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ROMANIA

Reimbursable Advisory Services Agreement on Evaluation of European Structural and Investment Funds Interventions in Information Technology and Communications (P174331)

Output 4

Final Evaluation Report of Selected Completed Projects and a Consolidation of Previous Outputs, Including Recommendations for the Design and Implementation of the Operational Programme for Smart Growth, Digitalization and Financial Instruments During the 2021–2027 Programming Period

November 2023

MINISTERUL INVESTIȚIILOR ȘI PROIECTELOR EUROPENE

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Proiect finanțat din FEDR prin POAT 2014-2020

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This report was delivered in November 2023 under the Reimbursable Advisory Services Agreement on Evaluation of European Structural and Investment Funds Interventions in Information Technology and Communications (P174331) signed between the Ministry of Investments and European Projects and the International Bank for Reconstruction and Development on June 30, 2020. It corresponds to Output 4 – "A final evaluation report of selected completed projects and a consolidation of previous Outputs including recommendations for design of the 2021-2027 programming period," under the above-mentioned agreement.

Executive Summary

This report presents the results of an evaluation of Priority Axis 2 of the Competitiveness Operational Programme 2014–2020 (COP) in Romania focused on projects in the information technology and communications (IT&C) sector. Priority Axis 2 aimed to increase deployment of high-speed broadband, including in underserved areas, increase economic competitiveness of the sector, expand e-government systems and services, and increase internet use for health, education, and culture. By assessing the efficiency, effectiveness, and impact of funded interventions as of March 31, 2023, this evaluation seeks to inform ongoing implementation of the Operational Programme for Smart Growth, Digitalisation and Financial Instruments (2021–2027), and design of future programs in the IT&C sector. The report presents the conclusions of the evaluation and recommendations in three areas.

Expanding Access to Broadband

Although the broadband rollout was delayed, 695 localities were enabled access to high-speed distribution networks capable of providing up to 10 Gbps bandwidth, enabling access for 119,592 new individuals and 7,189 small and medium-sized businesses. Delays in implementation were primarily due to delays in the construction permitting process, legislative inconsistencies on permitting at the local administrative level, restructuring of the primary public beneficiary, administrative delays in payments and technical audits, and the legal provisions surrounding the right to use existing electricity grid networks for broadband deployment.

Within-program evaluation of lots under Ro-NET registered no significant changes to firm size or profits, but the evaluation notes that only three years had passed since the first lots were made operational, and that the firm effects may be suppressed due to the onset of COVID-19 in the year following the operationalisation of the first lot (comprising 103 of 695 villages). Previous private rollout in the 2014–19 period in villages similar to Ro-NET

villages shows statistically significant effects on firm entry, suggesting that with time, Ro-NET may have some impact on private sector participation.

The evaluation recommends that national, regional, and local authorities coordinate and streamline permitting processes for the construction of high-speed internet infrastructure. Further follow-on evaluation of the effects of such rollout and resultant last-mile entry is recommended. While continuing to support broadband infrastructure, future programming must also address demand-side barriers to broadband take-up.

Increasing Economic Competitiveness

COP financed 241 projects to develop 278 innovative products and services, vastly exceeding the original target of 45 products to be developed. Flexible design and ease of communication with programme authorities during implementation were highly rated by grant recipients. However, application and administration processes can be further streamlined to cut down on the evaluation time (161 applicants waited for more than 300 days for a decision on their application), and reduce the approval to effectiveness period, which lasted for 9 months for 49 of the 80 surveyed beneficiaries.

Impact evaluation leveraging the staggered rollout of the grants registered no short-term changes to labour productivity, profits, firm size, or turnover for first-round grantees. More data and time may be required to evaluate the medium- and long-term effects of such interventions, and the evaluation recommends undertaking a longer-term evaluation (3–5-year time frame) to study the impact of grants supporting ICT products and services.

Increasing the Use of E-government Systems and Services

E-government projects, such as the big data platform of the Competition Council, the SIIEASC project to digitise civil registries, the E-cultura Platform, and the trade registry platform, were either implemented or nearing completion at the time of the evaluation.

Uncertain annual budgetary allocations for the upkeep and maintenance of developed e-government platforms, as well as insufficient investment in human resources for e-

government services, are two major challenges to e-government platforms' impact and sustainability. Complex rigid procurement procedures for software products can be detrimental, and coherent and integrated whole-of-government approaches to data flows and protection are needed. The evaluation, therefore, recommends improving coordination between ministries, significant investment into IT human resources, and ensuring that high value e-government projects include a plan for sustainability beyond the programming period.

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Acknowledgements

The evaluation was led by [redacted], Senior Digital Development Specialist. The core evaluation team comprised [redacted], Digital Development Specialist and Doctoral Researcher at the University of Oxford; [redacted], Client Coordination Lead; [redacted], Technical Expert and Client Coordination Liaison; [redacted], Economist and Doctoral Researcher at the University of Pennsylvania; and [redacted], Senior Data Scientist and Technical Expert. [redacted] aided in collecting primary data used in the report. [redacted] served as the editor, and [redacted] served as the designer for the typeset version of this report. Professor [redacted] and Professor [redacted] from the Bucharest University of Economic Studies provided inputs on the data and approach used for the evaluation.

The evaluation team was supported by [redacted], Program Assistant, Bucharest; [redacted], Program Assistant, Washington DC; and [redacted], Program Assistant, Washington DC. The Romania Country Management Unit was instrumental in facilitating this evaluation.

Peer reviewers [redacted], Senior Economist; [redacted], Senior Economist; [redacted], Senior Economist; [redacted], Digital Development Specialist; and [redacted], Energy Specialist, have provided valuable comments at various stages in the evaluation. The team is also exceptionally grateful to [redacted], Practice Manager for Eastern Europe and Central Asia, for her guidance and inputs.

The team is grateful for the partnership with the Ministry of Investments and European Projects, Romania. [redacted] and [redacted] have been invaluable to the data collection process and have provided useful guidance throughout the evaluation process. The team is also grateful to members of the Scientific Committee and Steering Committee convened for review of this evaluation, who have provided both written and oral feedback at various stages.

Some parts of the evaluation approach and results have been presented at the 2022 European Evaluation Society Conference, Copenhagen, and at research seminars at the University of Oxford, United Kingdom. The team is grateful for comments received from researchers and practitioners at these forums.

Abbreviations

Note: The names of Romanian Institutions are given in English translation.

ANCOM	National Authority for Management and Regulation of Communications
COP	Competitiveness Operational Programme
COP-MA	Competitiveness Operational Programme Managing Authority
COVID-19	Coronavirus Disease 2019 caused by the novel coronavirus SARS-CoV-2
DG REGIO	Directorate-General for Regional and Urban Policy
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
EU	European Union
GDP	gross domestic product
IBRD	International Bank for Reconstruction and Development
ICT	information and communication technology
IP	investment priority
IT	information technology
IT&C	information technology and communications
LBAP	local broadband access points
log	logarithm
MIEP	Ministry of Investments and European Projects
NAPP	National Agency for Public Procurement
NCSC	National Council for Solving Contestations
NGA	next-generation access
NGN	next generation network
NSDAR	National Strategy on the Digital Agenda for Romania
NTRO	National Trade Registry Organization
OIPSI	The Intermediary Body for the Promotion of the Informational Society
RAS	reimbursable advisory services
RDI	research development and innovation

R&D	research and development
SME	small and medium-sized enterprise
SIIEASC	Integrated Information System for Issuance of Civil Status Documents
STS	Special Telecommunications Services
SUTVA	single unit treatment value assumption
TI	Transparency International

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1. Introduction

Summary:

- The Competitiveness Operational Programme's Priority Axis 2 comprised projects amounting to EUR 1.2 billion (RON 6 billion). Payments as of March 31, 2023, stood at 46% of the allocated EU and national budget for projects still under implementation.
- Most project financing – up to 50 percent – was committed at the end of the programming period (2019–2020), limiting the evaluation's ability to comment on medium- and longer-term effects as many large value projects are set to close in 2023.
- Completed projects primarily comprise innovation grants awarded to firms in three rounds (2017-2020), and grants made to schools in 2020–2022 for e-education during the COVID-19 pandemic.

This report evaluates Priority Axis 2 of the Competitiveness Operational Programme (COP) in Romania comprising projects related to the information technology and communications (IT&C) sector based on their progress until March 31, 2023.

This report is the final output to be delivered by the World Bank under the Reimbursable Advisory Services (RAS) Agreement on the Evaluation of European Structural and Investment Fund Interventions in the Information Technology and Communications sector, signed with the Ministry of Investments and European Projects[(1)] on June 30, 2020. Under this RAS Agreement, the World Bank agreed to deliver the following outputs:

a) Output 1: Inception report, delivered on August 31, 2020. The Inception Report set the framework for subsequent analytical work and outlined the methodology and work plan.

b) Output 2: An assessment report summarising the findings of the initial evaluations, along with lessons learned and key recommendations for the 2021–2027 programming period.

c) Output 3: Interim evaluation report with ongoing assessments of selected ESIF-funded projects approved after March 31, 2021.

[(1)] At the time of signing, the Ministry of European Funds.

d) Output 4: A final evaluation report of selected completed projects and a consolidation of previous outputs including recommendations for the design and implementation of the Operational Programme for Smart Growth, Digitalisation and Financial Instruments during the 2021–2027 programming period.

The framework for this evaluation is aligned with the Common Provision Regulation No. 1303/2013 for European Structural and Investment Funds (ESIF) (2014–2020). The regulation emphasises the evaluation of financed interventions and a rigorous understanding of whether and how ESIF funded projects have achieved expected results. Article 54 articulates a two-fold mission for such evaluations:

a) to improve the quality of the design and implementation of programmes; and
b) to assess their effectiveness, efficiency, and impact.

The report is structured as follows. Chapter 1 (this chapter) presents an overview of the evaluation objectives, scope, and background to the evaluation. Chapter 2 analyses the intervention logic and articulates the evaluation methodology used for each component of the evaluation. Chapter 3 provides an assessment of projects to improve broadband connectivity – including the Ro-NET project on improving broadband connectivity in white areas, and the preliminary progress of, and challenges faced by, NGN/NGA projects contracted in 2019 and 2020. Chapter 4 focuses on the grants made to small- and medium-sized enterprises to develop innovative products and services to increase economic competitiveness. It provides an assessment of the efficiency of processes used for selection and implementation of innovation grants, the cost incurred per product or service developed, as well as impact on short-term outcomes in terms of profit, employees, turnover, and labour productivity. Chapter 5 focuses on projects relating to the digitisation of government services, including a platform to monitor data for the Competition Council, and a platform for civil status documents to increase the use of e-government systems and services. Chapter 6 focuses on projects seeking to improve internet use for education, health, and E-cultura, with a detailed analysis of the development of the E-cultura Platform. Finally, Chapter 7 summarises key findings, conclusions, and makes policy recommendations.

Evaluation Objectives and Scope

This evaluation's objectives were three-fold:

a) To support the Ministry of Investments and European Projects in assessing the efficiency, effectiveness, and impact of ESIF in the IT&C sector.

b) To identify factors contributing to the success or failure of the implementation and sustainability of funded activities in the 2014–2020 programming period.

c) To draw key lessons relevant to the design and implementation of the Operational Programme for Smart Growth, Digitalisation and Financial Instruments in the 2021–2027 programming period.

The evaluation's scope is restricted to Priority Axis 2 projects financed under the Competitiveness Operational Programme (COP) in the 2014–2020 Programming Period. The scope and findings of this report are further constrained by its timing in three important ways:

a) **The evaluation is limited to the projects that have been implemented and can at least start producing economic effects**. Under Priority Axis 2, a total of 472 projects were funded, of which 32 were terminated. As of March 31, 2023, 64 projects were completed within 6 months of the evaluation cut-off date; 13 large-value projects were scheduled to close on 31 December 2023. This report primarily comments on completed projects and projects in stages of advanced implementation.

b) **The economic impact of some COP investments (e.g., infrastructure, innovative products, and services) may occur several years after the closure of funded projects**. The scope of the report is limited in that it cannot comment on medium-term effects and cannot make definitive conclusions on the sustainability of funded interventions.

c) **This evaluation does not provide recommendations at the level of the Partnership Agreement, as it takes place during the 2021–2027 programming period**. The findings and recommendations provide some insights and key lessons learned that can be carried forward into future programming periods at the project level, including on how to select, implement, and monitor projects with similar objectives.

Overview of European Structural and Investment Funds in Romania

The European Structural and Investment Funds are the European Union's main investment policy tool. The five constituent funds of ESIF are the European Regional Development Fund, the Cohesion Fund, the European Social Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund. In addition, the Youth Employment Initiative (YEI) supports young people who are not in education, employment, or training, including the long-term unemployed and those not registered as jobseekers.

With a total budget of EUR 41.6 billion,[2] Romania had access to approximately EUR 35.2 billion from the EU across all ESIF to boost the socio-economic development of the country and reduce its socio-economic disparities in the 2014–2020 period. As one of the objectives of ESIF is to eliminate regional disparities, 42 percent of total financing was specifically allocated to less developed regions of Romania, with only 3.34 percent allocated to projects in the most developed Bucharest-Ilfov region.[3] The remainder of ESIF was committed to national-level – mostly e-government – projects.

ESIF investments are made in accordance with the priorities outlined in the Partnership Agreement between Romania and the EU for the 2014–2020 programming period, which are:

a) Promoting competitiveness and local development, with a view to reinforcing the sustainability of economic operators and improving regional attractiveness

b) Developing human capital, by increasing the employment rate and tertiary educational attainment, but also tackling severe social challenges and poverty levels in rural areas and for deprived or marginalised communities

c) Developing physical infrastructure, both in the information and communication technologies (ICT) and the transport sector, to increase the accessibility of Romanian regions and their attractiveness to investors

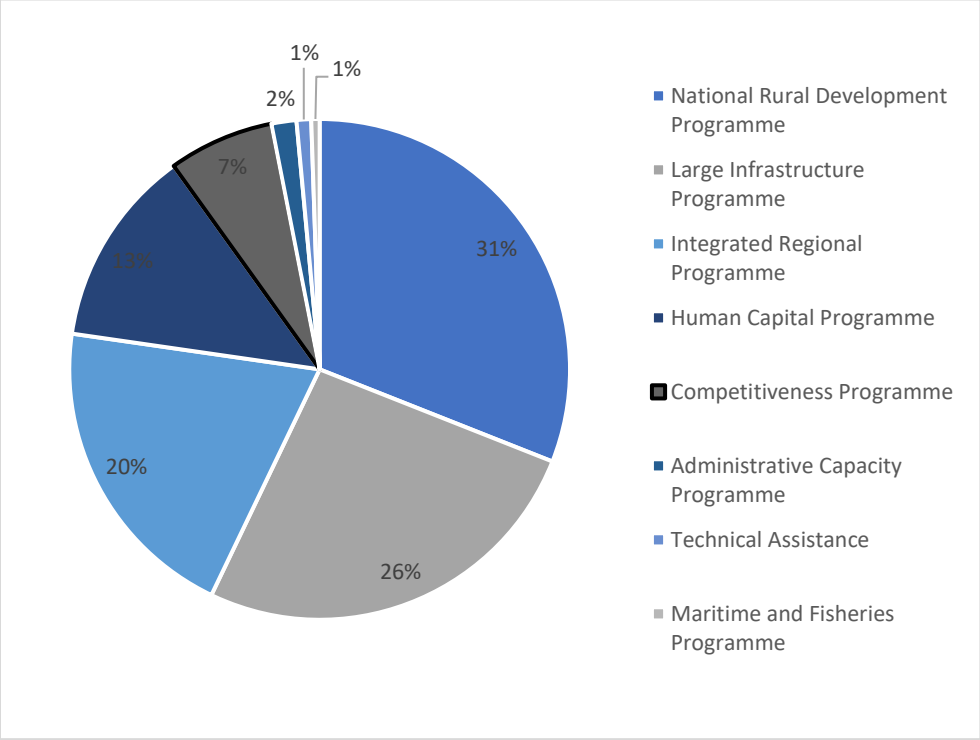
[2] This figure refers to the total ESIF budget for Romania (2014-2020), as reported by the European Commission on 31 December 2022.
[3] 51% of the total financing went to non-region-specific projects (e-government projects, national-level projects etc., and 3.84% was REACT-EU funding which was approved as a top-up to 2014-2020 ESIF to continue and extend the crisis response and post-crisis rebuilding measures during the COVID-19 pandemic.

d) Encouraging sustainable and efficient use of natural resources by promoting energy efficiency and a low carbon economy, protecting the environment, and adapting to climate change

e) Building a modern and professional public administration by means of systemic reform aimed at overcoming structural governance shortcomings.

ESIF funds are deployed via various Operational Programmes, including the Competitiveness Operational Programme (COP) funded by the ERDF, through which IT&C projects under evaluation are implemented. The structure of ESIF funding by operational programme in Romania is shown in Figure 1. COP funding comprised 7 percent of the total financing in the 2014–2020 programming period.

Figure 1: ESIF Structure by Operational Programme for 2014–2020 in Romania



Source: Original calculations using data from the European Commission on ESIF.

The Competitiveness Operational Programme

The Partnership Agreement for the 2014–2020 programming period identified competitiveness as one of the five challenges to Romania's development. It highlighted the

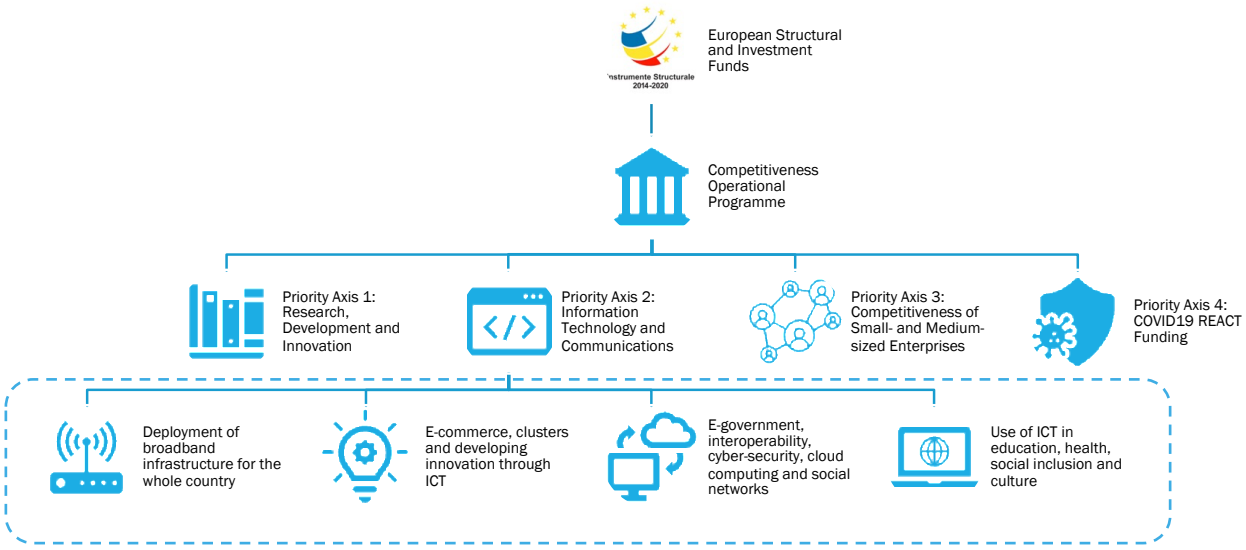
need to improve innovation and research capacity to develop products, services, businesses and processes, and the need to improve the enabling environment as well as the ability of firms to integrate with global value chains. A needs analysis conducted in the previous programming period found that low support to research, development and innovation, and an underdeveloped ICT infrastructure and services contributed to low economic competitiveness.[4]

Financed by the ERDF, COP initially had two Priority Axes[5] – Priority Axis 1 (PA1) on research and development and Priority Axis 2 (PA2) dedicated to Information Technology and Communications. Funding under both axes supports the Partnership Agreement's higher-level objectives. The two initial PAs were designed to enable complementary investments in innovation and new growth opportunities for firms, especially in R&D and IT&C sectors, on the one hand, and strengthening the baseline digital infrastructure overall, on the other. In addition, to respond to COVID-19, Priority Axis 3 (PA3) was added. It focused on improving the competitiveness of small- and medium-sized enterprises (SMEs). Finally, funding for crisis response and resilience from REACT (EU) was committed to Priority Axis 4 in late 2020. Figure 2 provides a diagrammatic overview of the eventual structure of the Competitiveness Operational Programme, with the dotted box demarcating the scope of this evaluation.

Developed in 2013, COP sought to contribute to the Europe 2020 Strategy and its flagship initiatives in the R&D and IT&C sectors – Digital Agenda for Europe, Innovation Union, and Industrial Policy for the Globalisation Era. It also followed the National Reform Programme and guidelines set out in the national strategies for research, development and innovation, competitiveness, digital agenda, next generation (NGN/NGA) infrastructure, and cybersecurity.

[4] The Competitiveness Operational Programme, Programme Document, version 2014.
[5] A Priority Axis brings together one or more investment priorities set out in European Union regulations governing ESIF. All activity funded by ESIF must contribute to delivering a priority axis.

Figure 2: The Competitiveness Operational Programme

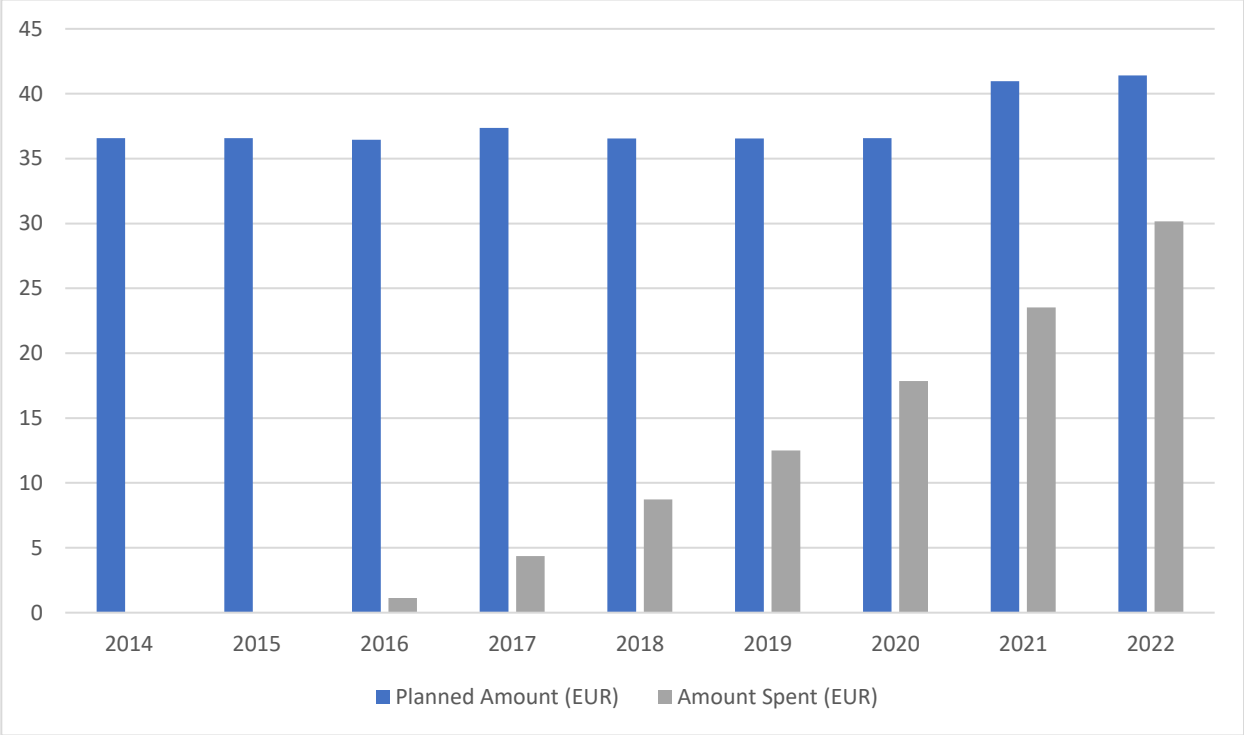


Source: Original elaboration by the evaluation team.

The total COP budget for the 2014–2020 programming period was EUR 2.8 billion, with EUR 2.3 billion in EU financing, and the rest derived from national contributions. Less developed regions, in alignment with the goals of ERDF, were allocated 1.47 billion EUR of EU financing.

As of December 2022, 73 percent of the total financing amount allocated to the COP had been spent (as reported to the European Commission). The first planning decisions were taken in 2015, with disbursements only beginning in 2016 (Figure 3). Over 60 percent of EU spending occurred in 2020–2022 suggesting implementation has just completed for many projects.

Figure 3: COP Spending as Share of EU Planned Budget in EUR billions (2022)



Source: Original calculations using data from the European Commission on ESIF.

For Priority Axis 2 projects, payments as of March 31, 2023, stood at 46% of the allocated EU and national budget for projects still under implementation. The remaining payments are scheduled for projects closing in 2023. As of April 30, 2023, total payments stood at RON 3 061 367 131.41, amounting to an overall disbursement rate of about 57%. ERDF payments were at 56% of the total ERDF budget on April 2023. The total, EU and national budgets for finalised and cancelled projects as of the evaluation cut-off date, are provided in Table 1.

Table 1. Budgets for Priority Axis 2 Projects as of March 31, 2023

Project Status	Total Budget (RON)	Eligible Budget (RON)	Grant (RON)	ERDF (RON)
Completed	2,747,639,299.32	2,517,205,096.70	2,185,574,258.76	1,850,516,691.99
In implementation	3,593,105,944.37	3,354,466,464.30	2,984,141,835.19	2,599,633,571.75
Terminated	215,866,007.32	200,175,435.35	144,722,215.16	122,297,292.72
Grand Total	**6,556,611,251.01**	**6,071,846,996.35**	**5,314,438,309.11**	**4,572,447,556.46**

Source: Data provided by OIPSI

Rationale, Design and Status of Priority Axis 2

By financing interventions in the IT&C sector, Priority Axis 2 helped to implement the National Strategy on the Digital Agenda for Romania (NSDAR)[(6)], a national strategic framework for digital growth to stimulate affordable, good quality and interoperable digital private and public services. The strategy set out several priorities clustered around four fields of action: (i) e-Government, Interoperability, Cyber Security, Cloud Computing, Open Data, Big Data and Social Media; (ii) ICT in Education, Health, Culture and e-Inclusion; (iii) e-Commerce, Research, Development and Innovation in ICT; and (iv) Broadband and Digital Service Infrastructure. See Figure 4 for all investment priorities under PA2.

At the time of COP design, Romania had a low national penetration rate of high-speed infrastructure, compared to other EU member states, and there were significant differences between urban and rural areas in broadband connectivity. Lack of broadband connectivity was seen as a major impediment for balanced development. Overcoming this

[(6)] Approved through government decision (HG 245/2015) and published in September 2014. https://www.comunicatii.gov.ro/wp-content/uploads/2016/02/Strategia-Nationala-Agenda-Digitala-pentru-Romania-2020-aprobata-feb-2015.doc.

