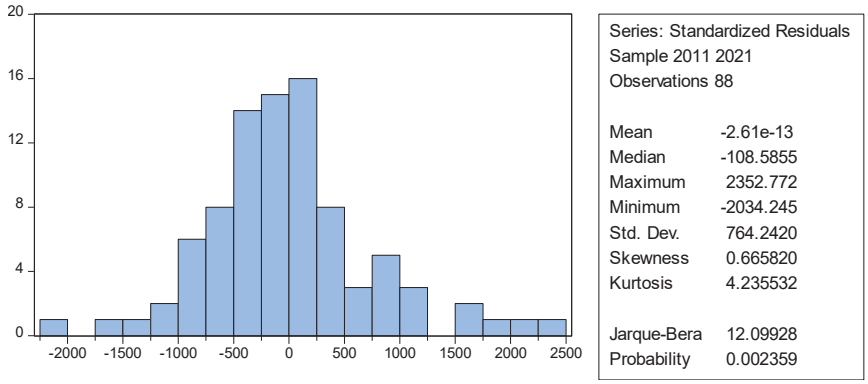
Variable	Coefficient	Std. Error	t-Statistic	Prob.
BROADBAND	13.97407	5.472239	2.553629	0.0124
D(E_COMMERCE)	77.60214	26.90713	2.884073	0.0050
C	-334.5220	296.2616	-1.129144	0.2620

R-squared	0.326921	Mean dependent var	857.9545
Adjusted R-squared	0.311084	S.D. dependent var	931.5321
S.E. of regression	773.1808	Akaike info criterion	16.17240
Sum squared resid	50813722	Schwarz criterion	16.25685
Log likelihood	-708.5856	Hannan-Quinn criter.	16.20642
F-statistic	20.64266	Durbin-Watson stat	1.621939
Prob(F-statistic)	0.000000		

Source: EViews 9.5

The model explains one third of the average change in GDP per capita (R^2= 0.32), with the broadband and e-commerce coefficients being significantly different from 0 at the 5% threshold. The Jarque-Bera test value is 12.099, below the threshold of the Chi-square distribution at 5%, i.e., $\chi 2(88;0.05) = 299$. The assumption of normality of errors will not be rejected (Figure 2).

Figure 2. Jarque-Bera Test



Source: EViews 9.5

The Durbin-Watson test is not relevant for econometric models in which there is differentiation. Therefore, the Breusch-Godfrey LM test for random effects was used. The results are presented in Table 7.

Table 7. The Breusch-Godfrey LM test

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives

	Test Hypothesis Cross-section	Time	Both
Breusch-Pagan	1.585658 (0.2079)	28.26776 (0.0000)	29.85342 (0.0000)

Source: EViews 9.5

The probability attached to the null hypothesis (errors are not autocorrelated) is 0.20 above the standard threshold of 0.05, so the autocorrelation hypothesis is rejected by order 2.

It can be concluded that the dynamics of GDP per capita in the period 2010-2021 was influenced by other factors too, not only by those included in the regression model. The value of the coefficients thus demonstrates that with the increase of e-commerce by one percentage point, GDP per capita will increase by 77.60214 euro/inhabitant. The broadband Internet infrastructure also has a significantly positive relationship over GDP per capita, of 13.97407 euro/inhabitant.

The results of the model prove that the digitalization of Romania has a direct and positive impact over the GDP per capita for all of the 8 regions, so the investments that will be made through the NRRP will lead to a higher increase of these indicators and to a sustainable and long-term development of the regions.

7. Conclusions

Any major crisis, as was the case of the Coronavirus (COVID-19) pandemic, comes with a series of problems, but at the same time, it also brings important opportunities to rethink national systems. In order to capitalize on these opportunities, but also to reduce the effects of the health crisis, at the level of the European Union, the instrument called the Recovery and Resilience Facility was launched, which seeks to assist the member states whose economy was impacted by the health crisis and provide support for the reforms and investments that they and I propose them. To lessen the economic and social effects of the coronavirus pandemic, make them more sustainable and prepare them for the opportunities and challenges brought on by the green and digital transition, funds totaling 723.8 billion euros (current prices) have been distributed as loans (385.8 billion euros) and grants (338

billion euros). After the COVID-19 pandemic crisis, this recovery mechanism aims to help the Member States recover in a sustainable manner.

The national recovery and resilience plans are different from one member state to another, both in terms of allocations and especially structures. From one country to the next, there are differences in the quantity, information and accessibility of categories as well as the availability of summaries of subcategories. However, two elements remain common to all countries: the green and digital energy components of the subcategories must reach at least 37% and 20% respectively in each of them.

The recovery strategy for Romania is built around six development pillars: smart growth, social and territorial cohesion, digital transformation, health and resilience, green transition and policies for the next generation. The strategy calls for actions in the areas of sustainable transportation, healthcare, education, and building renovation as well as public administration digitalization. The plan's projects encompass the full NRRP implementation period until 2026. The strategy calls for developments in all seven emblematic areas established at the European level.

The NRRP budget (total allocation) is 29.2 billion euros. At the end of 2022, out of the 215 reforms to be carried out, 32 have been completed. As for investments, out of a total of 292, none have been completed at this time.

The NRRP mainly addresses urban areas, supporting their sustainable development. Within the NRRP, through component 10 – The local fund, investments in local infrastructure are supported as follows: O1 - the green transformation and urban and rural areas' resilience are supported, as well as the reduction of regional, intra-regional, and county-level territorial discrepancies and O2 – by providing a framework for the reformation and digitization of territorial and urban planning instruments locally, among public authorities. Funds of 2,100 million euros are allocated.

By implementing the measures and actions proposed in the NRRP, urban development can be supported through investments and reforms that can lead to sustainable economic expansion and a higher level of quality of life. Some urban investments that make the transition to the digital economy can contribute to the consolidation of the smart city status and to an important development of metropolitan areas.

The novelty of this study which also adds value in the research community consists in the presentation of the relevant elements on digitalization at European and national level, focusing on the aspects related to digitalization at regional level, the notification of how digitalization manifests itself as a dynamic element of evolution in modern society, the signaling of the advantages and risks it entails and the analysis of the effects and impact of two independent variables – broadband infrastructure and e-commerce – at the NUTS 2 development regions level in Romania, for the 2010-2021 timeframe based on the first findings resulting from the presentation of general statistical data on the evolution of the economy and society of digitalization.

The limitations of the article are of a statistical nature as the data used from the Eurostat is already two years old and no statistical database has data published more recent regarding the indicators mentioned in this paper. Also, on a regional level the indicators are scarce, most of them being focused on country level. We will continue this study through a new econometric model in a future paper which will analyze the impact the NRRP had upon the development regions of Romania regarding another aspect from the plan.

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