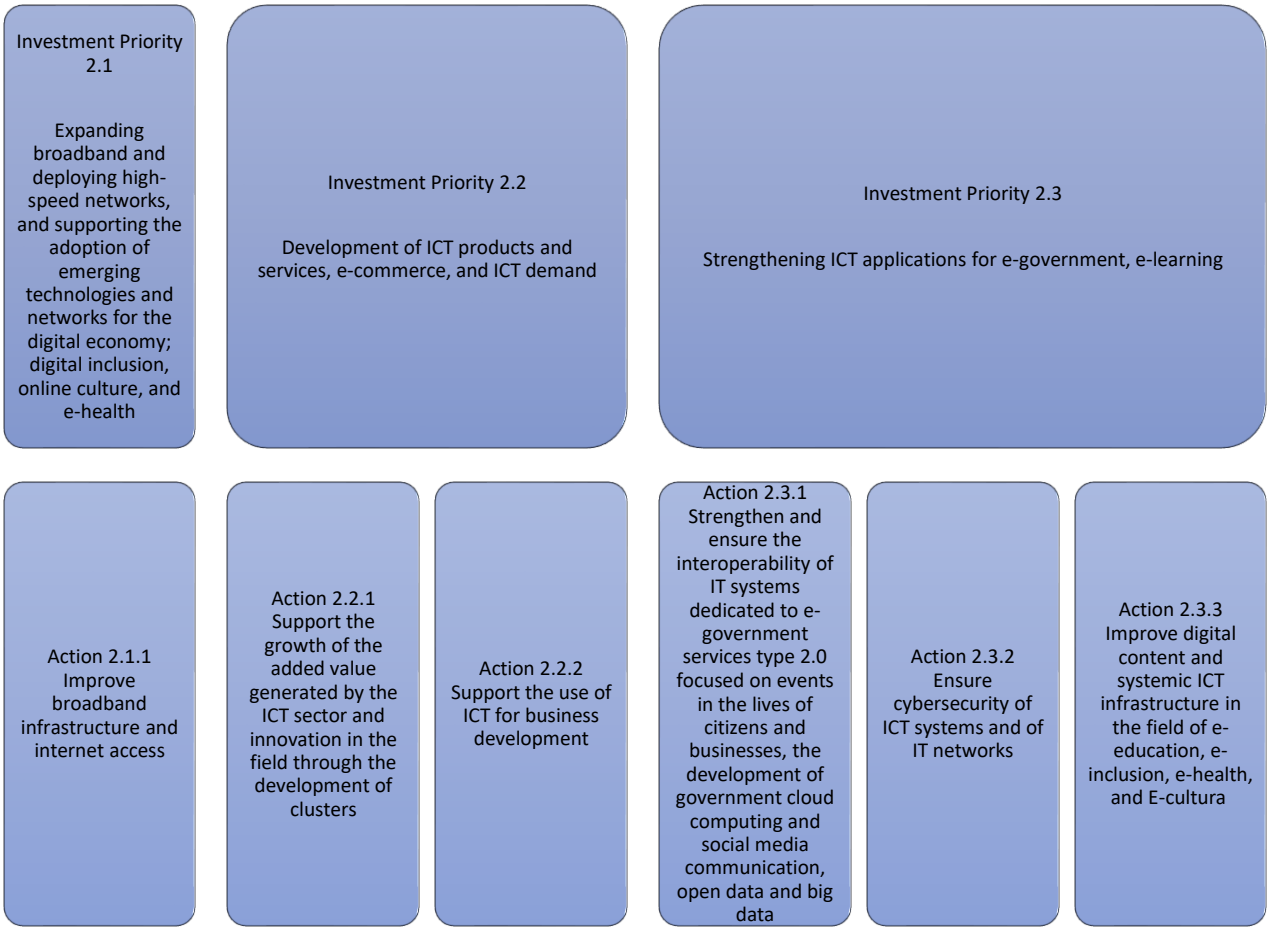
impediment provided the rationale for the first investment priority: extending broadband deployment, the roll-out of high-speed networks and supporting the adoption of emerging technologies and networks for the digital economy.

Additionally, the NSDAR established that there was a low level of integration of ICT products and services in the value chain of other industry and services sectors. This was compounded by poor cooperation at local/regional levels between academia, research, and industry to develop and promote ICT products and services, lack of incentives and adequate support for entrepreneurship and innovation in ICT, and a low share of population and SMEs which purchase goods and services online. This informed the rationale of the second investment priority: developing ICT products and services, e-commerce and enhancing demand for information and communication technologies.

The NSDAR also noted the lack of coordination and insufficient data security measures in the public IT systems, scanty digitisation of public institutions, and a low number of digitised public services. Romania was characterised by low use of ICT tools in education, low interoperability of healthcare applications and insufficient telemedicine, and limited digitisation of cultural artifacts. This formed the rationale for the third investment priority: strengthening ICT applications for e-government, e-learning, e-inclusion, E-cultura, and e-health.

The design of the COP, and specifically Priority Axis 2, sought to advance digital transformation, which became critical to business and operational continuity during the COVID-19 pandemic. During the design phase, ICT horizontal interventions in governance processes were identified as important drivers of Romania's economic competitiveness, as the promotion of a regulated, efficient, and secure digital environment would enable businesses and citizens to engage efficiently and effectively with public institutions.

Figure 4. Structure of Priority Axis 2 of the Competitiveness Operational Programme



Source: Original elaboration based on the Competitiveness Operational Programme.

Theory of Change

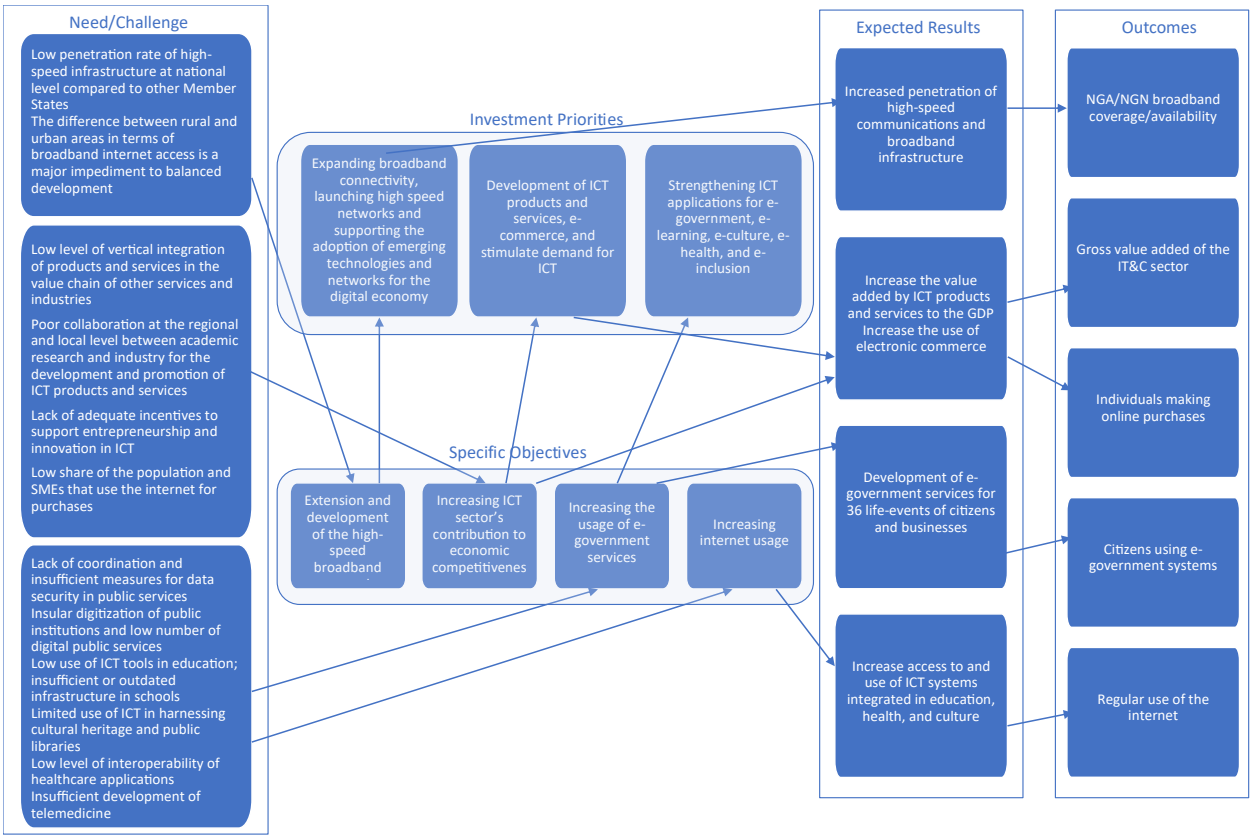
Based on the needs assessment conducted during the development of the NSDAR, the original theory of change set out three investment priorities: to increase the availability of high-speed broadband infrastructure and bridge the rural-urban gaps in broadband access; to stimulate demand for ICTs by developing products and further e-commerce; and to strengthen ICT applications for e-government, education, health, and culture. Each of these had expected results and outcomes that were measured as per the indicators in the evaluation framework. This included the measurement of NGA broadband coverage and

availability, the gross value added by the ICT sector and e-commerce take-up, and use of the internet for e-government, education, and culture.

During the evaluation, the team conducted stakeholder consultations and engaged with the Managing Authority of the Competitiveness Operational Programme to revise the original theory of change (Figure 5). The revisions were necessitated by the nature of implemented projects and the need to better articulate the results chain towards longer-term outcomes.

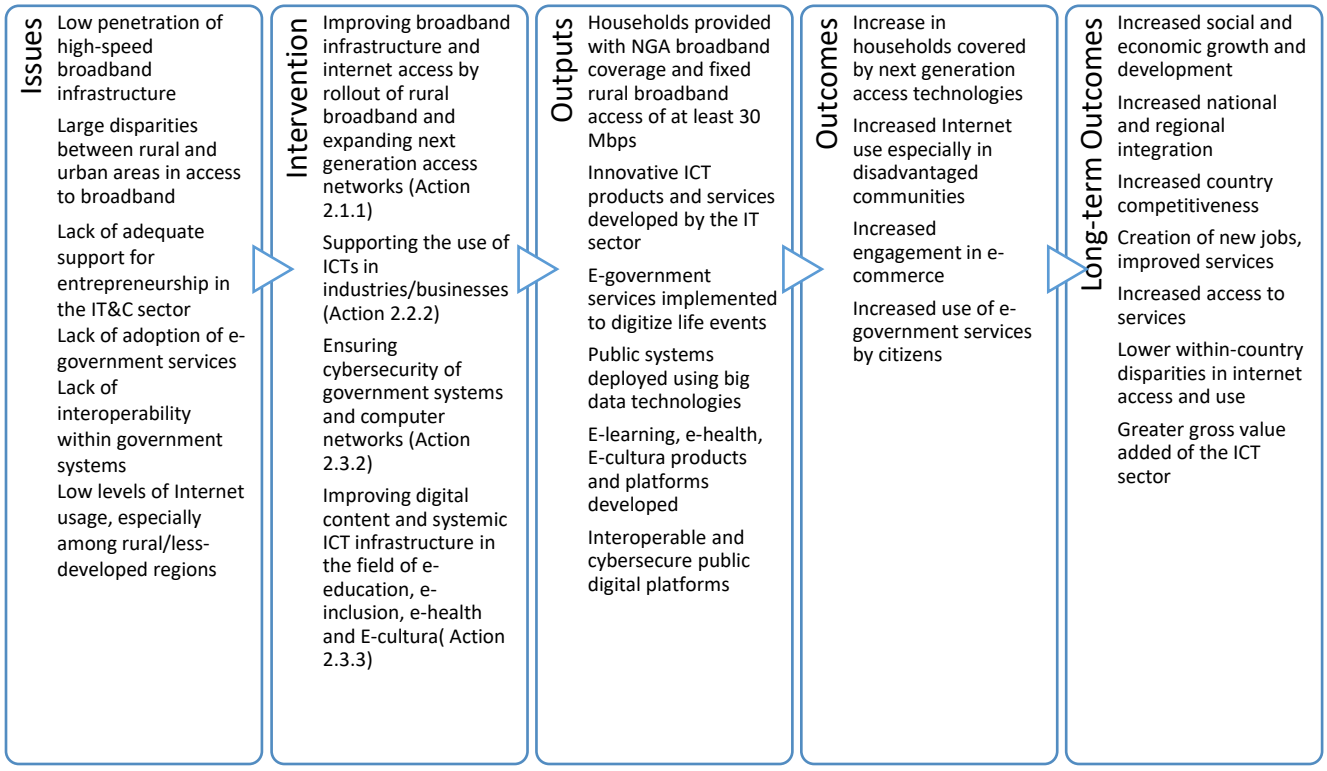
The revised theory of change in Figure 6 articulates the progression of inputs to outputs, outcomes, and eventual impact clearly, and highlights the fundamental assumptions that underpin the results chain. The team considered potential impacts of COVID-19 on the theory of change. While consultations suggested that some interventions during implementation faced challenges due to the pandemic, these remained minor in observed instances. As a result, the evaluation team expects the mechanisms that translate inputs to outcomes under this Priority Axis to remain relatively unchanged and presents qualitative evidence on COVID-19 impacts observed within the scope of the evaluation. To assess the impacts of the pandemic explicitly, further evaluations may be required.

Figure 5. Original Theory of Change per Evaluation Plan (2015)



Source: Translated (EN) from the Original Evaluation Plan of the COP.

Figure 6. Revised Theory of Change



Critical assumptions:

1. Strong government commitment to utilise EU funds under PA2 in the implementation period
2. Private sector willingness to engage in developing new innovative ICT products/services
3. Private sector willingness to roll out NGN networks
4. Citizens, especially disadvantaged communities, are interested in using the internet
5. Readiness within government to support common standards for cybersecurity and interoperable public digital platforms

Source: Original figure produced by the evaluation team.

Status of Priority Axis 2 Projects

This section provides a descriptive analysis of the status of projects financed under Priority Axis 2. This analysis frames the context for the scope of the evaluation and is critical to understanding the impact that may be evaluated at this stage.

Table 2.Value of Projects by Project Status and by Investment Priority

Investment Priority and Project Status	Total Budget (RON)	Number of Projects
Improving Access to Broadband	**525,026,651.70**	**28.00**
Completed	8,049,640.50	1.00
In implementation	516,977,011.20	27.00
Increasing Economic Competitiveness	**1,558,154,075.15**	**241.00**
Completed	790,515,970.18	151.00
In implementation	625,444,554.53	58.00
Terminated	142,193,550.44	32.00
E-Government	**2,827,412,102.03**	**203.00**
Completed	1,002,058,869.52	178.00
In implementation	1,822,824,567.79	23.00
Terminated	2,528,664.72	2.00
Increasing Internet Use	**403,845,480.23**	**293.00**
Completed	384,949,778.56	275.00
In implementation	18,895,701.67	18.00
Grand Total	**5,314,438,309.11**	**765.00**

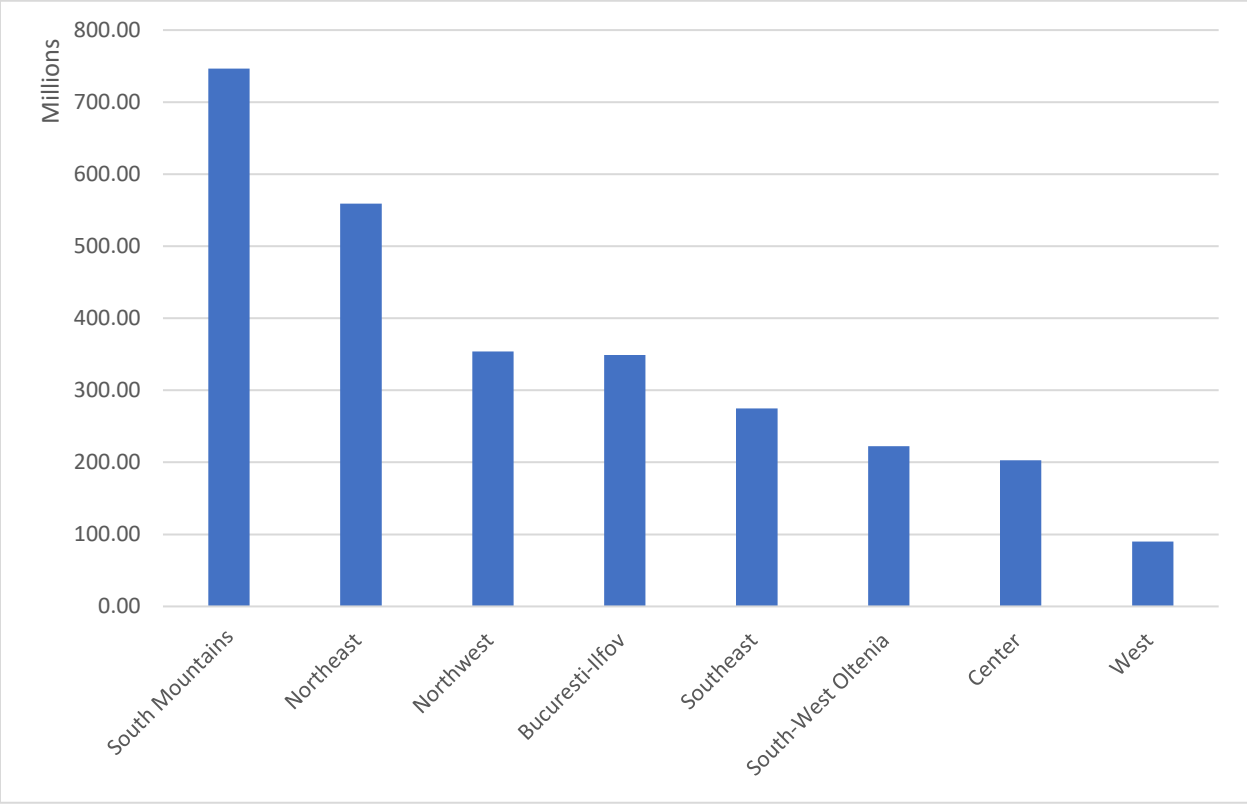
Source: Data Provided by OIPSI

Projects under implementation constituted the largest chunk of COP Priority Axis 2 financing as of March 31, 2023. Completed projects primarily belong to Investment Priority 2.2 focused on promoting firms' competitiveness, and Investment Priority 2.4 focused on promoting internet use in education, health, and culture – the latter primarily comprised of grants made to schools to provide tablets to students for e-learning during COVID-19. Of the 27 approved projects

on NGN/NGA access, only 1 project has closed. 23 contracts signed under Investment Priority 2.3 were still under implementation (Table 2). Across all investment priorities, 64 projects closed within 6 months of the cut-off date.

Projects amounting nearly 50 percent of the total financing value were committed as late as 2019 and 2020, towards the end of the programming period and the start of the evaluation period. Most programme funding is allocated to national-level programmes pertaining to e-government (60 percent). Regional allocations vary significantly (Figure 8). While overall allocations are lowest in the West region and the highest in the Southern Mountains region, per capita allocations were highest in the West region and lowest in the Northeast region.

Figure 7. COP Priority Axis 2 Allocations by Region, RON



Source: Original elaboration using data from the COP Managing Authority.

2. Methodology

Summary:

- This evaluation used both theory-based and counterfactual impact evaluation approaches to comment on the effectiveness, efficiency, and impact of funded interventions.
- Primary data was collected using two rounds of surveys in early 2021 and 2022, a focus group, and 30+ semi-structured stakeholder interviews.
- Case studies were developed using project documentation reviews, in-depth interviews, and in some cases, engagement with built online platforms.
- Counterfactual evaluations primarily relied on event studies, exploiting the staggered rollout of broadband and multiple rounds of firm innovation grants.

Research Questions

This is a summative, utilisation-focused evaluation combining theory-based and counterfactual approaches. The evaluation uses qualitative and quantitative methods for the analysis of both primary and secondary data. Primary data was collected through three rounds of interviews with internal and external stakeholders, two rounds of surveys of COP PA2 beneficiaries and applicants as well as a review of the portfolio of funded projects and relevant project documentation. Secondary data comprised legal, strategic, operational, academic and policy documents, as well as statistical data from the National Authority for Management and Regulation of Communications (ANCOM), National Trade Registry, and the Patents Office.

The evaluation addressed the following questions:

Effectiveness

1. To what extent were the interventions carried out according to expectations, produced the desired change (achieved specific objectives) and must be further funded?
2. What factors influence the effects of interventions and how?

Efficiency

1. How efficient were COP project selection and implementation processes?

2. How efficient were COP projects relative to relevant outcomes?

Impact

1. What is the observed progress in meeting the stated objectives in targeted sectors, territories, and groups since the beginning of the interventions (gross effects)?

2. To what extent may the observed progress be attributed to the funded interventions (net effects)?

3. What are the unintended effects of funded interventions, positive or negative, if any?

4. Are there any effects of funded interventions beyond the targeted territory, sectors, or groups (spill-over effects)?

5. To what extent are the effects of the interventions sustainable for a longer period (sustainability)?

Due to the pace of programme implementation, this evaluation report is only able to partially answer questions on impact and cannot answer questions on sustainability, which must be looked at in a separate ex-post evaluation focused on medium- and long-term impact and sustainability.

Theory-based Evaluation

Multiple sources and methods were used to address each evaluation question, to overcome the limitations of different methodologies, facilitate the triangulation of collected evidence, and maximise the robustness of the findings. The sections below briefly describe each method and its use.

Desk Review

A review of programme and project related documents was used extensively throughout this evaluation. Most importantly, at the early stages, the review of legal (Common Provision Regulation No. 1303/2013) and strategic documents – Ex-Ante Evaluation of the COP, Partnership Agreement 2014–2020, Competitiveness Operational Programme 2020, COP Evaluation Plan (2015), COP Monitoring Framework – was used to carry out a thorough policy review of PA2, identify the main objectives, elaborate the intervention logic, and develop the evaluation framework. This process was complemented by discussions with internal stakeholders (e.g., the Evaluation Team of the Ministry of Investments and European Projects and members

of the Managing Authority) to build a comprehensive understanding of the operational aspects of the programme.

The desk literature review was an essential tool for building a thorough understanding of PA2 interventions, and its theoretical, policy and operational context. The review of strategic and operational documents served as a basis for the analysis of effectiveness (results achieved so far) and efficiency, as ex-ante cost-benefit and financial analysis documents were reviewed. Additionally, a desk review of relevant legislation, implementation reports and evaluations of relevant earlier interventions was undertaken. Information collected through the desk review was triangulated with evidence collected through interviews (more information on interviews is provided below). Finally, a review of relevant academic literature was undertaken to inform the evaluation methodology. The list of sources to be analysed was continuously updated as and when new internal and external documents, reports, papers, etc. became available.

The above-mentioned portfolio-level analysis was complemented by more granular documentation reviews of seven projects, which were used in conjunction with in-depth interviews and stakeholder consultations to develop case studies. Project studies included a review of the main project design and implementation procedures, published objectives documents and interim implementation reports, if any.

Survey of Beneficiaries and Applicants

Surveys are frequently used to assess how stakeholders feel about the realisation of policy outcomes before, during and after a given policy intervention. Two rounds of surveys were conducted for the purposes of this evaluation. The survey questionnaire included closed and open-ended questions. Closed questions asked stakeholders to rank their experience of the programme and to express a degree of agreement or disagreement with given statements.

Surveys of applicants and beneficiaries under PA2 complement the desk review. The surveys were used to document both intended and unintended consequences of the interventions. Also, the survey was designed to include questions about lessons learned, to help improve the programming process in future years.

Two questionnaires were designed: a) a questionnaire evaluating the pre-application, application, selection and contracting of beneficiaries and b) a questionnaire focusing on project implementation, monitoring, and disbursements.

The two rounds of surveys took place in December 2020 – March 2021 and January – February 2022, respectively, and were administered in the form of online questionnaires in both Romanian and English. Details on the instruments and the exact timelines are provided in Annex B. The response rates in the two rounds of surveys were 20.8 percent and 15.7 percent respectively.

Although the response rates were within the average range for online surveys, the team noted possible survey fatigue, competing demands on respondents' time, and early stages of implementation of several projects amid COVID-19 as possible factors contributing to relatively low response rates. In the light of these considerations, in lieu of a third planned round of surveys in 2023, the team chose to conduct more in-depth interviews instead, especially those to do with mechanisms of impact and effectiveness.

The results of both surveys primarily inform the analysis of effectiveness, with some insights into the efficiency of processes used. The survey analysis included descriptive statistics, as well as some correlational analysis of firm characteristics and their responses to questions relating to efficiency and effectiveness of COP processes. In-depth interviews with stakeholders were triangulated with survey responses where appropriate, to provide a holistic evaluation.

Surveys fielded for this evaluation have some inherent *limitations*. First and foremost, they are not representative. Further, as with all surveys, there is a risk that social desirability bias might motivate respondents to provide answers that present them in as good a light as possible. In our surveys, this might translate either into respondents overstating their dissatisfaction with the process (if their funding application was unsuccessful) or overstating their satisfaction (if they were awarded funding). This risk was mitigated by offering assurances that survey responses will be kept confidential. The data was analysed in aggregate to protect respondents' privacy. Finally, the initial round of surveys was dominated by firms still under evaluation owing to the stage of programme implementation, which poses a risk due to response bias. To mitigate this, the team conducted some sub-group analysis to segregate responses of firms under evaluation separately from those that were already awarded grants and conducted a second round of surveys with beneficiaries analysed along with administrative data to shed light on relevant evaluation questions.

Interviews

To address the limitations of the desk review and surveys, this evaluation also used semi-structured interviews with key project and programme stakeholders to collect expert opinions on the implementation and effects of ESIF projects. Stakeholders were divided into programme-level and project-level stakeholders. Programme level stakeholders included the Managing Authority of the Programme, the primary implementation bodies, and the Ministry of Investments and European Projects. Project-level stakeholders were organisations which implemented projects funded through COP Axis 2. Interviews with programme-level stakeholders helped to inform the intervention logic analysis and clarify relations with other EU interventions and operational programmes (in combination with desk review of relevant documents). Further, in-depth interviews allowed for more nuanced discussions with stakeholders who had provided survey responses as well.

Efforts were made to reach out to all stakeholders of relevance to ensure comprehensive data. Throughout the evaluation, the team conducted around 30 interviews between January 2021 and April 2023. Among the interviewees were project managers for selected projects, contractors, regulators, managing authority officials, officials from the intermediary body, independent oversight organisations, organisations representing the sectors being evaluated, as well as representatives of firm beneficiaries selected through a random draw stratified for each round of awards under IP 2.2. Some interviewees were contacted multiple times, as the projects they oversaw progressed during the evaluation period.

The team streamlined the interview process by circulating Interview Guides in advance. The Guides were based on a long list of questions and tailored to specific groups of interviewees, generally focusing on strategic issues. The interviews spanned both completed projects and projects in various stages of implementation. Some interviews were used to corroborate the findings of the counterfactual evaluation, and followed a semi-structured format with the key objective to uncover some of the mechanisms that may explain the results, provide additional hypotheses for testing, and triangulate existing results.

Case Studies

To complement the surveys and interviews described above, the evaluation included seven case studies that highlighted implementation progress, challenges, and factors affecting the impact of interventions. The objectives of the case studies were to provide examples that would illustrate the results of the survey and identify trends that may merit further

investigation (for example, to assess the extent to which specific findings from individual case studies apply to the programme as a whole). Where counterfactual evaluations were not feasible (for e-government projects, for instance), the evaluation included more case studies than for other areas to better answer evaluation questions on impact and effectiveness.

Case studies consisted of the analysis of project documentation and interviews. Interviewees were first notified of having been selected for a case study through an official letter, and then received the Interview Guide that was used as the basis for discussion. As most case studies were developed for public beneficiaries implementing large projects, the response rate for case study related inquiries was 100 percent. The Interview Guides were based on a standard set of questions but tailored every time to the specific characteristics of the evaluated intervention. Each interview was supplemented by an in-depth project documentation review and additional follow-up meetings, as necessary, for the purpose of developing the case study and triangulating findings with other data sources. The evaluation team also interacted with developed online platforms, to include their characteristics in the case studies.

Focus Groups

A focus group was used to gather additional information on interventions under Investment Priority 2.2. The objectives of the focus group were to provide insights into the intervention logic of the programme and to understand to what degree the logic envisaged in the framework was borne out by the implementation. In addition, the focus group explored the unintended effects of interventions.

Initially, two focus groups were planned for each investment priority, but only IP 2.2 had enough stakeholders respond to the invitation to form a focus group. While six focus groups were planned and invitations were sent out accordingly, it was decided to have focus groups only when more than three participants respond. Thus, only one focus group was formed, and the remaining five potential focus group participants were included in the interview pool.

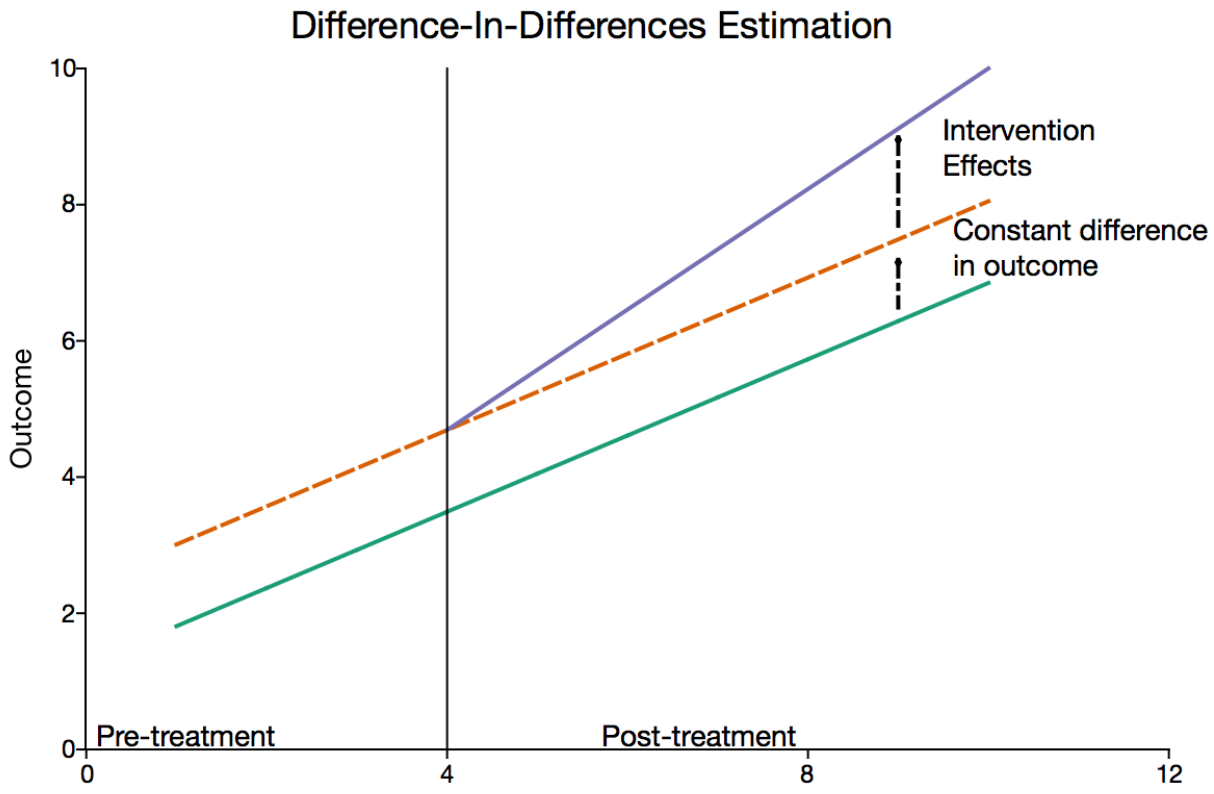
Counterfactual Evaluation

In this report, counterfactual evaluation was conducted for the rollout of broadband (Ro-NET) under Investment Priority 2.1 and interventions under Investment Priority 2.2, which focused on supporting innovative goods and services and digitisation of small- and medium-sized enterprises. Both counterfactual evaluations follow an event study design. Event studies are used to estimate treatment effects when treatment is not randomised, but panel data availability allows

the comparison of outcome trajectories before and after the onset of treatment, as well as across units treated at different times.

The event studies for the counterfactual evaluation use a difference-in-differences (DiD) design in which sets of units within the panel receive treatment at different points in time. The difference-in-differences method compares the changes in outcomes over time between a population that is enrolled in a program (the treatment group) and a population that is not (the comparison group). The difference in the before-and-after outcomes for the beneficiaries—the first difference—controls for factors that are constant over time in that group, since we are comparing the same group to itself. By measuring the before-and-after change in outcomes for a group that were not in the program, we obtain the second difference. It is essential to choose a control group that is similar in other observable and unobservable characteristics and account for time-varying factors that may interfere with inference. Figure 9 below provides a visual representation of the difference-in-differences methodology.

Figure 8. Visual Representation of the Difference-in-Differences Methodology



Source: ApTech, Introduction to Difference-in-Differences

The model is specified as follows. Let t = 0 before the intervention, and t = 1 after. The difference-in-differences estimator can be calculated as

$$\delta = E\,(Y_{1T} - Y_{0T} \mid T_1 = 1) - E\,(Y_{1C} - Y_{0C} \mid T_1 = 0)$$

where $T_1 = 1$ denotes treatment group at t = 1, whereas *$T_1 = 0$ denotes the control group and Y represents the outcomes.* In statistical terms, this is equivalent to the following regression*:*

$$Y = \beta_0 + \beta_1 * Treatment + \beta_2 * Post + \beta_3 * Treatment * Post + error$$

Where:
Y is the outcome variable;
Treatment is a dummy variable indicating the treatment (=1) and control (=0) group;
Post is a dummy variable indicating pre (=0) and post (=1) treatment;
Treatment * Post is a dummy variable indicating whether the outcome was observed in the treatment group AND it was observed after the intervention (=1), or any other case (=0).

For the method to be valid, the comparison group must accurately represent the change in outcomes that would have been experienced by the treatment group in the absence of treatment. To test the validity of the approach, the evaluation tested for the parallel trends assumption and stable unit treatment value assumption (SUTVA) in each case. This ensures that the potential outcomes without treatment are characterised by parallel trends and that there are no anticipatory effects. As the selection of treatment and control groups as well as the application of the tests for parallel trends and SUTVA varied across the two impact evaluations (for access to broadband and increasing economic competitiveness), we provide a more nuanced discussion of the application of the methodology to each case, as well as additional robustness tests, within the respective chapters.

3. Improving Access to Broadband

Summary:

- At the end of the evaluation period, infrastructure to connect almost 120,000 households was deployed, with infrastructure to connect an additional 160,000 households under implementation.
- While the share of the population under NGN/NGA coverage increased from 80 percent (2016) to 93 percent (2023)[7], this increase is not attributable to COP-financed projects still under implementation whose effects are yet to fully materialise.
- Delays in the construction permitting process, legislative inconsistencies on permitting, restructuring of the primary public beneficiary, administrative delays in payments and technical audits, and connecting electricity networks delayed implementation.
- Ro-NET cost nearly 80 000 EUR per connected locality; construction costs formed the bulk of this cost, but the project proved to be cost-effective overall.

Two types of projects supported under Investment Priority 2.1 were initially expected to improve broadband access for 300,000 households and increase the share of the population with NGN/NGA network access.

Ro-NET – a major phased project to expand broadband access – is a programme that initially sought to reach 187 000 households in 783 localities out of the white areas identified by the National Authority for Management and Regulation of Communications (ANCOM). The target indicator for this investment priority (number of households reached) was amended owing to the entry of private sector providers in white areas while the project was rolling out, leading to a lower target of 695 localities, and approximately 169 283 households. The beneficiary of the project was the Ministry of Communication and Information Society (subsequently restructured into the Ministry of Research, Innovation and Digitalisation). The Ro-Net project commenced implementation in 2016 and was rolled out in two phases. While all infrastructure has been deployed as of end 2022, technical and financial audits remain to be completed. Infrastructure built makes high-speed broadband internet available for about 120 000 households in designated white areas.

[7] European Commission's Digital Economy and Society Index

NGA/NGN projects were the second type of supported projects. Financing was granted through an open call for 27 projects implemented by seven small and medium-sized enterprises (SMEs) that are recognised by ANCOM as internet service providers in Romania. All these projects were signed in 2019 and 2020 and aim to reach a total of 160 527 households in 744 localities. As of March 31, 2023, out of the 27 NGN/NGA projects commissioned, 22 were still under implementation. Only five projects had completed implementation, four of which were completed in February or March 2023 and are in the process of being verified. One project in the Tulcea-Braila region, covering 4 321 households, was the first to be completed in late 2021[(8)]. Owing to delays in implementation, effectiveness and impact of these projects could not be adequately measured before the report cut-off date. Construction is still underway in most NGA/NGN designated localities.

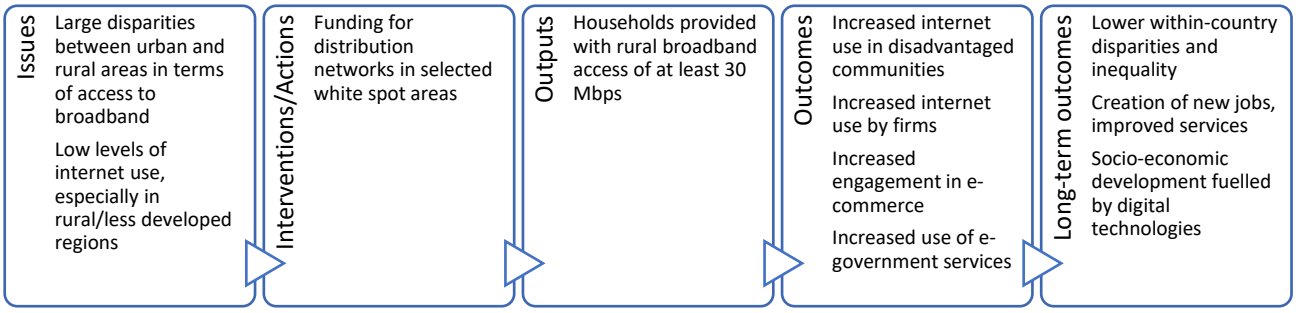
Both the Ro-NET and the NGN/NGA projects faced delays in implementation due to several factors. NGN/NGA projects studied mentioned protracted construction permitting as the key challenge to implementation, impacting projects' effectiveness. In early 2022, the Intermediary Body organised a meeting with beneficiaries to discuss the need to accelerate implementation and to agree on an extension of implementation deadlines based on beneficiaries' specific circumstances. As of the cut-off date, most NGN/NGA projects were due to close in Q2 and Q3 of 2023 and are not studied in detail in the rest of this chapter. A detailed analysis of the challenges faced by Ro-NET are in the following section.

The Ro-NET Project

The Ro-NET Project (MySMIS Project #109953) is a major, phased project under PA2 of the Competitiveness Operational Programme (COP), and it was funded in two consecutive programming periods: 2007–2013 and 2014–2020. The project seeks to build and operate national infrastructure for broadband communication for the provision of electronic communication services in disadvantaged rural areas not covered by broadband internet services. The overarching theory of change for Ro-NET as a rural broadband program can be summarised as follows:

[(8)]OIPSI, March 2022.

Figure 9. Theory of Change for Ro-NET



Source: Original elaboration of the evaluation team.

The Ro-NET project focused on the rollout of backhaul networks with an aim to create conditions for ensuring a healthy and balanced competitive environment, with direct effects on lowering tariffs applied to final subscribers and indirect effects on local economic growth and job creation. The project was phased, covering 99 localities in Phase I and 596 localities in Phase II. The Ro-Net project encompassed only backhaul infrastructure deployment, while local loops remain uncovered. The backhaul network comprised the intermediate links connecting the individual local broadband access points to the backbone infrastructure, including both passive elements (equipment for local broadband access points) and active elements (fibre-optic networks, radio relays, and microwave).

As stated in the national Ro-NET master plan, the entire process of development and implementation was designed to respect technological neutrality, both in the distribution (backhaul) network and in the local-loop (access) interconnection. Thus, the connection with local loops was allowed at the distribution point using any available technology. Up to four service providers can connect at any given local broadband access point constructed under the Ro-NET

program, which provides an overall broadband bandwidth capacity of 10 Gbps at each access point.

The Ro-NET project uses the design, build, and operate model where financial assistance is provided for the design and deployment of new infrastructure, and no aid is to be granted for the operation of the network. The infrastructure was designed to remain under public ownership, and the concessionaires were to pay a fee of 18 percent of the investment value for an 18-year concession to have the right to retain the remaining revenues generated from managing and operating the networks. The concessionaire(s) also had the option to purchase the respective network and its facilities, subject to a government decision transferring those assets from public to private hands.

A geospatial analysis by the regulator (ANCOM) in 2013, in consultation with service providers, identified 2 287 white areas where no operators offered broadband connectivity at a speed of above 4 Mbit/s for business users and 1 Mbit/s for residential users. Of these, 783 were initially selected where the provision of backhaul may result in last-mile broadband investments. Feasibility studies conducted by the Ministry of Communications and Informational Society (subsequently restructured into the Ministry of Research, Innovation and Digitalisation) indicated that for these 783 localities, after seven years of operation, operators will be able to turn a profit from the built infrastructure supported by state aid. Ro-NET Phase II thus initially focused on these 783 localities.

This target of 783 localities was revised to 695 during the implementation period owing to some areas experiencing market entry by service providers or having requisite infrastructure, and therefore not needing to be covered under Ro-NET. In two instances, local authorities did not issue building permits and thus construction could not proceed.

Localities were grouped into seven regions, and a tender was organised for seven lots (one per region). Selection was based on an open tender process with contracts awarded to the applicants satisfying parameters for selection and presenting the most economically advantageous offer (that is, requiring least financial subsidy). The process awarded Telekom Romania (formerly Romtelecom) and Cosmote the financing agreements to implement the projects. Telekom Romania won the contract for four regions and Cosmote for three. Orange Romania inherited the project after acquiring Telekom Romania in 2021.

Ro-NET infrastructure had all been deployed by end-2022, but technical and financial audits remain. The project was originally supposed to be completed by 2019, then, extended to 2020, and construction was completed in April 2022. As of November 2022, 695 localities have had broadband deployed; 691 municipalities were submitted to OIPSI for reimbursement of expenses. Four localities are undergoing technical analysis for final acceptance and submission for reimbursement. At present, all seven lots have been completed, with few instances where remedial actions need to be taken to repair the infrastructure damaged due to vandalism, auto accidents or landslides. The status of each lot is as follows.

Lot 1 – closed, in operation since 23.04.2019 (PIF810/23.04.2019)
Lot 2 – closed, commissioning on 22.07.2022 (CA no.327/12.05.2021, PIF338/22.07.2022)
Lot 3 – closed, commissioning on 26.07.2022 (CA no.6302/21.10.2021, PIF340/26.07.2022)
Lot 4 – closed, commissioning on 29.07.2022 (CA no.229/26.06.2022, PIF343/29.07.2022)
Lot 5 – closed, commissioning on 30.09.2022 (CA no.1530/31.07.2019, PIF692/10.11.2022)
Lot 6 – closed, commissioning on 28.10.2022 (CA no.461/14.09.2022 PIF623/28.10.202)
Lot 7 – closed, commissioning on 29.12.2022 (PIF780/29.12.202)

The main result of the of Ro-Net is that in 695 localities, new infrastructure allows market operators to enter broadband market. This is likely to improve public services and created conditions for greater access to information for residents. In case no service provider enters the market within 6 months of project closure, the implementing companies (Cosmote and Orange) can offer internet services to local authorities as anchor tenants. As of March 2023, Orange was analysing the feasibility of connecting around 40 000 households in Ro-NET localities to fibre-optic-to-the-home networks.

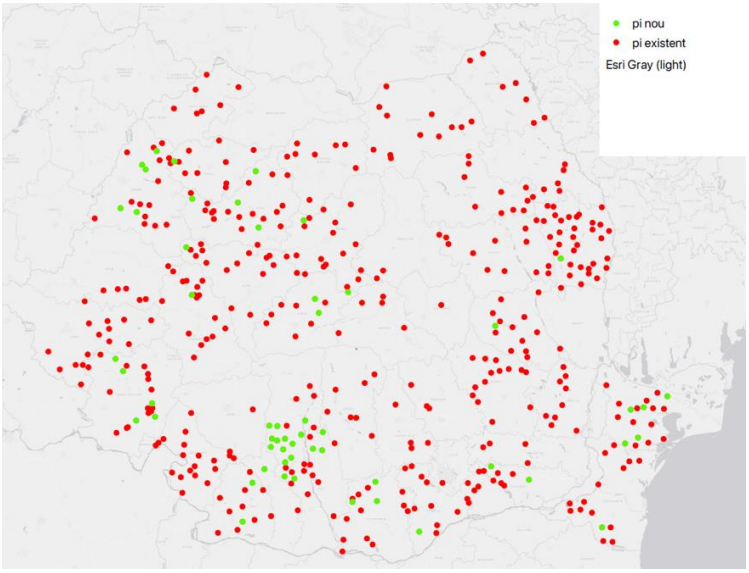
Table 3. Results of Ro-NET

Indicator Name	Value
3S36 - Radio Towers, (include radio equipment)	6
3S34 - New insertion points	48

Indicator Name	Value
3S30 - Number of beneficiaries of the project, households covered with access services	119 592
3S35 - Existing insertion points	362
3S33 - Local access points to the broadband network	695
3S27 - Number of access points to broadband internet	695
3S29 - Number of inhabitants of the localities not previously provided that are provided through the implementation of the project	345 819
3S28 - Number of SMEs of the localities not previously provided that are provided through the implementation of the project	7 189

Source: Ro-NET Project Management Unit.

Figure 10. Map of Insertion Points (New and Old), September 2021



Source: Original figure using Ro-NET data.

Causes of Delays to Implementation Limiting Effectiveness

Right from the beginning of Ro-NET Phase II, there were significant delays to project implementation. Using in-depth interviews with primary stakeholders triangulated with evidence from desk review and data obtained from the Managing Authority, the evaluation established several factors contributing to the slow progress in implementation.

Constant reorganization of the strategic public beneficiary. The evaluation found that shifts in ownership were a key barrier to project progress. The project implementation unit has undergone several restructurings, most recently in January 2021. After the reorganisation of the Ministry of Communications and Information Society in 2020 and 2021 (it was first amalgamated with the Ministry of Transport into the Ministry of Transport, Infrastructure and Communication and the Authority for the Digitalisation of Romania in 2020 and then moved to the Ministry of Research, Innovation and Digitalisation) nearly half of all project staff was lost, and the implementation was delayed severely.

From the beginning of 2020 until now, the activity within the project has been carried out with difficulty, as the project team comprises staff from two ministries. Further, constant reorganisation affected budgets. As of early 2021, there was no approved budget for the project implementation unit, although on paper the budget was approved under the Ministry of Research, Innovation and Digitisation. Stakeholders noted that ministerial ownership is key to project implementation success. Due to constant reorganisation of the team and its parent ministry, there were delays in payments, which eventually caused delays in the work of the contractor, Orange Romania.

Complexity of connecting to the existing electrical network. Interviewed stakeholders noted that the process of applying for permissions to use and connect to the electrical network was cumbersome due to the lack of clarity in the secondary legislation. There is a regulation that requires a coexistence study between electrical and communications networks before the technical authorisation to connect to the electrical network can be issued. This adds another layer to the complex bureaucracy that delayed project implementation.

Heterogeneity and complexity of local regulations and processes. Stakeholders noted that building permits were granted at the municipality level, even for large projects such as Ro-NET.

The authorisation procedures tend to vary by county and are often cumbersome, which delayed network construction. Lack of coordination between central and municipal authorities on the permits and rights-of-way procedures has also delayed the project.

Delays in payments. Over the course of project implementation and during evaluation, Ro-NET contractors cited several delays in finalisation and reimbursement for works that had already been completed. Payment delays were mostly generated by the concessionaires in relation to their subcontractors. As of mid-2021, construction had been completed in several localities in all seven lots, but delays in audits and subsequent reimbursements challenged operationalisation. Without the requisite finalisation and payments, the lots were not put into use, despite the completion of construction works. This was in part due to contractual agreements to complete construction in all localities within a lot before payments were made, which delayed operationalization.

Lessons to Improve Project Implementation

Revisiting and harmonising permitting processes. Romania could do well to consider a minimal information approach to building, permitting, and authorisation processes, by designating a nodal office at the county level that can summarise information in a user-friendly manner and keep it up to date considering constantly changing procedures and fees. This would allow service providers to receive information on most procedures in one location saving time and energy. It may also be useful to revisit the number of clearances based on which building permits are issued for new network buildouts, given that clearances were a bottleneck in the permitting process. Simplifying the requirements for accessing and using electrical network, especially for projects of such a scale, would be beneficial for future improvements to the internet infrastructure in white areas.

Lessons Learned for Future Projects

Focusing on the demand-side factors limiting internet adoption may be key to bridging the last mile access gaps. Reaching the most marginalised with affordable and cost-effective access to internet is an implementation challenge that cannot be solved through network rollout alone. Deep contextual engagement, sustained implementation support, and capacity development is therefore important. Given Ro-NET's success in achieving supply-side connectivity, future programmes should include demand-side policies, such as digital skills training and locally

relevant and easily accessible online content. The low device penetration rate and low digital literacy are key factors of the significant demand gap between urban and rural areas of Romania. Demand-side measures are critical to improving adoption, as in-depth interviews with government stakeholders delivering digital public services reported that intended beneficiaries did not know that certain operations could be performed online. The top three reasons for not using a service are the technical issues (site going down), lack of promotion, and lack of user support. Poor uptake of e-government services points to the need to increase resources and efforts in communication and user support for the general population.

Programmatic approaches to digital skills training stimulating demand for services should be one of the pillars of a comprehensive approach to last-mile connectivity in rural communities. Digital skills training lies on a broad spectrum, depending upon the trainees: high school graduates who are unemployed require very different resources from adults with traditionally weak literacy skills. Transforming digital skills training programs from a process-based training approach to a results-based training approach is key, with contextual needs assessments conducted to discover barriers faced by marginalised communities for better design, and a stronger focus on results.

Further, investing in the enabling environment for regular broadband use – such as through investments in digital public services, facilitating e-commerce – can help improve uptake within marginalised communities. Local capacity building and engaging with key public institutions to stimulate demand may act as a starting point for greater adoption. Further, disseminating information on benefits of mobile phone ownership and digital services use in low penetration localities may also be useful.

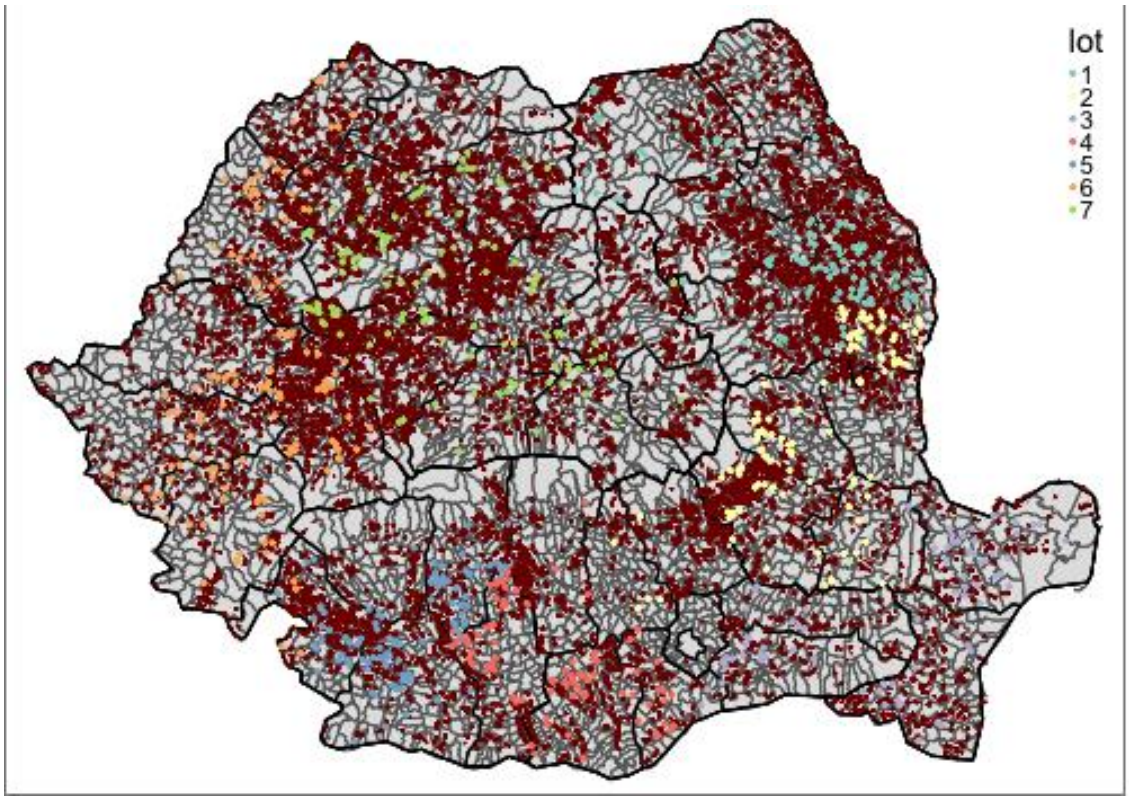
Consider other community-led models for supply-side rollout of last-mile networks. Currently, Ro-NET uses a DBO (design, build, and operate) model where the public authority (or a private sector company) builds, runs, and controls a broadband network in the municipality, county, or region. However, other models for last-mile connectivity are possible. In community networks, broadband investments are initiated by residents within rural communities (bottom-up approach), and public authorities can provide support through co-financing and rights-of-way granting, regulations to ease access to spectrum, coordination with other infrastructure deployments, and facilitating access to public infrastructure. This model has been applied in several countries; guifi.net in Catalonia, Spain, is a European example of such a model.

Short-term Effects of Ro-NET

We employ an event study approach including municipality and year fixed effects to estimate the impact of broadband availability on various outcomes for firms in newly covered areas. The Ro-NET project serves as a source of exogenous variation in broadband availability. Due to phasing, access to broadband was progressively rolled out, so that the necessary infrastructure (access points) was established in different localities at different times. Conditional on year and municipality fixed effects, the availability of high-speed broadband across municipalities is plausibly exogenous to outcomes by firms. This approach follows the literature on measuring the effects of broadband infrastructure (see Akerman et. al., 2015; Bhuller, 2013).

As some Ro-NET lots were only recently made operational, the impact evaluation assesses progress made by lots made operational in 2019 vis-à-vis lots that became operational later. The treatment group consists of firms located in villages that were connected to broadband in Lot 1 made operational in early 2019, while the control group is composed of firms in villages that were connected in Lots 2, 3, and 4 which were made operational in mid-2022.

Figure 11. Ro-NET Lots and NGN-white Areas Identified by ANCOM in 2015



Source: Original figure using data provided by COP-MA and ANCOM.

Profit, firm size (as defined by total labour force), and labour productivity are the dependent variables for the counterfactual evaluation. Ro-NET connected lots comprised 695 of the 6231 villages with less than 30 Mbps download speeds identified by ANCOM in 2015 (Figure 12). While connection of further 744 villages was commissioned via Priority Axis 2.1 under the NGA/NGN category, most of those projects faced construction delays and have thus not been included within this evaluation. While firm entry was evaluated, most villages where Ro-NET was rolled out had seen no entry, with less than 5% of the sample showing any kind of firm entry. A separate evaluation of private-led rollout alongside public rollout (including all operators which entered new villages without 30 Mbps broadband in 2014–2021) shows significant effects on firm entry.

Firm profit, size, and productivity are continuously measured and are expected to respond to the introduction of broadband connectivity. To enhance the robustness of our results, the study controls for various time-variant firm and village-level characteristics that may simultaneously affect broadband rollout and our dependent variables.

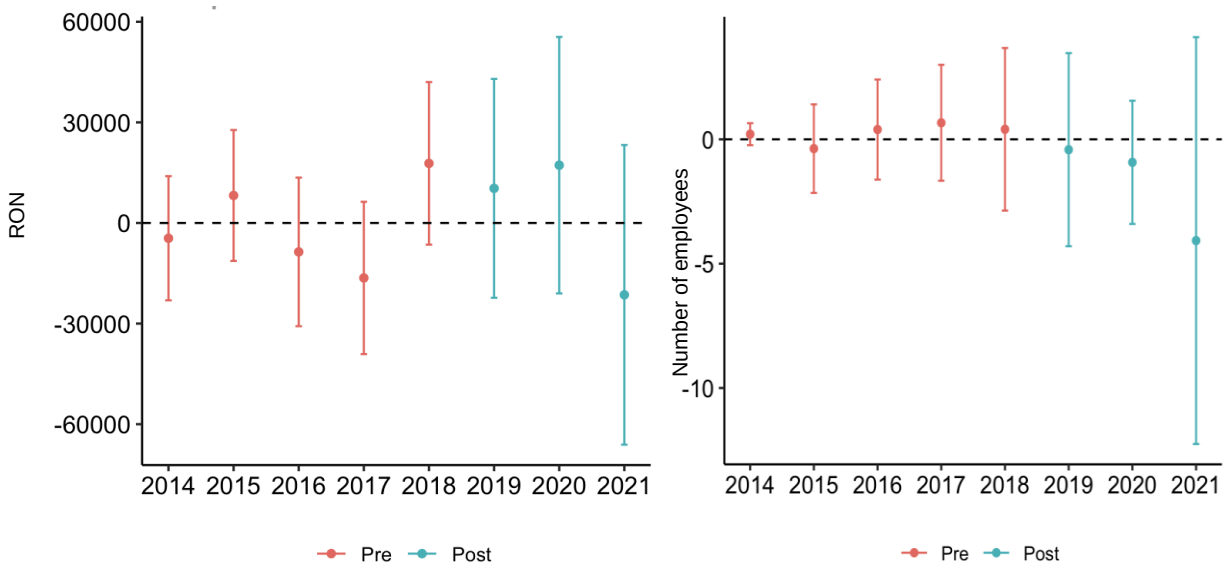
The post-treatment period is defined as the years from 2019 to 2021, the latest year for which data is available. The evaluation further tests the validity of the DiD approach by performing a parallel trends assumption check, to ensure that both the treatment and control groups were following similar trends in the pre-treatment period (Figure 13).

Figure 12. Parallel Trends Assumption for Ro-NET

Source: Original elaboration by the evaluation team

The critical assumption underpinning this analysis is that the localities chosen for all lots were roughly equivalent in their baseline trends, that is, these were all unserved or underserved localities that did not see entry by private providers in the absence of Ro-NET. This assumption is first checked using Figure 14 below. Parallel trends seem to hold primarily for profit and size but not for turnover and labour productivity. The event study is hence conducted for profit and firm size only, estimators that are robust to heterogenous treatment effects. (See Annex E for a more detailed discussion of the method.) No significant effects are registered on either estimator in the short period after the Lot 1 was operationalised (Figure 14).

Figure 13. Event Study Plots for Profit and Firm Size



Profit *Firm size*

Source: Source: Original elaboration by the evaluation team

These results must be carefully considered with significant caveats. Currently, the evaluation does not register any changes to firm outcomes in affected villages. However, the evaluation only looks at the operational lots, of which only one was operational with enough time to observe any impacts. The remaining six lots are yet to be evaluated for effects. As the lots were operationalised shortly before COVID-19, any firm effects observed may be overshadowed by negative impacts of the pandemic on firm operations. Further evaluation is recommended to uncover medium- and long-term effects of all lots, as well as spillover effects to adjoining villages.

Cost Effectiveness of Ro-NET

Efficiency of large-scale infrastructure projects can be calculated using cost-effectiveness and cost-benefit analyses. Cost-effectiveness analysis distils intricate programs into a straightforward ratio of expenses to results. While such analysis lacks nuance necessary for guiding all policy or investment choices, it does furnish a metric for comparing different policies. To determine cost-effectiveness, two crucial data points are required: a projection of the program's outcome and the program's expenditure. For Ro-NET, the outcomes are captured by the number of localities that would not have had internet connectivity in the absence of the program, while the costs are captured by the costs incurred in rolling out this connectivity (Table 4).

Table 4. Total Costs Incurred by Ro-NET as of March 2023

Type of expenditure	Project cost (EUR)
Fees (planning and design)	1 366 166.95
Land acquisition	0.00
Construction and buildings	41 863 616.70
Plant and machinery	0.00
Unforeseen expenses	1 608 109.07
Price adjustment	0.00
Technical assistance	0.00
Advertising	107 517.18
Supervision during execution construction works	990 780.25
Subtotal	45 936 190.15
Ineligible expenditure, including VAT	10 909 952.53
TOTAL	56 846 142.68

Source: COP Managing Authority.

Construction costs amounted to 73 percent of the total cost, which is reasonable given the challenging terrain of the localities served by Ro-NET. Planning and supervision were both a small component of overall costs, and only 3 percent was attributable to unforeseen costs, suggesting effective planning and use of allocated funds.

Ro-NET cost effectiveness ratio is 81,793 EUR for each previously unconnected locality, given that 695 localities were successfully connected as of project closure. This value is equivalent to the 80th percentile of the cost to connecting unconnected rural areas in the United States[(9)]. The evaluation notes that this is a relatively good value among comparable projects in the region. It is also noteworthy that the average cost of construction for Ro-NET was slightly lower than 80% of project costs estimated by a previous impact assessment conducted as part of the Broadband Cost Reduction Directive in Europe.

[(9)] Cost estimated by the United States Federal Communications Commission as their Reserve Price for bids to connect rural localities as of 2020 is available here: https://www.fcc.gov/auction/904.

4. Increasing Economic Competitiveness

Summary:

- Competitiveness Operational Programme (COP) provided financing to 241 projects to develop 278 innovative products/services via three rounds of competition in 2017, 2019, and 2020. This vastly exceeded the initial target of 45.
- Funded projects varied in their sectoral focus with most products being in various stages of market testing and release at the time of the evaluation.
- Share of the IT&C sector had improved to 3.85 percent of GDP in 2021 from the baseline of 3 percent, however, this change is not solely attributable to COP financing.
- Impact evaluation notes no impact on profits, with some effects on turnover and firm size.

To increase economic competitiveness, interventions under Priority Axis 2 sought to support the development of ICT products and services that enable the digitisation of SMEs. The funding focused on providing firms with financing support to develop innovative ICT products and services. A total of 241 projects were awarded financing through three different open calls – in 2017, 2019, and 2020. Of these, 58 were still under implementation, 51 projects were complete, and the remaining 32 were cancelled. Each of these calls funded private firms interested in adopting ICTs and developing products and services.

The overall picture in terms of output and outcome achievement is largely positive. The outcome indicator envisaged under the programme (the gross value added by the sector as a percentage of GDP) stands at 3.85 percent[(10)], a net improvement to the baseline value of 3 percent. However, given the large heterogeneity within the target sector, the specific contribution of funded firms under this programme cannot be causally linked to the achievement of the outcome.

The programme has assisted several SMEs to introduce new to the market products and new to the firm products. The initial output indicator was set at 45 innovative products or services. As of March 31, 2023, 278 products/services were being developed using ESIF financing, vastly exceeding the initial target. 193 products had been completed and verified by the Managing Authority.

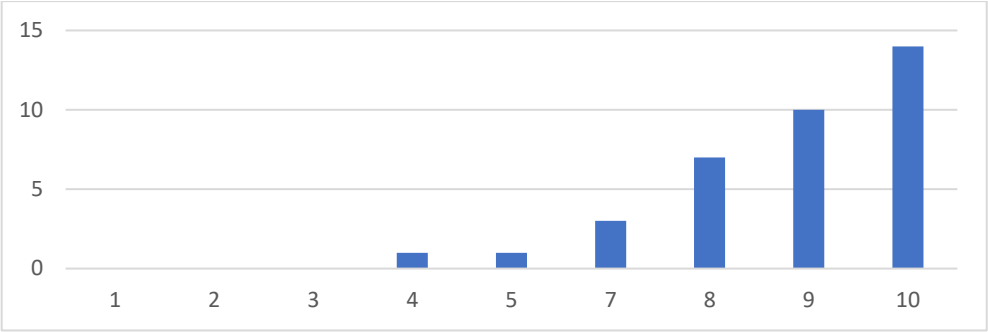
[(10)] COP Managing Authority based on INS Statistics.

A wide range of developed products were mostly being launched or tested at the time of evaluation – and thus the reflections on projects' effectiveness are based on early outcomes. The development of each product included a needs analysis, and funded projects ranged from enterprise software to improve internal company processes and productivity, to apps targeted at external audiences.

To illustrate the range of funded projects, the evaluation developed two detailed case studies – MARGO and Algoriina Safe Web – which were funded in different financing rounds, target different market segments, and have significantly different value propositions. *MARGO: A Start for Competitive SMEs* sought to develop a software product for SMEs in Romania. This software sought to combine enterprise resource planning and customer relationship management functions and was designed to cater to the needs of SMEs. MARGO aimed to improve company management by ordering and streamlining processes specific to each SME. *Algorina Safe Web*, on the other hand, was developed as an innovative parental control and education application, which will monitor and restrict children's activity online based on large-scale use of data and machine-learning algorithms. While the case studies shed some light on possible longer-term risks to effectiveness, this conclusion is difficult to generalise given the heterogeneity of products and services financed through COP.

Beneficiaries commended the flexibility of the program design in this programming period that enabled firms to decide how exactly to use their funding for developing ICT products/services. Evaluation survey data suggest that ease of communication with project officers and the Managing Authority may have significantly contributed to the effectiveness of projects under this investment priority. Beneficiaries in their survey responses praised their ease of communication with project officers and the Managing Authority, which they claimed was instrumental in resolving questions and challenges that they faced during implementation. Further, while some noted difficulties with MySMIS online platform used by beneficiaries for communicating with the project officers, most found the process manageable, primarily due to external support. Survey responses also point to the value of consultants' support in meeting monitoring and evaluation goals of the programme. This may have contributed to firms' ability to navigate processes and maintain strong and consistent engagement with project officers.

Figure 14. Beneficiaries' Reported Satisfaction with the Monitoring of Implementation Progress

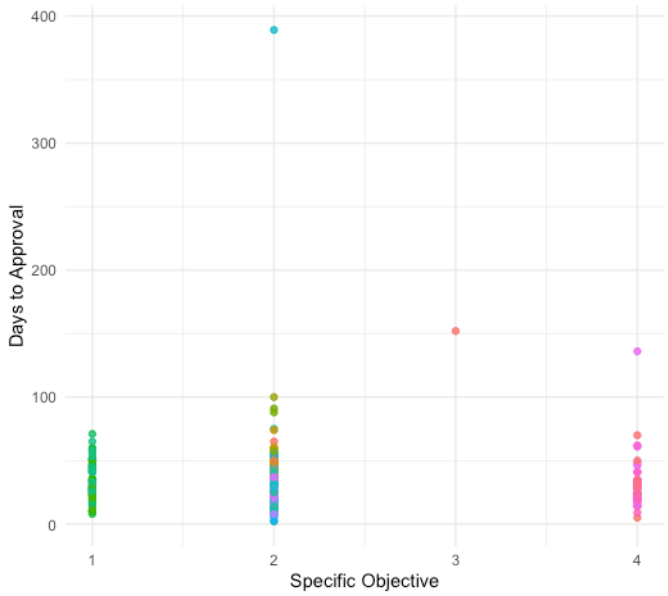


0 = not at all satisfied
10 = completely satisfied

Source: Beneficiary survey responses.

Beneficiaries' responses to implementation processes suggested a high degree of satisfaction across both public and private beneficiaries (Figure 15). Administrative data showed that initial complaints about payment reimbursements identified in the Interim Evaluation Report had been resolved over the life cycle of projects, with most projects being reimbursed within 100 days of submitting the final payment requests within the system. The figure below shows the average time to approval of projects submitted via MySMIS, suggesting some divergence by specific objective, and three outliers where payments were significantly delayed due to documentation lapses.

Figure 15. Average Days to Process Payment Requests for Reimbursements



Source: MySMIS administrative data analysed by the evaluation team.

However, some SMEs supported under the programme found the documentation burden quite high. Especially amid COVID-19, beneficiaries of ongoing projects reported difficulties in submitting reimbursement requests in accordance with the schedule. The guidelines were reported to be unclear, with certain aspects such as the method of payment for partnered projects being adjusted on an ad hoc basis. One SME claimed needing to "organise monthly meetings in person exclusively for the purpose of them [other employees] placing [their] handwritten signatures on a paper that is then anyway electronically countersigned by the legal representative of the firm in order to be uploaded to the platform." Standardising the process and communicating the requirements for reimbursement submissions more clearly may therefore ease compliance for participants in future programs.

Several beneficiaries raised issues pertaining to the technical limitations of MySMIS platform. Beneficiaries noted that the system restricts data uploads to a maximum of 50MB and does not allow for the uploading of folders or multiple files simultaneously, requiring users to follow up with authorities via email for larger documents. The interface for uploading receipts for reimbursement is not user-friendly, and the platform mandates the use of scanned documents with signatures, with no provision for electronic signatures. An additional drawback is the lack of interconnectedness between the platform's different modules, which necessitates repeated uploads of the same document during various stages of the process. In addition, MySMIS platform

currently contains some modules that do not support online workflow, particularly those related to budget tracking and document correlation. This leads to considerable delays in document processing, which impact both payment requests and payments. The system also lacks a save function, forcing users to restart the process if they log out before completing a process. Furthermore, slow uploading times persist, regardless of the speed of the users' internet connection. Another concern revolves around the sequencing and handling of documents as part of the implementation process within MySMIS. The automatic sequencing of documents in the communication module is counterintuitive, displaying the oldest communication first instead of the most recent. There is also a lack of clarity regarding the specific files and documents required for uploading. These issues amount to an unfriendly user interface and a poor user experience leading to calls from several beneficiaries for a comprehensive overhaul of the platform.

Some beneficiaries under this Investment Priority also noted challenges in hiring due to the limited-term nature of the employment contracts feasible under the funding envelope. Staffing challenges also included familiarising new employees with the European Structural and Investment Fund (ESIF) processes, in a tight labour market. This process took time and delayed the overall development of the eventual product. Long procurement delays (such as from approval to signature) harmed the companies' ability to hire qualified candidates, suggesting the need for a simplification of procurement processes. One interviewed firm stated that their "labour costs have doubled since 2019, and finding the right mix of programmers has been difficult".

Only one firm claimed that the project timeline was affected by the disruption of supply chains during the pandemic, leading to difficulties in receiving the hardware purchased through the project. Overall, supply chain disruptions were not a significant factor affecting implementation of projects.

Administrative data provided by the Managing Authority showed that the average processing time for the evaluation of an application was 100 days, however, 161 applicants waited for over 300 days to receive selection results. The median length reported by survey respondents and interviewees, when asked about the evaluation process, was over 12 months, including clarifications and submission of additional documents. Most applicants perceived this period as too long or long in applicant surveys – 42.5 percent of approved firms and 66.67 percent of rejected firms. The length of the selection process surfaced as a key concern in the interviews and focus group, as well as in responses to the survey.

Table 5. Perception of Length of Selection Process by Applicants, %

Perception of selection process	Share of approved applicants, %	Share of rejected applicants
Very short	3.75	0.00
Short	20.00	16.67
Long	32.50	8.33
Too long	42.50	66.67
Prefer not to say	1.25	8.33

Source: Applicants' and beneficiaries' survey by the evaluation team.

On average, applicants allocated three employees to work on the applications and spent about 316 hours on submitting their application and compiling the necessary documents. Most applicants used consultancy firms specialised in the programme application process. Some applicants – especially those with no prior experienc of such competitions – said that that they found the Applicants' Guide and Evaluation Criteria difficult to understand. In the survey, 58.58 percent of respondents found the Applicant Guide easy to understand, but a significant share of respondents – 23.95 percent – found it difficult.

Applicants also noted that the time from approval to effectiveness (when the signatures have been obtained to allow commencement of implementation) was often very long, with 49 approved firms stating that it was 9 months or longer. In additional comments respondents indicated that the process of finalising the contract and obtaining relevant signatures was time-consuming. Qualitative responses suggest that these processes were more cumbersome relative to other EU programmes that some beneficiaries had experience with, such as the EU's Horizon programme.

The survey responses also showed that the selection process under IP 2.2 was very welcoming to newcomers. Of the overall number of applicants, 80.12 percent had not previously applied for a grant under any other ESIF-funded scheme. Among beneficiaries, only 12 of 80 were implementing projects financed through other EU co-funded programmes. Of these 12, 6 were implementing projects funded by other European structural funds, 1 was implementing a project with other government funding, and 3 were involved in implementing projects under COP Priority Axis 1. However, applicants cited the complexity of documentation, burdensome budget preparation and procurement processes, changes to deadlines and other key criteria in the Applicants' Guide as challenges.

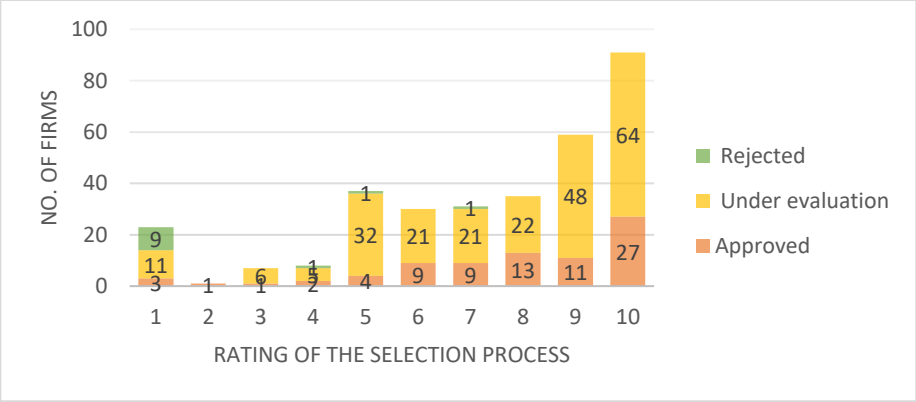
Table 6. Applicants' Previous Experience of ESIF Funding Applications, %

Responses	Share of firms
Yes	11.18
No	80.12
Prefer not to say	8.70

Source: Applicants' and beneficiaries' survey by the evaluation team.

Ratings of the selection process also skewed heavily rightward, towards higher satisfaction, although driven primarily by responses of firms under evaluation (Figure 17). A score of 10 is the highest level of satisfaction, whereas a score of 1 represents very low satisfaction.

Figure 16. Rating of the Selection Process by Applicants and Beneficiaries



Source: Applicants' and beneficiaries' survey by the evaluation team.

Impact of Funding Innovative Products and Services

The counterfactual evaluation asks the question whether receiving programme funding had any significant effect on firms' profitability (direct effects) and innovation (indirect effects). Firm innovation grants can affect firm outcomes through multiple channels. Innovation grants provide firms with the financial resources needed to invest in product development and process improvements. By offering financial incentives, these grants encourage firms to allocate more resources towards innovation-related projects, which can lead to the development of new and improved products, services, and technologies, thereby having an impact a firm's productivity and profits.

Further, new products can help firms identify and implement more efficient production methods, streamline processes, and optimise resource utilisation. Increased efficiency can

lead to improved operational performance and higher productivity. Finally, grants under the program can encourage collaboration between firms, enabling them to access specialised resources, improve R&D, and apply for patents and trademarks. This evaluation, therefore, looks at how grants made under PA2 affect productivity and performance, by considering turnover, profits, firm size (number of employees), and productivity.

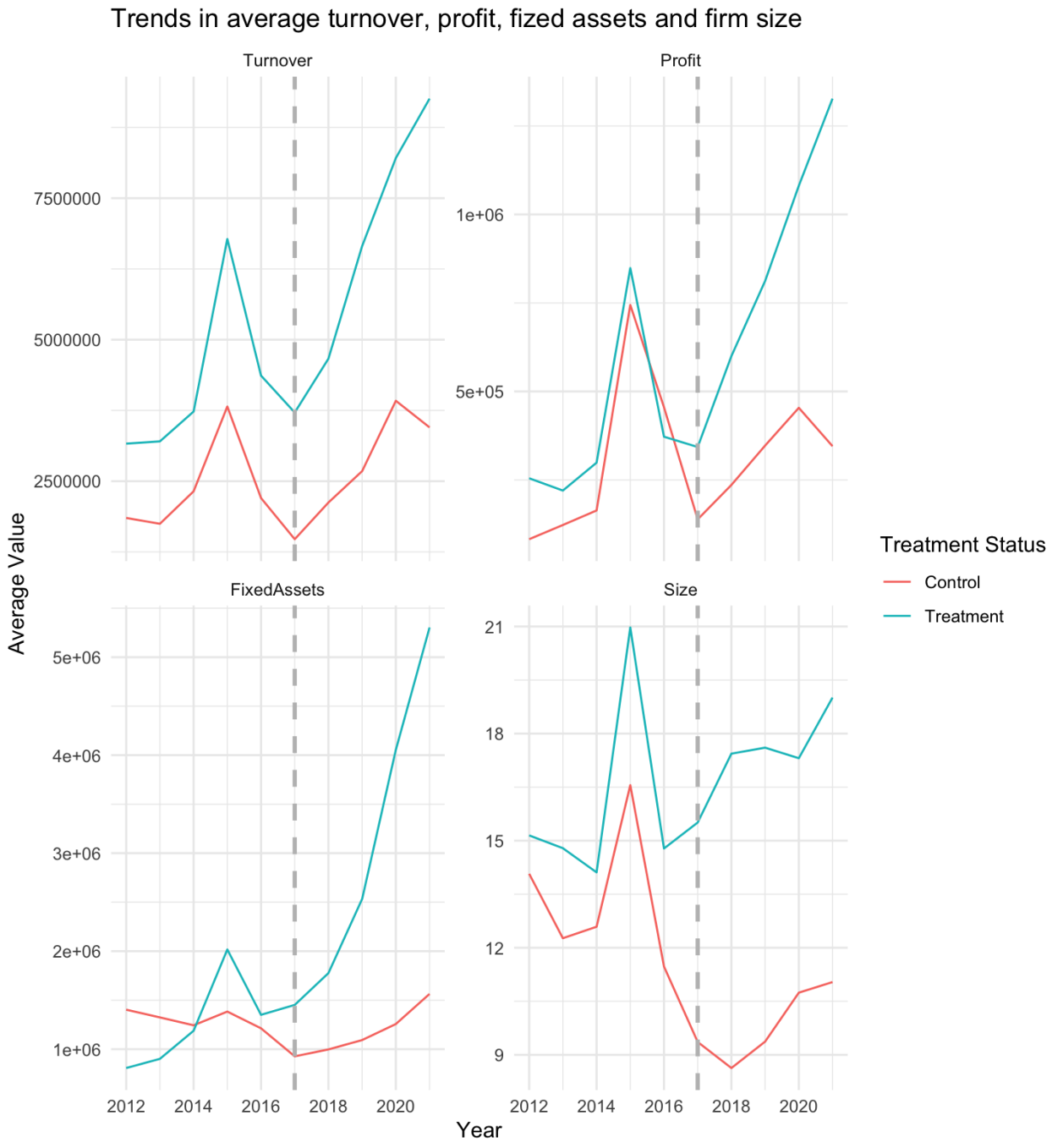
The impact of awarded grants was assessed using an event study design that exploited the staggered rollout of grants. Projects under Investment Priority 2.2 were approved in three phases, with three calls for proposals made in 2017, 2019, and 2020. The treatment group for is constituted by firms approved for funding across the three calls. Earlier evaluation outputs used primarily a two-period difference-in-differences approach comparing outcomes only within the program. In this evaluation, the outcomes of firms that received funding were compared with two groups of eligible firms: the not yet treated firms that received grants in 2019 and 2020, and the firms that reached the final stage of the selection process but failed the techno-economic evaluation by less than 20 points – the never-treated group. The counterfactual firms were thus chosen to be as similar as possible to the beneficiaries along all dimensions but the treatment. he evaluation was a close approximation of the causal impact of getting programme funding. The composition of the control groups controls for the influence of unobservable characteristics of companies. The team also ascertained that scoring data and weights for different criteria, as well as the evaluation process and evaluation personnel were similar for all calls.

To establish the validity of the estimate, the evaluation discusses parallel trends assumption and the stable unit treatment value assumption (SUTVA). The parallel trends assumption requires that the untreated units provide the appropriate counterfactual of the trend that the treated units would have followed if they had not been treated – that is, that the two groups would have had parallel trends. If parallel trends assumption does not hold, the estimation of the causal effect will be biased. It has also been proposed that the smaller the time tested, the more likely the assumption is to hold. In this analysis we compare the time trends of turnover, firm size, net profit, operating revenues, fixed assets, and patent applications of treatment and control groups before treatment and one year after the treatment that occurred in 2017 to check for parallel trends. For all four variables, parallel trends seem plausible (Figure 18).

SUTVA requires that the response of a particular unit depends only on the treatment to which the unit was assigned, not the treatments of others around it, i.e., that there are no spillover effects. In this analysis, SUTVA is not violated unless we have evidence of increased inter-firm interaction and collaboration because of the support made possible by COP funding.

There is no data on inter-firm activities and since firms in the same industry are competitors, it is safe to assume that there is none until data to the contrary is available.

Figure 17. Parallel Trends Assumption for IP 2.2



Source: Source: Original elaboration by the evaluation team

To capture the direct effects on beneficiaries, the following dependent variables (results indicators) were used: turnover; profits, employment; fixed assets, and labour productivity. While estimates on research and development expenditures and numbers of patents filed were attempted, they were not feasible due to insufficient data for inference.

The dataset for the counterfactual combines firm level information from three sources: COP Managing Authority, the National Trade Registry (NTRO), and the Patents Office

The following data were used for the counterfactual evaluation:

Information provided by COP Managing Authority

- List of beneficiaries
- List of rejected applicants
- Time of approval of beneficiaries (year)
- Amount of aid received by beneficiary
- Scoring/selection data

Firm-level measures from NTRO

- Turnover
- Number of employees
- Fixed assets
- Current assets
- R&D expenditures
- Geographic location of the firm
- Sector classification

As the program followed a staggered rollout design, the evaluation used estimators that were robust to heterogenous treatment effects. In line with the recent literature on difference-in-differences estimation, the evaluation chose to use doubly-robust estimators suggested in Callaway and Sant'Anna (2021) (Figure 19).

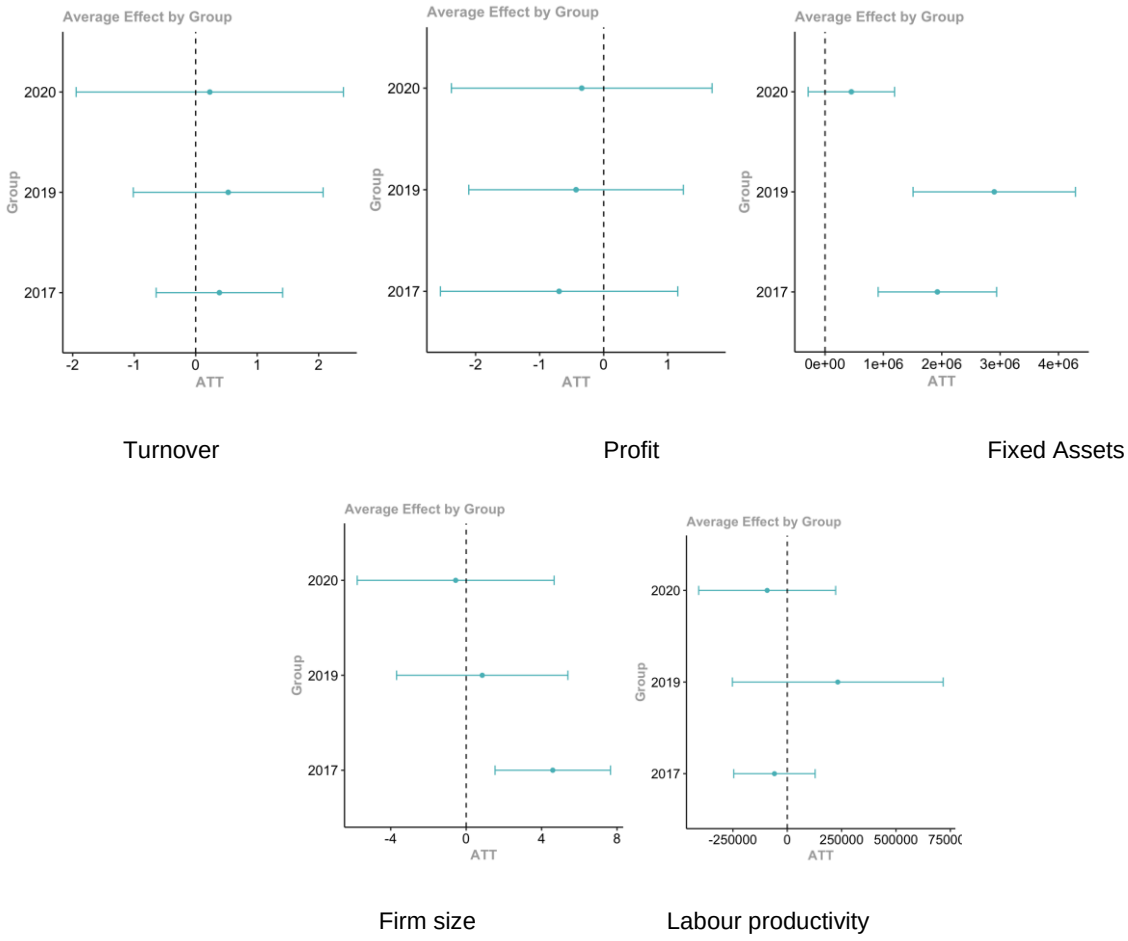
The evaluation finds no statistically significant effect on profits, turnover, fixed assets, labour productivity, or firm size, even four years after the grants were received. To understand the mechanisms that explain the lack of impact on profits, the evaluation conducted six in-depth interviews, and additional econometric analysis that may help explain the findings.

Figure 18. Estimation Results

	Turnover (log)	Net Profit (log)	Fixed Assets (RON)	Firm Size (N)	Labor Productivity
ATT(Average)	0.417	−0.572	2091524.738	2.823	33463.511
	(0.445)	(0.548)	(400232.330)	(1.138)	(97412.640)
ATT (2017)	0.386	−0.696	1924370.261	4.593	−58966.546
	(0.416)	(0.788)	(470203.225)	(1.406)	(87128.053)
ATT (2019)	0.529	−0.431	2899171.711	0.852	232295.937
	(0.689)	(0.749)	(675722.471)	(1.988)	(212698.430)
ATT (2020)	0.230	−0.343	450822.028	−0.558	−92368.064
	(0.999)	(0.832)	(370918.952)	(2.348)	(154579.930)
Observations	276	276	276	276	276
Std.Errors	firm	firm	firm	firm	firm
No. of groups	3	3	3	3	3
Time periods	10	10	10	10	10
Controls	notyettreated	notyettreated	notyettreated	notyettreated	notyettreated
Estimation method	Doubly robust	Doubly robust	Doubly robust	Doubly robust	Doubly robust

Source: Original elaboration by the evaluation team

Figure 19. Coefficient Plots for Turnover, Profit, Fixed Assets, Firm Size and Labour Productivity



Source: Original elaboration by the evaluation team

First, the team investigated if structural differences between the applicant firms and non-applicant firms may explain the absence of impact. In particular, the team was interested in understanding if certain types of firms – such as those more likely to become bankrupt in the short term – preferentially applied for EU funding. To test this hypothesis, firms which applied for EU funds are compared with those which didn't. The full dataset using the original data from NTRO containing more than 8 million firms' financial information from 2007 to 2019 is first restricted to only those companies in the same set of industry sectors as applicant firms. Additionally, the analysis leaves out the observations after 2017 to abstract from the effect of application.

Regressions on the pooled dataset are run to compare the firms which applied for EU funds and those which didn't. The most well-known index of bankruptcy likelihood is Altman's Z-Score[(11)]. With the data we have and based on Altman's Z-Score index, we constructed three dependent variables: operating revenues to total assets, non-fixed assets to total assets, and equity to total assets. Each of these ratios measures some aspect of financial health of a company and its ability to weather negative shocks. However, results of this model on all three ratios suggest no significant difference of financial health between the applicant firms and the rest of the firms within their sectors. In fact, when profits are regressed against the applicant indicator (that is, an indicator constructed to denote whether a firm is an applicant or not), controlling for year and industry fixed effects, the results suggest that, on average, applicant firms have a slightly greater profit than non-applicant firms (significant at the 95% level), all other things remaining equal. This suggests that it is not inherent firm selection or characteristics that are driving the lack of impact.

Then, the evaluation assessed how firms were utilising the EU funds, using in-depth interviews, to understand underlying mechanisms for the lack of impact. Six firms agreed to take part in the interview process out of total of 9 companies that were randomly selected. The qualitative analysis of interviews suggests that while some firms enjoyed a minor increase in turnover and profitability, this may not be a direct result of COP funding. The primary reason for this is the early stage at which products funded by the COP are, vis-à-vis the market. Interviewed firms suggested that, while they had developed products using COP funding, they were in the investment or market-testing phases, with little revenue to show on the books from products created through COP funding.

(11) For more information on the Altman's Z score, see: Bellovary, Jodi L., Don E. Giacomino, and Michael D. Akers, "A review of bankruptcy prediction studies: 1930 to present." Journal of Financial Education (2007): 1-42.

Further, most firms used the funds to hire programmers – in one case, a team of seven – to create a product. Consistent with EU co-financing rules, some companies used their own funds to finance some components of the project – typically, human resources and some hardware. In one case, the firm suggested purchasing dedicated space to store and process data, given the nature of their product relying on machine learning techniques requiring vast computing power. However, such investments are able to impact profit and turnover with a lag due to the time needed for the development, testing, and marketing of a product. All companies, while noting that that they perceive themselves as being more competitive after implementing the COP funded projects, suggested that the sustainability of project results will be determined by their market success over the next few years.

From this additional analysis the evaluation concludes that the apparent lack of impact, as revealed by the counterfactual evaluation, may be due not to the lack of programme impact, but to evaluating the impact too soon after treatment. A full ex-post evaluation after a couple of years may yield more meaningful results as to the impact of COP financing. Further, impact may be limited by the ability of beneficiaries to retain talent, maintain performance at scale, and in some cases, such as with products relying on artificial intelligence and machine learning technologies, ability to maintain large storage and processing capacity.

Case Study: MARGO

Constanta-based Yuka Mobili was the beneficiary of ESIF financing to develop MARGO (MySMIS Project #115978). The company had been designing and building custom furniture since 2000. As the company's business grew more complex, it needed an application for managing workflows such as client management, furniture design, project management, procurement, and financial planning. This led to the inception of MARGO.

The idea to develop MARGO can be traced back to 2008, when Yuka Mobili acquired its first 3D design software in a market dominated by paper-based design. In the same year, the company acquired its first server and began centralising all project documentation online within a shared folder. Company management gradually realised the benefits of having an integrated application that could manage all the workflows within Yuka Mobili. In 2012, the company developed, with the assistance of a programmer hired within the company, the first version of MARGO which focused on storing client and project data. To further develop MARGO as a standalone product for other SMEs, Yuka Mobili applied for EU financing in the 2007–2013 period, but their application was not approved. In November 2015, the company applied for COP funding, and their project application was approved after almost 2 years, in August 2017. The total value of the project was RON 6.75 million, including RON 3.47 million COP funding (Table 7)

Table 7. Project Financing for MARGO

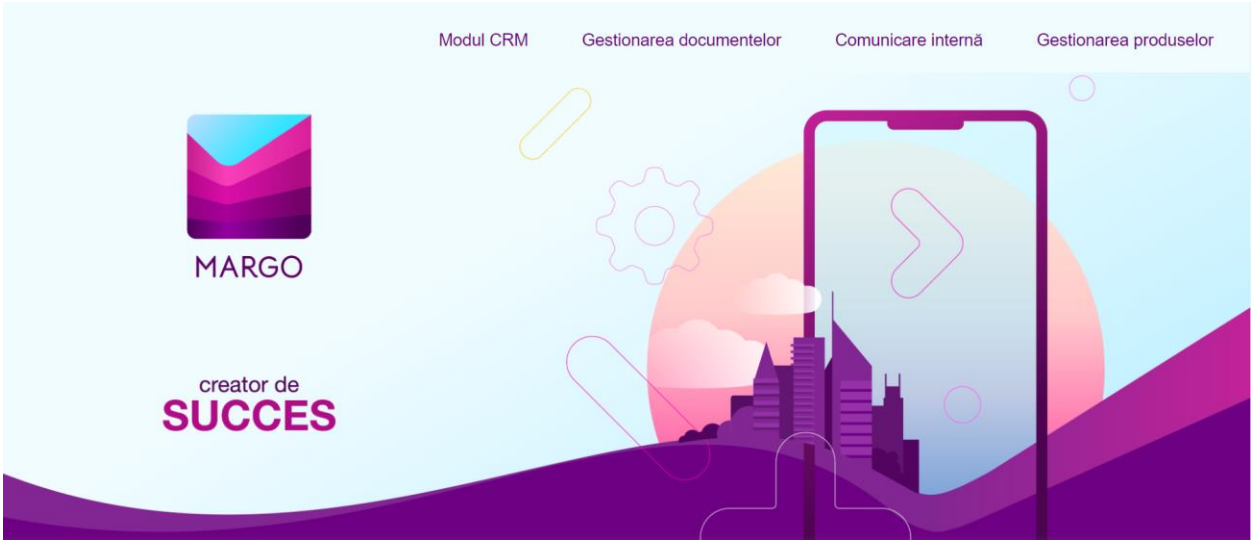
Project	Total Project Value (RON)	Eligible (RON)	Grant (RON)	Beneficiary contribution (RON)
YUKA Mobili S.R.L.	6,750,312.50	6,129,250.00	4,080,205.00	2,049,045.00

Source: Data provided by OIPSI

The project was completed in 2020 (Figure 21). The implementation per se did not face any major delays after the long approval process of the application for COP funding that delayed the start. Some resources lined up in 2015 to develop MARGO could not be called upon 2 years later, in 2017. Critically, some of the programmers that were supposed to be part of the project team left to pursue other opportunities. Yuka Mobili applied for COP funding to be able to hire the 10 programmers needed to develop MARGO. The hiring process commenced only three months into

project implementation, in late 2017 after financing had been approved. However, once the IT team was assembled, the company implemented the project without any major issues.

Figure 20. MARGO Software Website



Source: https://margo.ro/.

MARGO benefited from the fact that Yuka Mobili management knew all aspects of the business and had a skeleton framework already in place, which helped the in-house IT team to create the software and a logical workflow. To translate existing and additional business processes into software, Yuka Mobili management was able to provide clear guidance and specifications to the IT team of the product.

Results

MARGO, the intended software product for SME workflows management was successfully developed, and its main features were presented during a conference in Constanta. Yuka Mobili is currently using MARGO to manage its business and aims to market to other SMEs. Key stakeholders shared during in-depth interviews that the software had become critical to the day-to-day operations of the firm. Although incoming Yuka Mobili employees require extensive training for this product, management relied on all company processes being conducted using MARGO.

Management also reported that the company's financial performance had improved since starting to use the product. In two years, the company's turnover increased, and net profit was up 20 percent. According to key stakeholders, the main mechanism influencing this effect is the ability

of the software to improve client management and present 3D design features interactively to customers. MARGO also reduced errors in production and processing of orders through centralised data storage and communication. This enables the beneficiary to add more value to their finished products and increase their competitive edge vis-à-vis the market.

Factors Contributing to Effectiveness

Given that MARGO caters to several operational workflows at Yuka Mobili, constant upgrading and maintenance are key to effectiveness. Two programmers hired during the project were embedded into the company structure, mitigating the risk of the product not being updated regularly. As a result, management stated that MARGO is being updated according to the needs of the company every 2–3 days, with several features under development.

Management's knowledge of the company's business processes is key to developing software such as MARGO and tailoring it to the needs of the main user, Yuka Mobili. A deep contextual understanding of needs and regular two-way communication between the management and the developers, was key to the successful development of the application. Without a high level of involvement from management, it would have been harder for the IT team to customise MARGO to the extent needed by Yuka Mobili.

However, MARGO still needs to be validated by the market, and Yuka Mobili was at the initial stages of planning to distribute this software to other SMEs in late 2022. Yuka Mobili management has an agreement with a firm to distribute MARGO to other SMEs. As MARGO is tailored to the business processes of Yuka Mobili, the product requires several adaptations to be sold to other businesses. This process of tailoring it to other business is to be completed by a reduced team of programmers. Yuka Mobili stakeholders noted that while MARGO can easily be adapted to the business management needs of any new firm, adapting it to new production processes of firms in the sector will be a challenge. At the time of evaluation, the process of adapting MARGO for a market offer to other SMEs was still nascent, and thus, spillover effects on other firms in the sector due to MARGO are unlikely.

Lessons Learned for Future Projects

Shortening the period between application and decision would make COP funding more effective. A two-year wait with limited information about the status of the application can be a challenge and a deterrent for applicants, as prolonged uncertainty can lead to a loss of resources and interest in implementing the project.

Spillover effects may take time to manifest. MARGO's experience suggests that a high degree of product-market fit requires time and customisation. Products such as MARGO may therefore require time to be tailored to other players' needs. As a result, effects on other firms may take significant time to manifest, and thus evaluations ex-post may prove valuable in capturing such effects.

Case Study: Algorina Safe Web

The Algorina Safe web project (MySMIS Project #142817) is implemented by SABS Innovation SRL, initially named Algorina SRL, based in Iași. The project started implementation on June 24, 2021, and was expected to be completed in 24 months.

The general objective of the project is to create an innovative parental control and education application, which will monitor and restrict children's activity online. The app will do so by drawing on the findings in the fields of child psychology and pedagogical psychology. Following industrial research and experimental development, the project integrates deep learning and artificial intelligence algorithms. Project funding will be used to purchase workstations with software licenses, carry out research and development for the product, and build the company's capacity to provide information technology services.

The total value of the project is 6,163,915.36 RON with 4,147,335.16 RON ERDF contribution (Table 8).

Table 8. Financing for the Algorina Safe Web project

Project	**Total (RON)**	**Total Eligible (RON)**	**Grant (RON)**	**Beneficiary contribution**
"ALGORINA SAFE WEB"	6,163,915.36	5,767,674.90	4,879,217.82	888,457.08

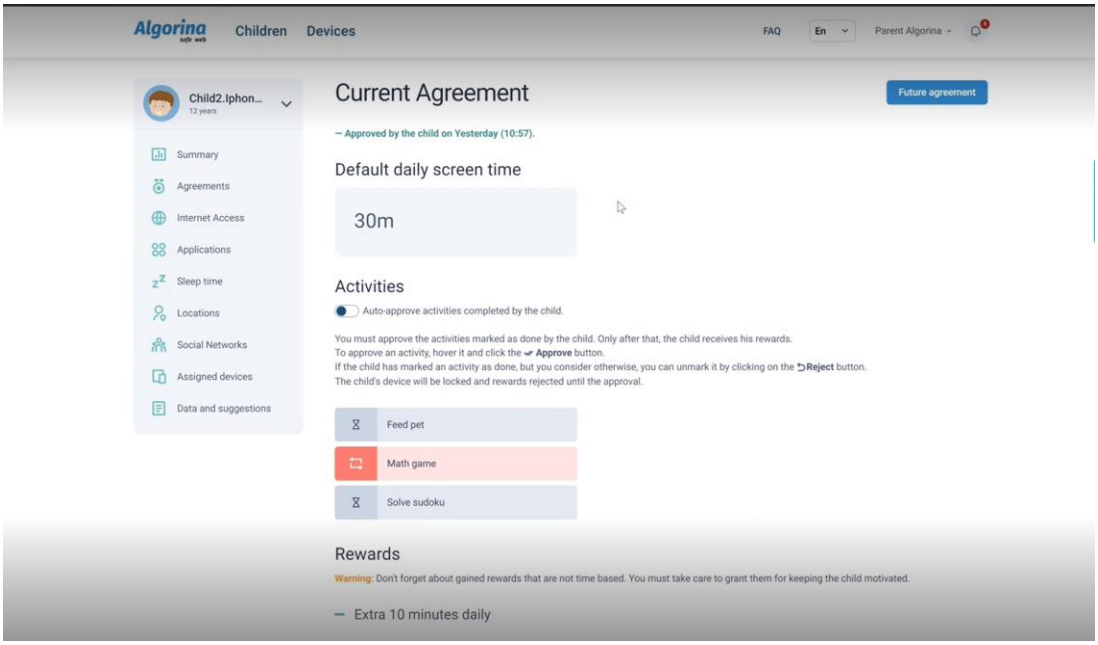
Source: Data from OIPSI

Algorina Safe Web will be an application, available in Appstore and Google Play, intended to make smartphone use safer and more educational for children. Parental control applications are typically based on the notion that the parent has full control over how the smartphone is used by their child, while Algorina Safe Web proposes a different approach based on a mutual agreement between the child and parent. This agreement is renewed daily and is, thus, a novel approach to parental control apps. The child has the option to reject the agreement, which signals that an additional discussion needs to be initiated by the parent to reach an agreement. An example agreement may consist of a default 30-minute screen that can be extended if the child agrees to play a math game generated by the application.

Another new feature of this application is its ability to tailor educational games and activities to the child’s interests and abilities. This approach will use artificial intelligence and will help to guide

the child and help the parent to tailor the activities when using a smartphone. For example, the application may generate a quiz based on the material the child reads during the day.

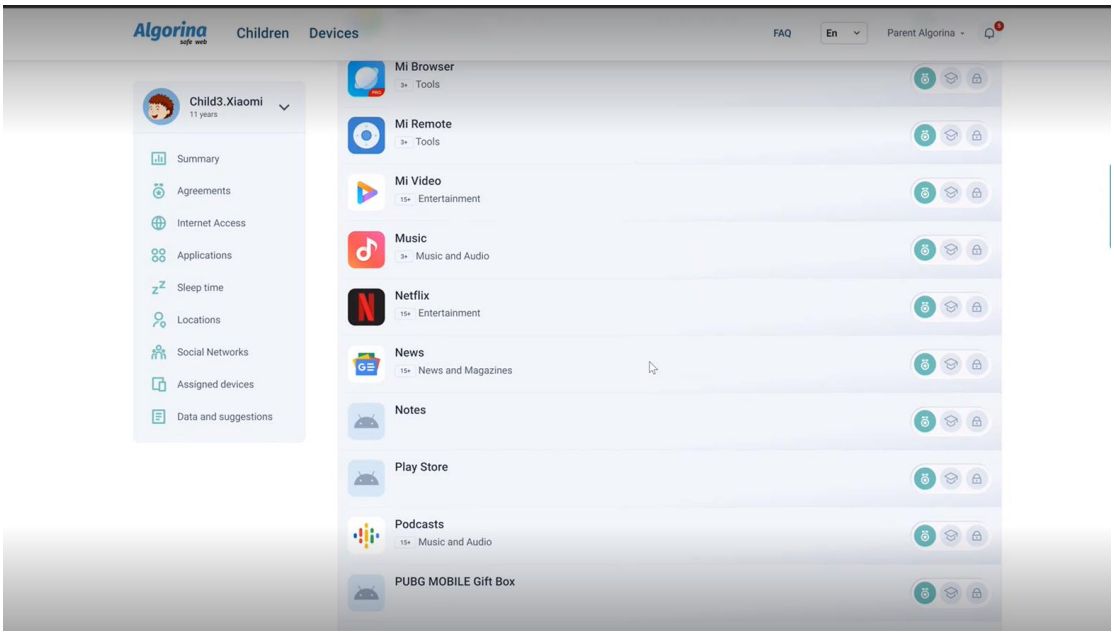
Figure 21. Algorina Safe Web Sample Agreement



Source: Algorina Safe Web

Algorina Safe Web can also grant access to certain apps filtering them based on their category or theme. For instance, an app for educational purposes can be used as much as possible by the child, while other apps are limited based on the child-parent agreement.

Figure 22. Algorina Safe Web Filtering System



Source: Algorina Safe Web

Project Implementation

The project was implemented with no significant delays. However, the major issue that plagued the project was increased labour costs prompted by the pandemic. During stakeholder interviews, it was mentioned that the Big Quit in the wake of the pandemic made finding the right mix of programmers very difficult. In many instances, labour costs doubled since 2019. SABS Innovation had to delay the implementation by 6 months to be able to afford the additional labour costs. Delayed start created additional pressure on the team, but this was the trade-off of hiring the right team for the job.

Results

The development is on track and the app is expected to be delivered in June 2023. At the time of writing, the application was being tested.

Another key result of the project is that it contributed to changing the paradigm of the company. SABS used to be a company providing services and, as a result of the project, will place its first product on the market. If Algorina Safe Web is successful, it will help the company's transition to innovation-based product development.

Efficiency of Spending on Innovative Products and Services

Since 102 projects under Investment Priority 2.2 were approved in 2017 and had delivered some results by the time of the evaluation, it was possible to conduct a preliminary assessment of the efficiency of programme spending under Investment Priority 2.2. While not fully informative of the overall efficiency of the programme as benefits were yet to fully materials, the calculation provides a rough-cut estimate to assess the efficiency of the interventions funded early on.

To conduct a cost-effectiveness analysis of the program that financed innovation grants in three stages, we need to consider the total cost and the total number of products or services produced. Additionally, we must account for the time value of money. Using the total project value of investments under the COP, a five-year time horizon, as well as a discount rate of 5.4 percent[(12)], the following analysis is conducted.

Total Spending on Investment Priority 2.2: 1,558,154,075.15 RON

Total Products/Services Estimated to be Produced: 278

Discount Rate: 5.4%

Time Period: 5 years

Discounted Cost = Total Cost/((1+Discount Rate)^Time Period)

Discounted Cost = 1,558,154,075.15/((1+0.054)^5)

Discounted Cost = 1,197,863,537.82 RON

Cost per Product/Service = Discounted Cost/(Total Products/Services Produced)

Cost per Product/Service = 4,308,861.65 RON

The discounted cost of the program over a 5-year period at a 5.4% discount rate is approximately 1,214,738,537 RON. The cost per product or service produced is 4,308,861.65 RON. This analysis provides a quantitative measure of the program's cost-effectiveness, can be compared to other similar programs, and serve as a basis for further decision-making.

(12) This is in line with European commission regulations on the use of discount and interest rates for state-aid interventions in Romania. https://ec.europa.eu/competition-policy/state-aid/legislation/reference-discount-rates-and-recovery-interest-rates/reference-and-discount-rates_en.

5. Increasing the Use of E-government Systems and Services

Summary:

- Most funded e-government platforms were in advanced stages of implementation at the time of the evaluation and scheduled to close in 2023.
- Funded e-government platforms developed by external vendors risk stagnation and lose flexibility without continued development and maintenance. Ensuring sustainability of such platforms, given the lack of specialised IT human resources, and sometimes, dedicated funding, within beneficiary agencies are key challenges.
- Public procurement processes, particularly for online goods and services, caused delays and disruptions. The rapidly evolving nature of the digital sector necessitates greater flexibility in software product specifications, as well as flexibility in reimbursement process for subscription-based services critical to product design and development.
- Standardised security requirements and data protection guidelines are crucial to avoiding duplicated work across agencies and ensuring regulatory compliance.

Investment Priority 2.3 focuses on projects relating to the digitisation of government services, including interoperability, cybersecurity, e-health, and e-education. Funded projects included a platform to monitor data for the Competition Council, a platform for civil status documents, online platforms for the Ministry of the Interior and the Ministry of Education, as well as other projects to achieve interoperability and obtain cybersecurity trust certificates across various departments. While some projects have faced challenges due to the onset of COVID-19, others have adapted well to implementing systems and platforms during the pandemic and reported efficiency gains in implementation due to the introduction of online meetings and processes. Since most of the projects are in various stages of implementation (and testing of completed portions of the software/platforms), some beneficial outcomes of new e-government services – such as cost savings from online processes and time savings from the use of digital public services – are yet to be observed and evaluated.

While funded projects varied in their scope and implementation stage, the evaluation identified common challenges across multiple beneficiaries that are critical to address for the success of future projects. Beneficiaries noted that commissioned projects were very complex and required specialists across technical domains and in a range of new technologies. Contracted technical specialists were not always well versed in public procurement processes

and often experienced difficulties with project procurement which delayed implementation and testing.

Sustainability of platforms developed under contract with private corporations, with limited knowledge transfer after deployment, is a further cause for concern. Lack of specialised IT human resources within government as well as the lack of earmarked permanent budgets pose questions about sustainability of the products and services created with the support of the COP. Ministerial budgets for operational maintenance and further development were not clearly formulated, and subject to annual budgeting processes. Beneficiaries have also reported challenges with recruitment and retention of IT specialists in the public sector critical to the continued development of funded platforms.

Given the dynamic nature of the sector, a more flexible approach to specifications of software products is required. Current procurement rules require fixed, narrow specifications to be provided prior to the development of the software platform/product. This is counterproductive in a field where software and available features are constantly upgrading. Agile development methods common to software development in the private sector were not deployed in part due to requirements of public procurement. Interviewed beneficiaries and contractors pointed out that having rigidly fixed specifications was detrimental to adapting and upgrading software and services procured during the period of product development, resulting in non-adaptive and often dated platforms. This also poses longer-term cybersecurity and uptake risks as older versions of software and services are more vulnerable to cyber-attacks and often less user-friendly, which may deter adoption.

Challenges of the public procurement process, especially for online goods and services, led to delays and disruptions. Beneficiaries noted the challenges of getting reimbursed under the current public procurement regime for online goods and services. For instance, to develop the front-end characteristics of a contracted platform, contractors required off-the-shelf software templates and packages that were often available via subscription-based services. Reimbursements for such use cases were protracted and often denied. Beneficiaries noted the need for greater flexibility in the reimbursement process for such services, libraries, and templates, as they may be critical to product design and development.

Beneficiaries noted the importance of coherent security requirements, and data protection guidelines that are both explicitly communicated and complied with. The lack of standardised guidelines and project implementation guides on data protection common to all

agencies implementing e-government and e-services projects hampered effectiveness of projects as it led to duplicated work across agencies and multiple versions of guidelines produced to comply with regulatory requirements.

Beneficiaries mostly track outputs, not outcomes, of funded projects. While design documents and plans suggest greater time savings and more efficient case processing estimates, the indicators that were being tracked across e-government projects were primarily linked to the number of service users, number of entries in databases, or even the number of applications developed. To ensure that beneficiaries commit to long-term support of funded applications, metrics linked to outcomes – such as processed cases, time saved, and efficiencies gained – should be tracked and studied rigorously. Tracking these indicators can also help resolve pain points in use and ensure better delivery of digital public services.

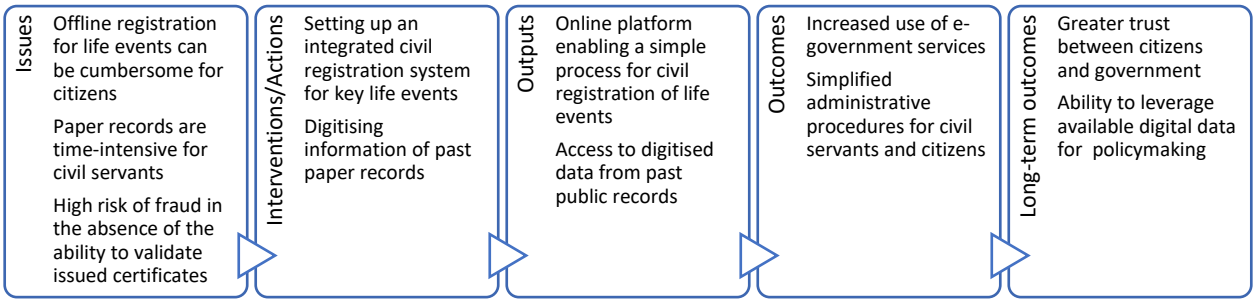
Beyond these common themes, the diversity of funded projects necessitates deeper evaluation of individual large value projects' achievements, challenges, and lessons learned. The following section details the design and implementation of three e-government platforms: the Integrated Information System for the Issuance of Civil Status Documents (SIIEASC), The National Trade Registry Big Data Platform, and the Competition Council's Big Data Platform.

Integrated Information System for the Issuance of Civil Status Documents (SIIEASC)

Integrating the different components of the hitherto incompatible and largely paper-based systems of civil registration and documents issuance is a technical challenge related to standards, protocols, and data exchange, often requiring institutional agreements across many government departments. The first challenge of coordination is assigning clear responsibilities within the systems and ensuring that there is no duplication or gaps during the registration lifecycle. In Romania, as in several other countries, the status quo is characterised by a proliferation of mutually incompatible databases capturing different citizen records. When civil registration databases are neither connected nor interoperable with any of the other management information systems in agencies with which they need to interact (e.g., health, education, and social protection), they typically offer poor user experience, and the adoption rate of e-government services is low. Further, given that civil registration systems are the responsibility of several ministries or departments – health, interior, justice – and statistical offices, coordination and communication among multiple agencies is key.

To address this important development challenge, the Ministry of Internal Affairs, through the Directorate for Persons' Records and Databases Management initiated the Integrated Information System for the Issuance of Civil Status Documents (SIIEASC), Sistem informatic integrat pentru emiterea actelor de stare civilă, in Romanian (MySMIS Project #120025). This project has a long history, having started in 2005–2006 with World Bank financing. After the failure of the original project, it was attempted again with Sectoral Operational Program Increasing Economic Competitiveness POS CCE (2007–2013) funding. Despite a successful application, the project was cancelled, and the funding was lost. Funded again in the 2014–2020 period, SIIEASC has benefited from the lessons learned from previous iterations and is being implemented. The theory of change for the project is described in Figure 24 below.

Figure 23. Theory of Change for SIIEASC Project



Source: Evaluation team.

The project seeks to reduce the time taken to handle requests regarding the registration of civil status and the issuance of certificates around the four main life events (birth, marriage, divorce, death), yielding efficiency gains. In addition, it seeks to enable better collaboration between IT services at the central and local levels in data processing, reducing time for handling citizens' requests because of the digitalisation of these operations and the electronic management of these documents. Also, the project seeks to digitise civil status documents issued over the past 100 years. The project seeks to enable over 3200 administrative territorial units to offer digital public services by issuing civil status documents electronically.

The budget allocated to the SIIEASC project is RON 184 920 864.06, of which ~85% is financed by the European Regional Development Fund under the Competitiveness Operational Programme (COP), and the remaining by the national budget. At the time of the

evaluation the project is in advanced stages of implementation and scheduled to close in September 2023. Fifty-seven processes for four life events have already been digitised, although the work on the architecture for delivering these services to the end user is still going on. The hardware and data centres have been completed and operationalised. The installation of workstations in all of Romania's town halls has been completed and will enable the electronic issuance of civil status documents.

The main software solution for civil status documents faces a 10-month delay as of March 2023, with the contractor stating an intent to complete it by June 2023. The digitalisation of the archive of civil documents – 80 million documents since 1920 – is also delayed because older documents are hard to digitise via optical character recognition. In both situations, the contractor did not estimate the amount of time needed to complete deliverables accurately, in large part due to the complexity of the undertaking. For example, the project beneficiaries and contractor, identified over 210 ways of digitising historical birth records that varied by geographic location. Due to such underestimated complexities, the project has been extended by 27 months from the initial closing date.

Causes of Delays in Project Implementation Limiting Effectiveness

Lack of familiarity with ESIF processes. SIIEASC stakeholders noted challenges in applying for and receiving funding, but also issues with bureaucratic approval procedures. They noted the importance of flexibility in the procurement of software products and services, and simplification of administrative levers for processing eligible expenses for technology-related products and services. Stakeholders reported high risk of rejection of applications for reimbursement of expenses if not in strict adherence to the funding application, and a lengthy process of revisions that led to delays. The rapidly evolving nature of the digital sector necessitates flexibility in reimbursement process for subscription-based services critical to product design and development, which were yet to be implemented.

Availability of Technical/IT Human Resources. Stakeholders noted the lack of policies to support the retention of IT staff in public administration, or to attract IT professionals into this field. They suggested that the number of available specialists is far too small, and they lack a critical skillset required for public procurement (preparation of specifications according to guidelines), which often led to delays during project implementation.

Supply Chain Disruptions due to COVID-19. During the pandemic, supplier and manufacturer delays caused delays, as some products were being procured from Asia from countries badly impacted by the pandemic.

Risks to Sustainability

Romanian public IT infrastructure relies on limited budget allocations and, as a result, has been maintained poorly and needs updating. Success of SIIEASC will in part depend on the condition of digital platforms used across the government. Digital capabilities of civil servants are uneven, which also is a challenge. Project beneficiaries also noted the lack of digital skills among citizens as a potential risk factor limiting uptake.

Political risks. Project beneficiaries also noted that political change is a risk to digitisation projects, given that in the past rapid political changes caused delays in the implementation of projects.

Communication and outreach, once the SIISEASC portal has been completed, will be critical to its success, and should be sustained via several communication modes – online, television, radio, etc. Neglecting to communicate with the public about the new portal will delay its uptake by users and undermine project objectives. According to beneficiaries, the top three reasons for poor use of already existent online services were technical problems (periodic unavailability of the site), lack of promotion, and the lack of user support.

Lessons learned for future projects

The repeated failures of attempts to create this platform in the past provide some insight into the complex political economy underpinning large, cross-agency data sharing projects. Accounting for political economy constraints would be key for future programming. The multiannual character of investments made under ESIF was critical to the development of SIIEASC. Due to annual budgetary restrictions in Romania, as well as inherent complexity, projects like SIIEASC cannot be implemented with the national budget funding alone. SIIEASC, in the opinion of project beneficiaries, highlights the additionality of ESIF in Romania.

Promote centralised, interoperable data flows across government agencies. Institutional, administrative, and technical capacity to are essential to adequately register deaths. Counties should thus digitise and transfer data from the local level to central data processing sites administered at the national level. The digitisation of existing CRVS data enables efficient transfer of data from the local level to the central data processing site.

Facilitate continued coordination between ministries. Strong inter-bureaucratic coordination among government ministries will help to identify gaps within the data at the local and national levels, leading to better assessment of trends and potentially improving local development outcomes. Interoperable platforms are a foundational pillar for improving public digital services, and linking digitalised civil registration data with other administrative datasets held at the ministry level can help unlock various applications and analyses that help in programme design and policy implementation across various ministries.

Invest in human capital for the public sector digital transformation. Capabilities inside and alongside government to analyse and make use of data is essential to leverage the potential of data digitalised through the SIIEASC project. It is key to make investments in reorganising and strengthening the human resources of government agencies to harmonise approaches to data governance and to ensure the proper capabilities to establish and implement effective data governance strategies. This can include programs to cross-train policymakers and technologists and, in other instances, efforts to embed technical expertise across traditional government ministries.

Optimisation of administrative processes must be completed before digitalisation. This includes processes that may be inefficient (in the recording of civil status), duplicate data collection, and other bureaucratic procedures leading to unnecessary delays in the digitization process.

The National Trade Registry Big Data Platform

The Romanian National Trade Register Office (NTRO) is subordinated to the Ministry of Justice and tasked with assembling and keeping key information on Romanian companies. NTRO responsibilities include:

- Maintaining the trade register
- Archiving registration documents
- Providing documents and information on companies upon request
- Assisting legal and natural persons subject to registration in the trade register
- Editing and publishing the Insolvency Proceedings Bulletin.

NTRO had to improve its internal reporting capabilities and its capacity to exchange data with other public institutions and businesses because it was having difficulties running its extensive database. As NTRO had data exchange protocols with public institutions such as the

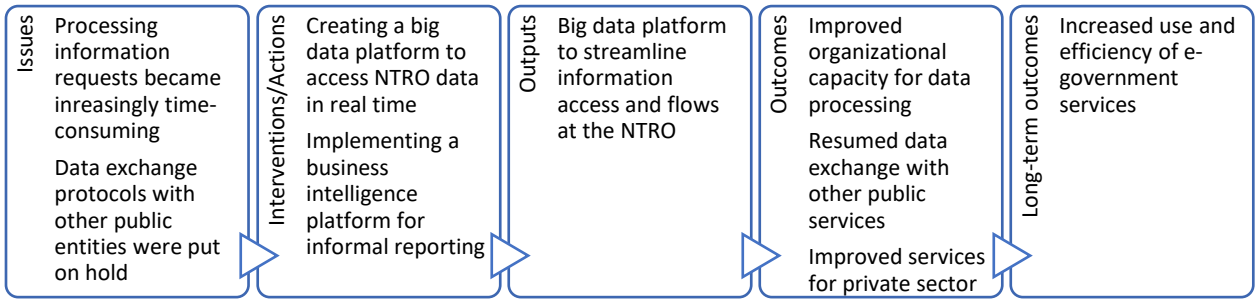
National Agency for Fiscal Administration (NAFA), Ministry of Environment and the Competition Council, it needed a tool to enhance its capacity to analyse big volumes of structured and unstructured data.

Development of the NTRO's Big Data Platform was made possible by the Improving the capacity to process data and reporting of the National Trade Register Office through Big Data architecture and technologies project (MySMIS #108513). The total project value is RON 31.4 million, with 80 percent co-financed by ESIF.

The general objective of the project was to develop NTRO's ability to process information and to deal with data requests from the public administration and private entities more efficiently, while also optimising internal reporting and management. The project had three strategic objectives, which were to be met by the Big Data Platform as in the theory of change below (Figure 25):

- Modernising internal processes involved in providing information to other state institutions
- Increasing the use of e-government services.

Figure 24. NTRO Big Data Project's Theory of Change



Source: Original elaboration by the evaluation team.

The project was implemented without any major setbacks, but delays occurred during procurement. Technical difficulties in communication between the Electronic Public Acquisitions Platform and the Official Journal of the EU (JOUE) caused a four-month delay. The notification of the extension of the deadline for submitting bids for the project management contract did not reach JOUE in time, therefore, the procedure was rejected and had to be restarted. In addition, the modification of the Government Emergency Ordinance 114/2018, which made managing authorities responsible for the ex-ante control over the public acquisition procedures, created confusion within all contracting authorities, as it was not clear where the documentation needed to be approved. Further, implementing Business Intelligence, the internal reporting platform, was challenging for both NTRO and the contractor. These delays triggered an amendment extending the project by nine months. After the beneficiary solved these issues, the project was implemented as planned.

COVID-19 pandemic had a considerable impact on project implementation, but all parties involved adapted to the new setting. Due to social distancing measures, training for users of the Big Data Platform was delayed. Participants had to be split into small groups to comply with attendance caps implemented during the pandemic, and training had to run in multiple sessions. Also, the MySMIS application was updated to support online reimbursements, but for a short period in was not clear if the paper-based system was still being used. Nonetheless, the last three reimbursement requests for this project were submitted online.

The project closed on January 28, 2021, after 36 months of implementation and delivered on its main objectives. The Big Data Platform was implemented, the hardware was installed in the NTRO Centre, while the Business Intelligence reporting tool was used extensively within the NTRO. Table 9 details project completion indicators.

Table 9. NTRO Big Data Project Indicators

Indicator	Target value	Value obtained
Number of institutions that use and access the information	449	449
Big Data application	1	1
Number of users benefitting from more efficient electronic services	306 322	306 322
Upgrade kit implemented for database server of the current IT systems	1	1

Source: Evaluation Team with data from NTRO

As the Big Data Platform became operational, NTRO resumed its data exchange protocols with NAFA, the Competition Council and the Ministry of Environment. With the old system, it took up to eight hours to process more complex information requests. In addition, users had to be careful not overload the system. After the implementation of the Big Data Platform, the information is available in real time and can be tailored to the specifications of the requesting entity, be it a private company or a public institution.

The archive with records prior to 2005 was also integrated within the Big Data Platform. Although there were some issues in optimising the speed and precision of the optical character recognition, the archive can be used when processing data requests. Another key result is that NTRO will reduce its dependency on paper. The archive will be further digitised through the life events project which also benefits from COP funding. As the information exchange is automated, paper and email request can now be directed exclusively to the NTRO portal.

However, maintenance will be a key challenge to the sustainability of the NTRO Big Data Platform. Maintenance activities can't be included in EU funded projects; therefore, most IT platforms are only covered in case of hardware and software faults during the warranty period.

As public administration budgets have a limited space for investments, updating IT platforms may prove challenging in the long term. Without updates, the platform may become obsolete. To mitigate this risk, the NTRO will maintain the platform through a ticket system and will try to externalise the maintenance of the platform if needed.

Lessons Learned for Future Projects

As procurement processes present many challenges in the initial stages of most projects, beneficiaries should plan for all possible scenarios. Beneficiaries should consider a more conservative estimate of the time needed to complete procurement because coordinating with multiple public institutions can be challenging. As the process can get bogged down in complex administrative procedures at any stage, teams should also consider a possible worst-case scenario, where bids are rejected and need to be relaunched. A more conservative estimation of the time needed to complete the procurement process will ease the pressure on the project's implementation timeline.

As noted in the interviews, lack of advance payments in financing agreements can severely limit the pool of firms that are able to sustain complex IT projects. The project had 4 billing milestones with 40 percent of the sum billed during implementation and 60 percent at final acceptance. In a 36-months-long project, companies face a long period without receiving payments, creating a situation where contracting firms effectively must finance these projects for several months. This is especially problematic for IT projects in which up to 70 percent of the budget is for hardware purchase.

IT projects for central authorities can take a long time to be implemented, which limits the pull of potential contractors and, by implication, may limit project effectiveness. From concept to final acceptance an IT project for the central government may have a 4-year timeline, which is very long for the IT sector.

Adaptation to the COVID-19 pandemic proved essential in managing the project. Although the training process was affected by the pandemic due to social distancing requirements, the project was able to move forward by switching the management to online communication, as the broadband infrastructure in Romania has the capacity for high-speed connections. Moving coordination meetings online even proved beneficial for this project.

The Competition Council's Big Data Platform

The Romanian Competition Council is the authority tasked with the enforcement of national and EU competition rules[13]. To be able to fully fulfil this role, the Competition Council needed an IT tool that could analyse big volumes of sparsely connected data. The development

[13] For a full description of the Competition Council's responsibilities see http://www.consiliulconcurentei.ro/en/about-us/description-of-competition-council/role/.

of the Big Data Platform enhanced the Competition Council's capacity to analyse large amounts of data through automated processes.

Processing big volumes of structured and unstructured data is a key aspect of Competition Council's investigations. This has been mostly done by consulting the paper archive or the Relational Database Management System, both methods being exceedingly time-consuming and essentially reactive. To improve the efficiency of investigations, an instrument was needed to proactively flag competition and market distortions. Especially as private sector companies became more technologically advanced, employing machine learning and artificial intelligence, the Competition Council needed a big data platform to better understand how companies function in this new environment.

The development of the big data platform was done through the project Optimisation of interactions between the business environment by implementing an advanced analysis and data exchange mechanism through the development of an E-government and Big Data IT System within Romania Competition Council (MySMIS #109641). The project's financing agreement was signed on January 29, 2018, and was expected to be implemented in 36 months. A subsequent amendment extended the project by 12 months, with the new end date of January 29, 2022. The Competition Council partnered with Special Telecommunications Services (STS) on the technological side of the project. The total project value was RON and the breakdown is shown in Table 10 below.

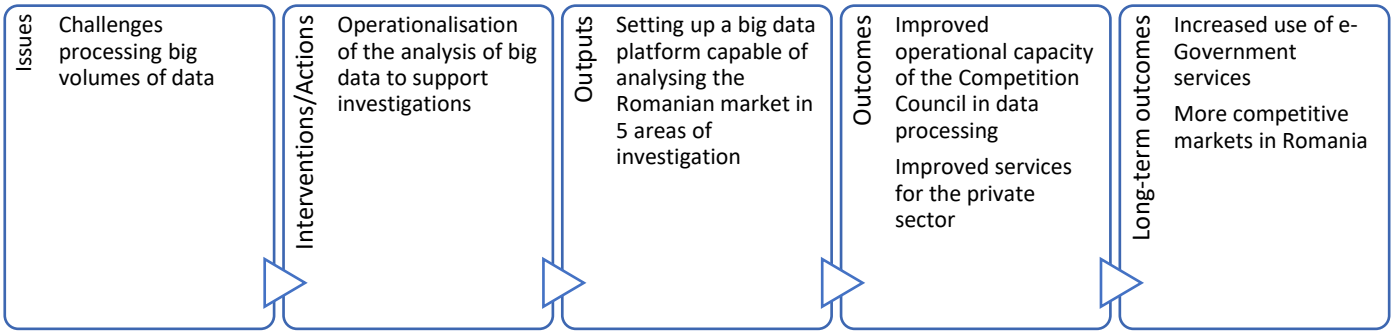
Table 10. Financing for the Competition Council Project

EU funding (million RON)	National funds (million RON)	Non-eligible expenses (million RON)	Total (million RON)
31.03	5.76	13.8	50.6

Source: Competition Council.

The project's general objective was to operationalise the analysis of big volumes of data to support investigations and other functions of the Competition Council by implementing a big data platform. The platform aimed to help investigations in five areas: cartel screening, rigged auctions, structural and commercial links between enterprises, sector enquiries and economic concentration. The theory of change for the project is outlined in Figure 26. Five specific project objectives and results are summarised in Table 11.

Figure 25. Competition Council Big Data Project's Theory of Change



Source: Original figure by the evaluation team.

Table 11. Competition Council Big Data Project: Specific Objectives and Results

Specific objectives	Results
1. Implementing a big data platform by creating the analytical models supporting investigations using at least 9 data sources	1. Implementing a big data platform that would consolidate the Competition Council's data 2. Integrating the structured, semi-structured, and unstructured data in the big data platform; integrating 9 data sources 3. Implementing 10 reports that would help strategic decision making of the Competition Council

Specific objectives	Results
2. Increasing the operational capacity by implementing a secured access to a big data platform for 50 users	1. Mobile access for 3 big data applications
3. Increasing the investigative capacity of the Competition Council by using the structured and unstructured data in 10 workflows	1. At least 10 workflows that generate data for the big data platform
4. Ensuring the analytical support for 5 major investigation areas	1. The following investigation areas will benefit from tailored big data analysis: screening for rigged auctions; cartel screening; connections between firms; economic concentration 2. Integrating Council's IT systems in the big data platform
5. Increasing the capacity of the council's staff by training them in administering and using the big data platform	1. 10 Competition Council staff and 10 Special Telecommunication Services staff will be trained to administer the platform R2. 150 staff of Competition Council will be trained to use the big data platform

Source: Competition Council.

The implementation of the big data platform was to be the foundation for the Council's future projects in high end technologies such as artificial intelligence and machine learning. Understanding the technology was a key issue when the project proposal was written, therefore, the beneficiary had a steep learning curve to understand the potential of this technology and to tailor it to the needs and interests of the Competition Council.

Project implementation was delayed in the early stages due to a prolonged legislative process and procurement related disputes. Approving the project's substantiation note through a government decision and responding to three challenges to the procurement process

by one of the companies necessitated a 12-month extension, pushing the project's implementation timeline to 48 months.

The approval of the project's substantiation note by Government Decision (500/2002)[14] took longer than initially expected. The process took approximately 2 months due to several remarks made by the Ministry of Finance and the Economic and Technical Committee on the project's budget, delaying the launch of the tender process. The decision was approved by the Government on March 29, 2018, taking effect on April 11, 2018, when it was published in the Official Gazette[15].

During procurement one of the companies challenged the procurement process three times, delaying it. During the initial stages of the process, a demo session was organised for all the firms that passed the technical and eligibility evaluations. One of the companies that did not pass the demo stage contested the process. The National Council for Solving Contestations (NCSC) ruled in the Competition Council's favor[16].

The challenges to the procurement process created considerable staffing issues for the contracted company. Although NCSC ruled in the Competition Council's favor, the challenges caused an 8-month delay in implementation. This setback proved problematic for the company that won the contract, as it had to reallocate its human resources to other projects until a ruling was issued. After the NCSC decision, the contractor could not immediately reallocate the right pool of experts to the project. Due to this misalignment, the relationship between the Competition Council and the contractor reached an impasse that was overcome after both sides understood that another delay would pose a serious risk to the achievement of project objectives.

The beneficiary noted that the National Agency for Public Procurement's (NAPP) ex-ante evaluation of the documents created significant delays. NAPP has a key role in evaluating projects' procurement documentation, but some aspects of the process, such as the duration of the review and repeated rejections of the documents with no clear guidance on how to address the problems, cause significant delays. The process is further delayed by the requirement that repeat submissions must be once again verified by the Economic and Technical Committee. The beneficiary cited a specific misunderstanding of the Ministry of Communications' instructions on

[14] Government Decision 500/2002: https://sgg.gov.ro/1/wp-content/uploads/2018/03/HGANEXA-5.pdf.
[15] The Official Gazette, April 11, 2018, http://www.monitoruljuridic.ro/monitorul-oficial/320/2018-04-11/.
[16] The CNSC ruling 333 and 846/2020: http://portal.cnsc.ro/decizii.html?a=search&Dosar-CNSC:nume-contestator=NTT+data&reg:registrationDate=-&Dosar-CNSC:CUI-Contestator=RO13091574.

certifications for security experts. Although included in the project's tender book, NAPP deemed the certifications excessive and ruled that they be removed.

During implementation, importing databases from other public institutions was fraught with issues. The Competition Council's platform needed to collect data from multiple public institutions, including the Electronic Public Acquisitions System, Romanian Authority for Digitalisation, National Trade Register, Ministry of Justice, and National Agency for Fiscal Administration. For the platform to be able to integrate the data correctly, a particular data index was needed, but this was not always achieved at first attempt, and data from three agencies had to be remapped thee, and additional human resources had to be allocated to complete the process.

Certain measures implemented in response to COVID-19 pandemic facilitated project implementation. Paperless document flow, including digital signatures, became more acceptable to the Romanian public administration. Online coordination meetings were well attended and successfully replaced physical meetings. On the negative side, several key experts got sick and could not be easily replaced.

When project closed in January 2022, it had delivered on all its objectives. As can be seen in Table 12, the project either met or exceeded all key indicators.

Table 12. Competition Council's Big Data Project: Key Indicators

Indicator	Target value	Actual value	Percentage
Number of institutions that use the platform/ access information	**3**	**4**	**>100%**
Applications developed using big data technologies	**1**	**1**	**100%**
Number of reports generated that support the activity of the Competition Council	**10**	**61**	**>100%**
Number of data sources integrated in the platform	**9**	**10**	**>100%**

Indicator	Target value	Actual value	Percentage
Number of applications from the big data platform implemented within the project to which access is ensured remotely	**3**	**3**	**100%**
Number of workflows that generate data for the platform implemented at the level of the Competition Council	**10**	**10**	**100%**
Number of existing IT systems leveraged in the new big data architecture	**3**	**4**	**>100%**

Source: Competition Council.

The big data platform is functional and is being gradually adopted as a tool in all five major areas of investigation. After the platform was developed it was optimised so that it yielded a manageable level of alerts. Initially, about 100 indicators were developed, but in February 2022, the platform yielded 4 000 alerts. Therefore, these indicators were refined and aggregated to reduce the number of alerts to a manageable level. The platform has several modules with varying degrees of complexity. Some modules yield straightforward results and can be used already, but the more complex modules, such as rigged auctions and economic concentrations, need to be further refined. The process of optimising the platform is still underway as the results yielded indicate that the algorithms of the platform need further refining.

Nonetheless, inspectors of the Competition Council have started using the platform in their investigations, especially the feature that maps linkages between firms and shareholders' structure. About 20 processes and complex analyses have been conducted using the platform, such as sectoral investigations, studies, and analyses. The platform also indicated several instances of economic concentration which were validated through subsequent expert

analysis. Although some of the results were false positives, three results indicated by the platform are currently under investigation.

The case management and workflows application part of the project is regarded as a clear success because it is being used by all the inspectors in the Competition Council. Since all documents within the Competition Council are now generated electronically, workflows have improved. The Competition Council inspectors immediately started using the workflow application, especially during the COVID-19 pandemic, as it helped with remote work. In 2022, the Competition Council went through a reorganisation process, and the workflow application was easily customised to be in line with the new structure. In addition, the Competition Council's integrated IT strategy made possible the integration of the applications developed in the past. As the Council had the necessary documentation, the contractor could map the updates to older REGAS and Price Monitor applications and integrate them with the new big data platform.

Over 20 years' worth of the Competition Council's paper archive has been digitised and integrated in the big data platform, which is expected to reduce investigation times. Although the Council's archive is well organised, searching and gathering data for a market study used to take weeks, if not months. According to the beneficiary's estimation, the big data platform reduces the data search time to around 5 minutes. Also, the platform is expected to reduce the time of sector investigations, and investigations into distorting competition. Economic concentration is another key area monitored by the Competition Council, and the new platform will help make decisions regarding potential mergers a lot faster.

Another key result is that the Competition Council has switched to a paperless operation for increased efficiency. The implementation of digital workflows resulted in a significant reduction of the cumbersome paper trail that was needed for day-to-day operations. The workflows also allowed department managers to better understand the operational process and to implement measures to improve it. Moving towards a paperless operation improved the efficiency of decision making in the Competition Council.

Implementing the big data platform changed how the Competition Council is perceived internationally and in Romania. The platform will considerably increase the data gathering capacity of the Council and may reduce anti-competitive behavior. As similar big data projects implemented by competition watchdogs in Europe were more modest in scope, the international standing of the Competition Council of Romania has been boosted.

Risks to Sustainability

In the short term, securing the budget to maintain and develop the big data platform has been identified as the key risk for the sustainability of the platform post EU financing. As the EU financing doesn't allow for maintenance activities to be a part of the contract, the Competition Council will need to secure funding from the state budget. Another sustainability risk is keeping up with the technological development of the market that Competition Council monitors. Further financing will be needed to refine the platform. This risk was partly mitigated by housing the platform hardware at the STS data center and benefiting from its expertise on security and maintenance of IT platforms. In the near future, it is expected that the Competition Council's big data platform will migrate to the government cloud, which is a key milestone[17] for the National Recovery and Resilience Plan.

Not attracting the right kind of experts is another key risk to the platform's sustainability. The platform will need highly skilled IT specialists to make new data correlations and analyses, especially after the platform has been used in the Council's investigations. Since the salaries offered by public administration can't match what such IT specialists earn in the private sector, the Competition Council will need to find a way to attract the necessary cadre if the platform is to retain its viability. The Competition Council will try to fill these roles of data analysts in-house.

The platform's sustainability will also depend on its contribution to Competition Council's investigations in the short term. As the platform is being rolled out and used in actual investigations, its track record will determine if it will be used extensively and to what extend it will improve the competitive environment.

Lessons Learned

Partnerships within the public administration may optimise the use of human and other resources and help overcome programme limitations. When the maintenance of hardware could not be included in the financing requests, Competition Council entered in partnership with STS and outsourced this non-core competency to a specialised branch of the Romanian public administration.

[17] The list of institutions that will be hosted in the Government Cloud can be found here: https://sgg.gov.ro/1/wp-content/uploads/2023/01/HG-70.pdf.

Public institutions have different approaches to creating databases, which makes integrating them difficult. Remapping data from partner institutions was a complex and time-consuming process for the contractor. The lack of a unitary approach in the development of similar platforms by public institutions may hamper the creation of big data platforms in the future.

6. Improving Internet Use for Education, Health, and Culture

Summary:

- Most projects were approved in 2021, with beneficiary schools reporting challenges in navigating the complex European Structural and Investment Funds (ESIF) structure, particularly during the COVID-19 pandemic. Streamlined processes may be beneficial for future programming.
- Procurement challenges were encountered, particularly with sourcing hardware for e-education and specific equipment for the E-cultura platform project.
- Project implementation delays have arisen due to a variety of factors including challenges in contractor procurement, underestimation of task complexity and time requirements (e.g., for 3D scanning), communication issues between contractors and beneficiaries, and the overall complexity of developing an online platform.

Projects under this objective saw the greatest number of approvals and commitments in 2021. 469 projects were signed for the purchase of tablets (out of which 2 were cancelled, 3 were not implemented, and 293 were transferred to Priority Axis 4) across 2021 and 2022. Further, three new projects were approved to support and scale up the use of digital systems and telemedicine within the healthcare system – two with the Ministry of Health (both signed in 2021) and 1 with the Ministry of Defence signed in 2023. At the time of the evaluation, these contracts are still being implemented, or have just completed. As a result, this section reports factors affecting the implementation of the e-education projects, and covers progress made by the E-cultura project (the largest financed project under this objective) in greater detail.

Lack of familiarity with the ESIF structure and process is a potential concern for funded projects under this objective. Beneficiary schools – 2000 of which were targeted under the COP during the COVID-19 pandemic – were primarily new to the ESIF process as first-time beneficiaries. In surveys, they reported being challenged by the length of the procurement process and their relative lack of familiarity with the workings of the European funds. Beneficiaries noted that the documentation required for application often stretched their limited resources, and required specialist knowledge that was hard to obtain during the COVID-19 pandemic. Some stated that they faced delays in processing the requisite documents due to the inherent complexity of the requirements, which necessitated a lot of administrative information. They suggested that streamlined and flexible project processes during emergencies, such as a pandemic, may be considered for future programming periods.

Procurement challenges were also notable in beneficiary responses. Some beneficiary schools reported difficulties in procuring hardware (laptops and tablets) for education in time for the start of the school term, reasons for which varied from the lack of a sufficient number of local suppliers, to documentation delays which then delayed the procurement of equipment. Large-scale projects, such as the E-cultura platform, also struggled with procurement of specific items, such as those required for scanning and digitising artifacts, amid the COVID-19 pandemic. Impact and effectiveness of the e-education and e-health projects may require a separate evaluation to identify medium- and long-term effects. The rest of this chapter concerns itself with the evaluation of the E-cultura Platform.

The E-Cultura Platform

The European Commission, via recommendation 7579 in 2011, stipulated that Romania should digitise 783 000 pieces of cultural heritage. In 2017, 150 000 cultural artifacts were digitised in Romania. However, due to the Europeana.eu regional cultural platform changing its quality criteria, the number of digitised artifacts aligned with the EU recommendation was a mere 100 in 2021. To meet its commitments, the Ministry of Culture developed the E-Cultura: Romania's Digital Library project (MySMIS #11436) and signed the financing agreement on July 13, 2018. The total project value is RON 52.85 million (Table 13).

Table 13. E-Cultura Project: Funding Breakdown by Source, million RON

EU funding	National funds	Total value
43.32	9.53	52.85

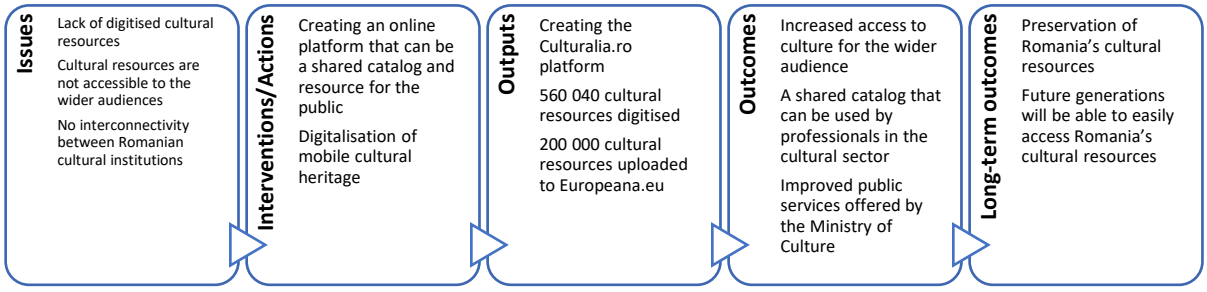
Source: E-cultura project.

As part of the project, 45 cultural institutions were selected to digitise their artefacts, including 19 museums, 5 libraries, the National Film Archive, the Romanian Television Society, the National Heritage Institute, the National Library of Romania, and the Constantin Brăiloiu Ethnographic and Folklore Institute. The project was expected to be implemented in 3 years but was extended for an additional 24 months. It is expected to be completed by July 2023.

The project aimed to improve public services offered by the Ministry of Culture by digitizing Romania's cultural movable heritage with the help of modern information and communication technologies, to improve access to cultural resources. To do so, the project aimed to develop the Culturalia.ro platform and digitise selected Romanian cultural heritage to the required standards. The project aimed to to digitised, store online, and make accessible on a

single platform to be developed as part of the project 560 000 cultural resources, of which 200 000 were to be delivered to the Europeana.eu platform. See Figure 27 for the project's theory of change.

Figure 26. E-cultura Project: Theory of Change



Critical Assumptions:

Ability to have the appropriate scanning technology for digitising cultural resources

Existing public interest for digital cultural consumption

Existing internet connectivity and uptake

Source: Evaluation team.

With hindsight, the project faced two critical design stage challenges. First, project design posed critical challenges to the development of partnerships, as the design did not accommodate independent partnerships between the key beneficiary (Ministry of Culture) and other cultural institutions that would have enabled transfer of budgets. In the actual design, cultural institutions that participated in the project could not be responsible for their own budgets and implementation timelines. The onus fell on the Ministry of Culture's Project Management Unit to coordinate all aspects of the project. Second, according to ESIF program level indicators, the breakdown of digitised artifacts by whether they came from a developed or less developed region was mandatory. This proved to be challenging since most museums and artifacts were in developed regions. The project team mitigated this challenge during implementation by attributing digitised artifacts to their areas of origin.

As of March 31, 2023, the project had exceeded most results indicators. Currently, around 583 117 cultural resources have been uploaded to the site, including artefacts, archive news

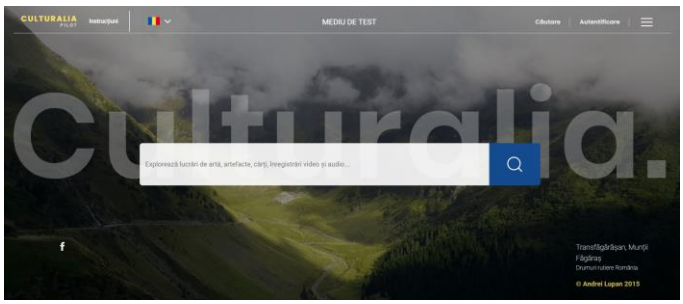
footage, books, historic documents and many more. The Culturalia.ro platform is online, and the import of cultural resources has been completed – providing a valuable resource to the public, as several digitised artifacts were not easily accessible to the public in the past (Figure 28). The process of uploading digitised artifacts to Europeana.eu is underway and expected to be completed by July 2023.

Table 14. E-cultura Project: Results Indicators Status as of April 2023

Indicator	Status	Next steps
560 640 cultural resources digitised and publicly available in Romania's Digital Library	583 177 cultural resources digitised	n/a
The development of an IT platform that can act as a digital library and national shared catalogue (Culturalia.ro)	Culturalia.ro is online with 583 177 cultural resources digitised and available on the site	Optimisation underway until July 2023
200 000 cultural resources digitised and uploaded to Europeana.eu	Underway	To be completed by July 2023

Source: The Ministry of Culture Project Management Unit.

Figure 27. Culturalia.ro Landing Page



Source: https://culturalia.ro/.

Digitised cultural resources can be accessed via the site's search feature in multiple formats, such as MP3, MOV, PDF, TIFF, as a variety of documents, books, objects, and other items have been digitised. Out of 583 177 cultural resources, 2 535 artefacts can be viewed in high resolution 3D format, among them historical pots, household items, sculptures,

figurines, etc. (Figure 29). The artifacts are accompanied by a technical description and an annotation describing the artist's life and work.

Table 15. Types of Cultural Resources to be Digitised

Type of cultural resource	Number to be digitised
Books	16 500
Rare Books	3 390
Documents	268 820
Object digitised	140 500
3D digital objects	6 500
Audio	16 120
Video	9 400
Cultural Articles	120 000

Source: Ministry of Culture Project Managing Unit.

Figure 28. Sample High Resolution Artifact – Shepherd Kid Figurine

Source: https://culturalia.ro

The process of uploading cultural resources to Europeana.eu commenced in late 2022 and have been uploaded as of September 2023. The process was protracted as it involves validation. The 300 000 digitised cultural resources selected by the Ministry of Culture to be sent to Europeana.eu were first sent for Sandbox validation in packages containing hundreds or thousands of cultural resources. Once the validation process is completed the cultural resources are uploaded to Europeana.eu.

The project resulted in all participating cultural institutions taking stock and standardising metadata of their own cultural resources for uploading to the platform. This has had a positive spillover effect on smaller institutions who do not have the resources to buy and maintain servers, as they are able to take advantage of the public platform free of charge.

However, several issues delayed project implementation, necessitating the extension of the closing date by over two years. Some of the challenges faced by the project are described below.

Challenges in finding the right contractors at the beginning of the project. The project stalled in its initial stages as procurement of complex equipment met with difficulties. In some instances, companies were not able to join the bidding process, especially for the acquisition of the equipment specified by the Romanian National Television. In such cases, the bidding process needed to be repeated from the beginning, which led to delays in implementation further on.

Underestimating the time required for 3D scanning of the cultural resources. The digitisation of cultural resources took longer than initially estimated, and prices for imported equipment soared due to supply chain issues. The scanning of each resource was estimated to take up to 30 minutes, but it actually took up to 3 hours. The scanning process was challenging due complex legal responsibilities for the integrity of cultural resources – while an institution may be legally responsible for the integrity of the cultural resource being digitised, the scanning process was carried out by another institution, owing to the need to centralise the scanning within the Ministry of Culture for budgetary reasons. To complete the scanning process, the beneficiary had to procure 59 months of extra labour. In addition, not all the necessary equipment to complete the process was purchased on time, leading to further delays.

Underestimating the complexity of developing the online platform. The development of Culturalia.ro platform needed more iterations than estimated by the contractor. The contractor estimated that three to five iterations will be needed to finalise the platform design, but in reality, 10 iterations were needed on core elements and 18 on some details. This happened partly because the Ministry of Culture developed its vision of how the platform should work as it started using and understanding it. Due to the high number of iterations, the actual costs of developing the platform doubled, according to the contractor.

Miscommunication between the contractor and beneficiary on data migration. Data migration issues strained communications between the Ministry of Culture and the contractor. As the tender book did not capture the complexity of the data import, the Ministry of Culture and the contractor took different positions on how the data should be transferred to Culturalia.ro. To efficiently store the data, Culturalia.ro uses a non-static data model or metamodel called an entity attribute model. The contractor developed the import mechanism, but as the data needed to be

remapped for the platform's model, the Ministry of Culture needed the data import script, which was considered beyond the initial scope of the agreement with the contractor. However, the beneficiary and the contractor managed to come to terms regarding the data migration in 2021 in order to deliver a functioning platform. The import scripts have been developed and optimised by the contractor allowing 80 to90 percent of the digitised cultural resources to be added to Culturalia.ro by end of July 2022.

Bureaucratic procedures during the project's lifetime. Legislation affecting project implementation created several issues for the Ministry of Culture. The Ministry of Culture was solely responsible for hiring the people needed to implement the project and had to adhere to the Romanian public administration procedure (job announcements, selection of candidates, hiring exams). In addition, the Intermediary Body for the Promotion of the Information Society asked to be notified after every hiring exam, of which there were about 50 during the lifetime of the project. This led to increased amount of paperwork that was not linked to project outcomes.

Marginal impacts of the first wave of COVID-19 pandemic in 2020. One institution closed during that period, and the project was granted a two-month extension. According to the Ministry of Culture, other large components of the project went along as planned with no major setbacks in the development of the platform and the digitalisation of resources due to COVID-19.

Improved Transparency in Implementation

The monitoring of the E-cultura project by Transparency International (TI) and the Institute for Public Policies improved its transparency and implementation. In 2014, DG Regio and Transparency International (TI) decided to implement the Integrity Pacts monitoring mechanism of selected EU funded projects with several managing authorities invited to participate from all EU countries. The Integrity Pacts were developed in 1990 to prevent corruption in public contracting. The COP Managing Authority was part of this Integrity Pact and initially proposed the Ministry of Education's e-Government project for the TI monitoring, but as the project did not advance as planned, E-cultura was proposed as an alternative.

TI monitored the E-cultura project during the implementation of its contract with the contractor hired to develop the Culturalia.ro platform. During the project's implementation, the TI team participated in coordination meetings between the Ministry of Culture and the contractor and were granted access to the procurement documentation. Both the contractor and beneficiary noted that TI's involvement had a positive effect on their communication. According to the Ministry of Culture and the contractor, TI's recommendations in its two reports improved

the overall quality of the documentation, and their presence had a moderating effect for both sides, especially during the discussions about the data import scripts.

Risks to Sustainability

Not securing the budget to develop and maintain the platform is main risk to the sustainability of the project. The platform will be maintained by the contractor up to 2025, but there is a degree of uncertainty as to what will happen after that. Without political support within the Ministry of Culture, and financing from the national budget to support its maintenance and upgrading, the platform might struggle past the maintenance period.

Lack of expertise within the ministry to maintain the platform poses another risk. The contractor has designed the platform in such a way that no major intervention on the code will be needed for the next five years. However, the contractor recommends hiring a dedicated team of experts that could routinely maintain and develop the platform without any major overhaul. This poses challenges owing to the limited supply of such specialists, and the lack of competitive renumeration in the public sector.

Resistance to transitioning from existing paper-based workflows is yet another risk to sustainability. As Culturalia.ro is meant to become the new shared catalogue for cultural institutions, professionals in the culture sector used to paper-based workflows may not transition easily to the new platform. Monitoring take-up among key institutional stakeholders and ensuring its continued use may be important to its long-term sustainability.

Lessons learned for future projects

Project design should include a post-EU-financing sustainability plan. Although some maintenance aspects are covered, not securing the budget and human resources are the main risks to Culturalia.ro's sustainability in the long term. The Ministry of Culture's Project Management Unit will make costs projections in order for the Ministry to absorb the costs of maintaining the platform, but this aspect will be clarified in the closing stages of the project. The National Research and Cultural Formation Institute is a potential partner of the Ministry of Culture that can be involved in the administration of Culturalia.ro.

Outreach and communication are needed to ensure uptake of funded services. A comprehensive public relations campaign may be needed to raise awareness of platforms and services developed using COP financing. For instance, for the E-cultura project, the Ministry of Culture has commenced a communication campaign to promote the platform in partnership with

national television and the Ministry of Investments and European Projects. Other beneficiaries could learn from such efforts to ensure uptake and effectiveness of their own projects.

Good communication and trust-building between contractors and the implementing team is key to the project's success. As the communication regarding data migration for the platform reached an impasse, the project risked ending in failure. The contractor managed to understand the Ministry of Culture's needs and changed the framework of how they addressed the issues that were important to the development of the platform.

Institutional partnerships may benefit for future complex projects. Partnerships would spread responsibility and bolster efficient use of resources, especially in cases where complex bureaucratic procedures are required. In the case of the E-cultura project, the implementing team had to hire a lot of people to be able to implement the project which, due to public administration procedures, proved challenging. Devolving budgets to partners may be useful in such cases.

Monitoring by an independent organisation improves transparency and implementation. The monitoring of the E-cultura project by a consortium of NGOs led by TI and the Institute for Public Policies improved the transparency of the E-cultura project and should be implemented more widely in projects supported through EU or national funds.

7. Core Findings and Recommendations

The main findings, conclusions, and recommendations of this evaluation are summarised in Table 16 below.

Table 16. Summary of Findings, Conclusions and Recommendations

Findings and conclusions	Recommendations and timelines	Responsible actors
Selection and administration Average time taken for the evaluation of applications and selection of beneficiaries is long. 161 private firm applicants waited for more than 300 days. Time from approval to effectiveness was 9 months and longer for nearly half of surveyed beneficiaries. Software used for the process can be improved significantly, and processes streamlined to ensure timely submission and ease of use for applicants.	Increase transparency and introduce key performance indicators to monitor processing – for instance, a minimum percentage of applications to be evaluated within a target timeframe. Use simplified selection procedures for non-competitive public beneficiaries for the 2021–2027 programming period. Simplify documentation submission requirements for applicants, including via enabling online submission of all documents, and reviewing signature rules for reimbursements. *Implement in the short term, by end 2024*	Competitiveness Operational Programme Managing Authority (COP MA), MIEP
Connectivity projects The Ro-NET project has successfully connected 119 592 households in 695 localities. 22/27 NGN/NGA projects are under implementation. Progress continues to be challenged by the heterogeneity in local regulations and processes – such as building permits and rights of way – and poor federal-municipal coordination to resolve these issues led to delays.	Work closely with national, regional, and local authorities to coordinate and streamline permitting processes for building permits to expedite implementation. Address demand-side barriers to broadband take-up alongside supply-side barriers to infrastructure rollout. *Implement through 2021–27 programming*	COP MA, OIPSI
Competitiveness projects Considerable progress has been made in financing innovative products and services and enhancing digitisation of firms. As of March 31, 2023, 193 products/services had been finalised with a further 85 under development.	Evaluate the medium- and long-term impacts of grants to develop ICT products and services to firms prior to scaling up financing. *Implement through 2021–2027 evaluation plan*	MA PoCIDIF/MIEP Central Evaluation Unit

Findings and conclusions	Recommendations and timelines	Responsible actors
However, products funded by these investments are in early stages of market testing. Firm sizes have increased, but profits did not.		
e-Services projects E-cultura and SIIEASC projects were in advanced stages of implementation. The Competition Council and National Trade Registry platforms had been developed. Lack of human and budgetary resources for maintenance are risks to impact and sustainability.	Plan operations and maintenance budgets during project design and seek commitment from beneficiaries prior to allocation of funds. *Implement throughout ESIF 2021–27* Build capacity and recruit talent in cutting-edge software and hardware systems into government.	Responsible beneficiary ministries

Source: Evaluation team.

This evaluation has assessed progress towards Priority Axis 2 objectives in terms of efficiency, effectiveness, and impact of funded interventions. Given that 65 percent of the total Priority Axis 2 financing was attributed to projects still in implementation as of the report cut-off date of March 31, 2023, and 70 percent of the overall financing was contracted in 2019 and 2020, this evaluation is limited by implementation progress.

Nevertheless, the evaluation finds that improvements to selection, evaluation, and administration processes will benefit future programming. Greater digitisation of the application processes and improvement of the user interface of the software used by applicants may yield tangible gains. Simplification of administrative procedures, such as giving up the requirement to submit signed and scanned documents in favour of an e-signature or online communication regime, may reduce the administrative burden born by applicants. The evaluation also warrants improvements to the reimbursement processes, which are subject to delays in some cases exceeding 100 days.

Local regulations show heterogeneity and necessitate a harmonised approach in local and regional permitting processes. It is thus recommended that authorities at various levels coordinate and expedite the permitting processes for swift implementation. Given that the share of population covered by NGN/NGA networks has significantly increased since the start of this programming period, the evaluation also recommends that future programming consider demand-side barriers to take-up, beyond supporting supply-side efforts to roll out infrastructure.

PA2 funding of innovative products and services has impressively exceeded its initial target, having supported 193 innovations. However, many are still in the early stages of revenue generation. Although increases in firm size and marginal improvements in turnover were

observed, net profits did not show a substantial increase three years after project completion. As these innovations are in early stages of the product cycle, more time may be required for a comprehensive assessment of their market performance. However, the evaluation recommends to streamline administrative procedures for disbursing grants and to amplify support for the digital transformation and innovative development of SMEs.

Finally, while several e-government projects are in their advanced stages, most faced critical delays in implementation due to underestimation of their complexity and insufficient technical and human resources. Sustainability of these platforms is a key concern across platforms and beneficiaries. It is, therefore, recommended that all large-scale e-government projects consider sustainability from the onset, and invest in human resources to amplify platforms' impact assure maintenance and upgrading.

Annex A. Documents Reviewed for the Evaluation

Programme Documents

Competitiveness Operational Programme document (versions of July 2016 and December 2018).

Decision C (2018) 8851 amendment to the Competitiveness Operational Programme 2014–2020.

Decision C (2017) 8200 amendment to the Competitiveness Operational Programme POC 2014–2020.

Ex-ante evaluation of the Sectoral Operational Program Increasing Economic Competitiveness

Monitoring Framework for the Competitiveness Operational Programme 2014–2020

Applicant's Guide, Action 2.2.1 Supporting the growth of the added value generated by the ICT sector and innovation in the field through the development of clusters (Calls 1, 2 and 3).

Applicant's Guide for Action 2.2.2: *Digitisation of SMEs.*

Applicant's Guide for Action 2.3.1: *Strengthen and ensure the interoperability of IT systems dedicated to e-government services type 2.0 focused on events in the lives of citizens and businesses, development of government cloud computing and social media communication, open data and big data – government cloud computing and social networks in public institutions*.

Applicant's Guide for Action 2.3.1: *E-government and life events.*

Applicant's Guide for Action 2.3.1: *Development of government cloud computing and social media communication, open data and big data.*

Applicant's Guide for Action 2.3.*1: E-government and big data.*

Applicant's Guide for Action 2.3.2: *Ensuring cyber security of ICT systems and computer networks (Appeal No. 2).*

Applicant's Guide, Action 2.3.3 *Improving digital content and systemic ICT infrastructure in the field of e-education, e-inclusion, e-health and E-cultura - SECTION E-education (Calls 1 and 2).*

Applicant's Guide, Action 2.3.3 E-health.

Applicant's Guide, Action 2.3.3 E-cultura.

Project Documents

1. Ro-NET Project Presentation – The Construction of a National Broadband Infrastructure in underprivileged areas.
2. Technical Project – Optimising the interaction with the business environment and implementation of advanced analysis mechanisms and data exchange through the implementation of an e-governance and analysis information system within the Competition Council.

3. Ministry of Education and Research[18] – Information System of School Management, SMIS 130632.
4. Ministry of Internal Affairs – Services HUB (Supply Centre for Electronic Services) for the Ministry of Internal Affairs. SMIS 122632.
5. Ministry of Internal Affairs – Integrated Information System for Issuing Civil Status Documents – SIIEASC. SMIS 120025.

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Blumenstock, J., Keleher, N., Rezaee, A., & Troland, E. (2020). The Impact of Mobile Phones: Experimental Evidence from the Random Assignment of New Cell Towers**.** *Working Paper. http://www.jblumenstock.com/files/papers/jblumenstock_2020_ccn.pdf*

Briglauer, W., & Gugler, K. (2019). Go for Gigabit? First Evidence on Economic Benefits of High-speed Broadband Technologies in Europe. *JCMS: Journal Of Common Market Studies*, *57*(5), 1071-1090. doi: 10.1111/jcms.12872

Brown, A.N., & Skelly, H.J. (2019). How Much Evidence Is There Really? Mapping the Evidence Base for ICTD Interventions. *Information Technology for International Development 15*, 16–33.

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Cusolito, A. P., Lederman, D., & Pena,Jorge O., (2020). The Effects of Digital-Technology Adoption on Productivity and Factor Demand: Firm-level Evidence from Developing Countries (English)*. World Bank Policy Research working paper WPS 9333* Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/829161595512126439/The-Effects-of-Digital-Technology-Adoption-on-Productivity-and-Factor-Demand-Firm-level-Evidence-from-Developing-Countries

Fang, L. (2018). The Dual Effects of Information Technology Clusters: Learning and Selection. *Economic Development Quarterly*, *32*(3), 195-209. doi: 10.1177/0891242418783849

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Annex B. Interviews and Focus Groups

The evaluation team conducted systematic outreach to the following stakeholders.

Organisation	**Unit**	**Theme/Specific Objective**
Managing Authority of the Competitiveness Operational Programme		All themes
Ministry of Research, Innovation and Digitalisation		All themes
Ministry of Public Works, Development and Public Administration	Directorate General for Regional Development and Infrastructure	Access to broadband infrastructure
Ministry of Agriculture and Rural Development	Directorate General for Rural Development	Access to broadband infrastructure
Ministry of Internal Affairs	SIEEASC Project Management Unit	Increasing use of e-government
Ministry of Education		Increasing use of e-government
Ministry of Health		Increasing use of e-government
Ministry of Labour and Social Protection		Increasing use of e-government
Ministry of Culture		Increasing use of e-government
Government Chief Information Officer		Increasing use of e-government
ANCOM (National Authority for Management and Regulation of Communications)		Access to broadband infrastructure

Organisation	Unit	Theme/Specific Objective
ADR (Authority for the Digitalisation of Romania)	COP Information Society Intermediate Body	All themes
Competition Council		1. Increasing economic competitiveness 2. Increasing use of e-government
Trade Registry		1. Increasing economic competitiveness 2. Increasing use of e-government
State Office of Patents and Trademarks		Increasing economic competitiveness
The Association of Regional Development Agencies of Romania		Access to broadband infrastructure
National Association of Rural Municipalities		Access to broadband infrastructure
National Association of Towns		Access to broadband infrastructure
National Association of Mobile Operators of Romania (AOMR)		Access to broadband infrastructure
National Association of Internet Providers of Romania (ANISP)		Access to broadband infrastructure
Association for Electronic Communications of Romania (ACER)		Access to broadband infrastructure
Association for IT and Communications of Romania (ATIC)		Access to broadband infrastructure
Association of Telecom Operators of Romania (AOTR)		Access to broadband infrastructure
Employers' Association of the Software and Services Industry (ANIS)		Increasing economic competitiveness
Romanian Association for Electronics and Software (ARIES)		Increasing economic competitiveness
Foreign Investors Council		Increasing economic competitiveness

Organisation	Unit	Theme/Specific Objective
National Council of SMEs		increasing economic competitiveness
National Association of Businesspeople of Romania		Increasing economic competitiveness
National Association of Online Stores of Romania		Increasing economic competitiveness
Coalition for Romania's Development		Increasing economic competitiveness
National Association of People with Disabilities		Increasing economic competitiveness
Federation of Democratic Trade Unions		Increasing economic competitiveness
CNSRL Fratia		Increasing economic competitiveness
Cartel Alfa		Increasing economic competitiveness
National Unions Block		Increasing economic competitiveness

Interviews were conducted with the following representatives of these beneficiaries.

Participants in the COP Specific Objective 2.2 focus group conducted on February 8th, 2021:

1. Representative of the State Office for Patents and Trademarks
2. Representative of the National Council of SMEs
3. Representative of the Romanian Association for Electronics and Software
4. Representative of Foreign Investors Council
5. Representative of the National Unions Block

Participants in the interviews conducted from February 1st to March 30th, 2021, July 1st to August 31st, 2022, and January 1st to April 31st, 2023.

1. Project deputy manager and IT expert for SIIEASC Project, Ministry of Internal Affairs
2. Representative of the Ministry of Agriculture and Rural Development

3. Project Manager and Vice-Project Managers for Big Data Project (SMIS 109641) Competition Council
4. Project Manager and IT Expert on Electronic Catalogue Project, Ministry of Education
5. Expert, Strategy Analysis and Innovation Unit, and Technical Experts (Coverage and Quality Mapping and Geospatial Visualization) from ANCOM
6. Representative of the National Association of Online Stores of Romania
7. Project Manager, Ro-NET, Ministry of Research, Innovation and Digitalisation – Directorate of Communications - Ro-NET
8. Manager, Project on Digitising Cultural Artifacts, Ministry of Culture
9. Representative of the West Regional Development Agency - The Association of Regional Development Agencies in Romania
10. Managing Authority of the Competitiveness Operational Programme
11. Representatives of the National Association of Mobile Operators in Romania
12. Company Manager, Margo Software (MySMIS 115978)
13. Project Manager, Termene AI (MySMIS 129271)
14. Company Manager, Tele-Conctact (MySMIS 129553)
15. Company Manager, Algorina Safe Web (MySMIS 142817)
16. Project Manager, Blockchain Security (MySMIS 142643)
17. Project Manager, Innovative ITC Solutions for Children with Learning Disabilities (MySMIS 130016)
18. Competitiveness Operational Programme – Managing Authority
19. The Intermediary Body for Digitalisation in Romania
20. Experts, Statistical Analysis Unit, ANCOM
21. Contractor, E-cultura Project
22. Contractor, Competition Council Big Data Project
23. Contractor, Ro-NET Project (Orange)
24. Representatives from Transparency International, monitors for the E-cultura Project

Annex C. Instruments Used: Survey Guides, Focus Group Guides, and Interview Guides

Survey questionnaire for all applicants (EN translated to RO)

No.	Question	Response
	What part of the selection process are you currently in?	Was awarded financing Application was rejected Under evaluation
1	Name of firm/organization	
	CUI Number	
2	Nature of the organisation	Public Private Non-governmental organization Other: _____
3	Year founded	
4	Number of employees	
5	Company turnover (annual) (if applicable)	
6	Name of the call for projects you applied for, in the 2014–2020 cycle (as mentioned in the Call for Projects) and code	
	Name of project	
7	Has your firm applied for any previous projects under the IECOP (in 2007–2013 cycle)?	
8	Size of award applied for (in RON)	
9	Number of employees who worked on the application	
	Number of hours spent on the application overall by your organization	hours
10	On a scale of 1–10 where 10 is the highest score, how satisfied were you with the process used for selection of organizations under this call for projects?	
11	Why? Please elaborate on your rating above.	
12	How easy was it to understand the criteria employed for selection of applicants?	Very easy Easy Difficult Very difficult Prefer not to say
13	Why? Please elaborate on your rating above.	
14	How long was the process from your submission of bids to notice of selection/rejection?	____ months
15	If you were awarded a contract, how long did it take from notice of award to effectiveness of the contract (with signature)?	

No.	Question	Response
16	What was your opinion on the length of the selection process?	Too short Short Long Too long Prefer not to say
17	What part of the selection process did you find the most challenging?	
18	Why? Please elaborate on your answer above.	
19	Were your queries at various stages of the selection process responded to in a timely and efficient manner?	Yes No Prefer not to say
20	How was your experience with the software platform used for submitting applications?	Very Good Good Neutral Bad Very Bad Prefer not to say
21	How would you assess the reliability of the platform used for submitting applications (MySMIS)?	Very Good Good Neutral Bad Very Bad Prefer not to say
22	If there is anything you would like changed/improved about this process, what would that be?	
23	How would you rate the efficiency of the process overall, based on your experience?	Very good Good Neutral Bad Very bad Prefer not to say

Survey questionnaire for beneficiaries only

No.	Question	Response
1	Name of firm/organization	
2	Nature of the firm/organization	Public Private Non-governmental organization Other: _____
3	Year founded	
4	Number of employees	

No.	Question	Response
5	Company turnover (annual)	
6	Name of the call for projects applied for, in the 2014–2020 cycle	
	Code for the call for projects you applied for	
7	Size of award requested for (in RON)	
	Size of award granted (in RON)	
	Did you have any co-financing for this award?	Yes No
	Size of co-financing/financing from other sources (if applicable, in RON	
8	Are you implementing projects under any other EU-funded Operational Programmes (including POC Axis 1) in this cycle?	Yes No
	If yes, which Operational Program? If yes, how many projects financed through EU Funds have you been awarded to date?	
	If you are implementing projects under other Operational Programmes in the 2014–2020 cycle, how do you rate your experience with projects financed through those programmes compared to POC – Axis 2?	Much better Better Similar Worse Much worse Not applicable
9	On a scale of 1–10, how satisfied were you with the process used for monitoring the implementation of projects by firms under this call for projects?	
10	Why? Please elaborate on your rating above.	
11	What are your opinions on the timeliness of the reimbursement process?	
11a	Were there any situations of delays that impacted your cash flow and normal operations? Kindly elaborate.	
12	What part of managing the implementation process did you find the most challenging?	
13	Why? Please elaborate on your answer above.	
14	Were your queries at various stages of the implementation process responded to in a timely and efficient manner?	Yes No Prefer not to say
15	How was your experience with the software platform used for submitting operational documents during implementation?	Very Good Good Neutral Bad Very Bad Prefer not to say
16	How would you assess the reliability of the platform used for submitting operational documents during implementation?	Very Good Good Neutral Bad Very Bad Prefer not to say

No.	Question	Response
17	If there is anything you would like changed/improved about this process, what would that be?	
18	How would you rate the efficiency of the implementation process overall, based on your experience?	Very good Good Neutral Bad Very bad Prefer not to say

Stakeholder Interview Questionnaire - <Project Name>

[Generic project under IP 2.3 questionnaire adapted for each interviewee]

This interview questionnaire seeks to understand stakeholder perspectives to assess the extent to which interventions funded under the Competitiveness Operational Programme (2014–2020) have met their goals and objectives.

Introduction

Thank you for agreeing to participate in this interview. My name is <insert name>. I am conducting this interview on behalf of the World Bank Group to evaluate the effects of interventions funded under Competitiveness Operational Programme (COP). The purpose of this interview is to help us better understand the effect that COP has had on key stakeholders such as yourself.

It is important that you respond to all of the interview questions based on your experience and perspective.

Warm up

Do you have any questions before we begin?

Objective questions

What is your current role in the Competitiveness Operational Programme – Axis 2/Thematic Objective (TO) 2.3 Enhancing use of e-government?

Have you been involved in the design of COP Axis 2? If so, could you kindly describe the nature of your involvement and the processes by which you were consulted in different phases of programme design?

What is the role of the ministry in expanding access to e-government in Romania, and how have different ESIF funds been utilized for this objective?

Reflective Questions <Project Name>

What challenges/problems necessitated the inception of this project?

What were you looking for in a solution and how did it inform the design of your project?

What initial challenges did you encounter at the design stage and how did you engage with the COP selection process? Kindly describe your engagement in detail.

What process did you follow during implementation?

What roadblocks for implementation did you overcome? What could have been done better?

What kind of success have you seen with the project so far? Kindly share any anecdote of how the project may have made a difference in terms of increasing access to e-government in Romania.

Was there anything about the implementation/results that positively surprised you?

Has this solution saved money and/or increased productivity?

Questions for further data collection

Whom else should we contact as part of this process to gain additional insights into the design and implementation of TO 2.3 of COP Axis 2?

Conclusion

Those are all the questions I have for you today.

Are there any other comments you would like to provide?

Thank you very much for your time!

Stakeholder Interview Questionnaire – Programme Level

[Adapted for Each Interview; Generic Template for IP 2.2 below]

This interview questionnaire seeks to understand stakeholder perspectives to assess the extent to which interventions funded under the Competitiveness Operational Programme (2014–2020) have met their goals and objectives.

Introduction

Thank you for agreeing to participate in this interview. My name is <insert name>. I am conducting this interview on behalf of the World Bank to evaluate the effect of interventions funded under Competitiveness Operational Programme (COP). The purpose of this interview is to help us better understand the effect that COP has had on key stakeholders such as yourself.

It is important that you respond to all of the interview questions based on your experience and perspective.

Warm up

Do you have any questions before we begin?

Objective questions

What is your role in supporting projects under COP for the development of e-commerce in Romania?

Was your association invited to consultations when COP – Axis 2 was designed?

If yes, were your opinions/input reflected in the approved COP – Axis 2? For the opinions that were not included, did you receive justifications?

Did members of your association receive funding under COP – Axis 2?

Reflective questions

Did you think this project helped meet the objective of increasing economic competitiveness in Romania?

Do you think POC Axis 2/Action 2.2.2 Support for using ICT to develop businesses, with particular focus on e-commerce development has contributed to the development of e-commerce in Romania?

In your opinion, what was the best feature of the design of POC – Axis 2/Action 2.2.2?

In your opinion, what was the best feature of its implementation?

What did you like the least about the POC – Axis 2/Action 2.2.2?

In your own words, describe the ways in which you think Action 2.2.2 will impact Romanians. Which elements are critical to the success of the programme?

Are there any unintended impacts or consequences that you know of – either positive and/or negative?

Questions for further data collection

Are there other projects/programmes with similar specific objectives/actions taking place in the same geographical area?

Whom else should we contact as part of this evaluation process?

Conclusion

Those are all the questions I have for you today.

Are there any other comments you would like to provide?

Thank you very much for your time!

Updated Ro-NET Stakeholder Interview Questionnaire

A. Project Design

- How was the Ro-NET methodology applied to reach the 783 localities out of the 2298?
- In the end, 695 localities from the original 783 were included in RO-NET project. What prompted the adjustment of this indicator?

B. Implementation

- According to the latest information, lots 2 and 3 were finalised in February 2022, while Lot 4 was finalised on May 26, 2022. How did the implementation work out for these lots?
- Lots 6 and 7 were completed in September 2022 marking the end of project implementation, how did implementation work out for the remaining two lots?
- What were the most difficult aspects of implementing this project? What worked / what did not?
- Were the issues with ENEL and Electrica solved?
- How did the relationship with Orange workout after they acquired Telekom?
- What could (if anything) have been done to tighten the implementation timeline of the project? What were key bottlenecks that you feel could have been resolved quicker?

C. Outcomes

- In your opinion, what were the project's most significant outcomes?
- How would you describe the impact of the Project (macro-view)?
- How would you describe the sustainability of the outcomes post-completion? Will internet usage grow in the 695 localities that benefitted from the project? Do you think people in these areas can afford internet services?

D. Monitoring and evaluation (M&E) of outcomes

- Were the indicators adequate to assess the progress throughout the project? Were the M&E arrangements effective?
- How did you collect the data and analyse it? What level of data do you currently have on Ro-NET, and what indicators do you monitor on a regular basis?
- Do you have a list of areas for rollout as prioritised, and dates when implementation began and completed in each of those areas? We would be grateful for this information.
- Was M&E data used to inform project management and decision-making? How so?
- Was the partnership with Ministry of Investments and European Projects and COP anaging Authority effective? What worked? What didn't work?

· Did the Managing Authority/Ministry of Investments and European Projects adequately facilitate the design of the project?

· In which ways did the partnership with the POC-MA and the Ministry of Investments and European Projects help/hinder implementation? What could have been done to avoid delays?

E. Lessons Learned

· What are your key lessons learned (positive and negative)?

· Are there any lessons that we can draw on for future projects?

· If you were assisting another person design a similar project, what would you recommend that they include in the design?

Stakeholder Interview Questionnaire

This interview questionnaire seeks to understand stakeholder perspectives to assess the extent to which interventions funded under the Competitiveness Operational Programme (2014–2020) have met their goals and objectives.

Introduction

Thank you for agreeing to participate in this interview. My name is <insert name>. I am conducting this interview on behalf of the World Bank to evaluate the effect of interventions funded under the Competitiveness Operational Programme (COP). The purpose of this interview is to help us better understand the effect that the COP has had on key stakeholders such as yourself.

It is important that you respond to all of the interview questions based on your experience and perspective.

Warm up

Do you have any questions before we begin?

Objective questions

Design

- Did you participate in the design of the project for submission to ESIF/COP-MA? (If yes, go to sub-questions; if no, ask for the right person to pose these questions to)
    - What challenges/problems necessitated the inception of this project?
    - What were you looking for in a solution and how did it inform the design of your project?

    - What initial challenges did you encounter at the design stage and how did you engage with the COP selection process? Kindly describe your engagement in detail.
- Was the design adequate in your opinion, in view of the objectives you sought to achieve? What aspect of your company's daily activity you sough to improve with the help of this project?
- Were the project risks adequately identified? Were appropriate actions to mitigate those risks planned?
- Why did you opt for EU funding instead of other types of financing?
- Did lessons from earlier projects influence design? Examples?

Implementation

- How did you use EU funding? For example, did you use it for trainings or to create an innovative product?
- What were the most difficult aspects of implementing this project? What worked / what did not?
- How do you rate the various aspects of implementation below? Are there any lessons that we could draw for the following areas?
    - Commitment and leadership on the agenda
    - Coordination and engagement with various stakeholders
    - Organisational capacity for implementation
    - Legislation and regulations affecting the project (National/EU)
    - Monitoring and Reporting (to the MA)

- Do you think the implementation timeline was adequate for the project?
    - What could (if anything) have been done to tighten the implementation timeline of the project?
- Did COVID-19 affect project implementation? How? What were some of the ways in which you overcame the challenges? What lessons would you have for other projects under implementation?

Outcomes

- In your opinion, what were the project's most significant outcomes?
- Kindly share any anecdote of how the project has made a difference for your company.
- Have there been any unplanned benefits (e.g., Increased profit margins and competitiveness) as a result of the project?
- Were there any spillover effects?
- How would you describe the impact of the project on your firm's day to day operations?
- How would you describe the sustainability of the outcomes post-completion? What are some key remaining challenges? Are you intending to commercialise this product?

Monitoring and evaluation (M&E) of outcomes

- Were the indicators adequate for assessing the progress made under the project? Were the M&E arrangements effective?
- Was data collected and analysed in a timely manner?
- Was M&E data used to inform project management and decision-making? If so, how?

- Was the partnership with the Managing Authority effective? What worked? What didn't work?

Lessons learned

- What are the key lessons learned (positive and negative)?
- What are some lessons for the next programming period? Are you planning to apply?
- If you were assisting another person design a similar project, what would you recommend that they include in the design?

Questions for further data collection

Whom else should we contact as part of this process to gain additional insights on the design and implementation of this project?

Conclusion

Those are all the questions I have for you today.

Are there any other comments you would like to provide?

Thank you very much for your time.

Focus Group Guide

Facilitator's welcome, introduction and instructions to participants

Welcome and thank you for volunteering to take part in this focus group. You have been asked to participate as your point of view is important. I realise you are busy, and I appreciate your time.

Introduction: This focus group discussion is designed to explore your current thoughts and feelings about the interventions funded under <investment priority/specific objective>. The focus group discussion will take no more than two hours. May I tape the discussion to facilitate its recollection? Please express your verbal consent for the taping of this discussion (if yes, switch on the recorder).

Anonymity: Despite being taped, I would like to assure you that the discussion will be anonymous. Chatham House rules. The tapes will be kept safely in an encrypted folder until they are transcribed word for word, then they will be destroyed. The transcribed notes of the focus group will contain no information that would allow individual subjects to be linked to specific statements. You should try to answer and comment as accurately and truthfully as possible. I and the other focus group participants would appreciate it if you would refrain from discussing the comments of other group members outside the focus group. If there are any questions or discussions that you do not wish to answer or participate in, you do not have to do so; however please try to answer and be as involved as possible.

Ground rules

- The most important rule is that only one person speaks at a time. There may be a temptation to jump in when someone is talking but please wait until they have finished.
- There are no right or wrong answers.

- You do not have to speak in any particular order.
- When you do have something to say, please do so. There are many of you in the group and it is important that I obtain the views of each of you.
- You do not have to agree with the views of other people in the group.
- Does anyone have any questions?
- OK, let's begin.

Warm up

- First, I'd like everyone to introduce themselves. Can you tell us your name and your professional designation, as well as your familiarity with the Competitiveness Operational Programme?

Introductory question

I am just going to give you a couple of minutes to think about your experience of engaging with the projects under the programme. What do you think are key characteristics that are important to note about the programme?

Guiding questions

- What, in your mind, did the project seek to accomplish? How successful did you think it was in doing so?
- Are there specific projects that stood out, in terms of their impact? Why did they stand out?
- What drove the effects of the projects toward the specific objective according to you?
- What are some of the biggest challenges that you faced, as a beneficiary/external stakeholder of the programme? What steps did you take to overcome those challenges?
- Do you think the projects funded to support the *development of ICT products and services and e-commerce* are likely *to improve economic competitiveness within Romania?* If not, why not?
- Are there possible unintended effects – both positive and negative – of the projects? What may they be? You can think about environmental, social, political, cultural, or other effects these projects may have in Romania.
- Do you think the projects are running on time? Are there specific projects that were more delayed than others? If there are projects that are not on time, what do you feel are the cause of the delays? What measures did you take to rectify them?
- Did your organisation apply for funding to or familiarise yourself with other Operational Programmes? How many operational programmes did your project apply to for funding?
- Did your organisation apply for funding in the previous programming period?
- What was your experience with the general process of EU funds?

    - In the selection phase (prior to the award of bids)
    - In the implementation phase (after the award of bids)
- Do you think the disbursement procedures for COP were simple and easy for you to understand? If not, what challenges did you face?
- Are there other projects like this one, that sought *to increase economic competitiveness*, that you are aware of or have worked with? In comparison to them, how would you rank your experience with COP?
- Do you engage with end-beneficiaries? What have you heard about how people perceive this project? Are there any stories you would like to share?
- Do you think the projects added value to the existing infrastructure available in Romania? If not, why not?
- After funding ends for these projects, how do you think the projects will continue to sustain themselves? Are there any challenges to sustainability that you foresee? Why or why not?
- What could have been done better? How would you make the procedures easier for everyone involved?

Concluding question

- Of all the things we've discussed today, what would you say are the most important issues for you?

Conclusion

- Thank you for participating. This has been a very successful discussion.
- Your opinions will be an asset to the study.
- We hope you have found the discussion interesting.
- If there is anything you are unhappy with or wish to complain about, please contact the World Bank team via email.
- I would like to remind you that any focus group comments featuring in this report will be anonymous.

Annex D. List of Members of the Evaluation Coordination Committee

Number	Institution's name	Representative
1.	Ministry of Education	Government representative at public policy level in education and research and data provider
1.	Ministry of Transport and Infrastructure	Government representative for the implementation of public policies in the field of communications and data provider
2.	Ministry of Economy	Government representative for public policies in the field of trade and the business environment
3.	Ministry of Health	Government health public policy representative and data provider
4.	Ministry of Environment, Waters and Forests	Government representative at environmental public policy level and data provider
5.	National Institute of Statistics	Data provider
6.	The Authority for Digitization of Romania	Government representative at the level of public policies in the digitalization field
7.	Executive Unit for Financing Higher Education, Research Development and Innovation	Government representative at public policy level and data provider
8.	Directorate General for the European Competitiveness Programs, Management Authority for the Competitiveness Operational Program	Government representative for the management of European structural and investment funds
9.	General Directorate of the Intermediate Organization for Research (OIC), Ministry of Research, Innovation and Digitaliaztion	Government representative for the management of European structural and investment funds
10.	General Directorate of the Intermediate Body for the Promotion of the Information Society (OIPSI), the Authority for the Digitization of Romania	Government representative for the management of European structural and investment funds

Number	Institution's name	Representative
11.	General Directorate, Regional Operational Program, Management Authority for the Regional Operational Program, Ministry of Development, Public Works and Administration	Government representative for the management of European structural and investment funds
11.	Romanian Association of Banks	Social partner
12.	General Association of Romanian Engineers	Social partner
13.	Association of Romanian Businesspeople	Social partner
14.	Alma Mater National Trade Union Federation	Social partner
15.	The National Council of Small and Medium Private Enterprises in Romania	Social partner
16.	Romanian Research and Design Patronage	Social partner
17.	Patronage of Young Entrepreneurs from Romania	Social partner
18.	Academic Society from Romania	Social partner
19.	Analysis and Programming Directorate	Government representative for the management of European structural and investment funds
20.	National Authority for Communications Administration and Regulation	Government representative for administration and regulation in the communications sector
21.	Association for Information Technology and Communications from Romania	Social partner
22.	Association of Regional Development Agencies in Romania	Social partner
23.	Romanian Association for the Electronics and Software Industry	Social partner
24.	Employers' Association of the Software and IT Services Industry	Social partner

Number	Institution's name	Representative
25.	Chamber of Commerce and Industry of Romania	Social partner
26.	Ministry of Labor and Social Solidarity	Government representative at the level of public policies in the field of labor and social protection and data provider
27.	Ministry of Culture	Government representative at the level of public policy in the field of culture and data provider
28.	Management Authority for the Administrative Capacity Operational Program, Ministry of Public Works, Development and Administration	Government representative for the management of European structural and investment funds and data provider
29.	Association for Intercommunity Development ITI Danube Delta	Government representative for the management of European structural and investment funds
30.	General directorate for public policies, strategies and internal managerial control, General Secretariat of the Government	Government representative at the level of public policies
31.	The National Organization of Disabled Persons from Romania	Social partner
32.	National Council for Combating Discrimination	Anti-discrimination authority
33.	Federation of Democratic Trade Unions from Romania	Social partner

Annex E. Econometric Methods

This section provides a brief introduction to difference-in-differences (DiD) design with multiple treatment time periods. It summarises the approach taken by several recent research papers and draws on the work of Callaway and Sant'Anna for the explanation of DiD with multiple time periods. See the selected bibliography below for more details.

The standard approach to estimating difference-in-differences with time periods is to use a two-way fixed effects specification of the form:

$$Y_{it}=\theta_t+\eta_i+\beta^*D_{it}+v_{it}$$

where θ_t is a time fixed effect, η_i is a unit fixed effect, D_{it} is a treatment dummy variable, v_{it} are time varying unobservables that are mean independent of everything else, and β is the parameter of interest interpreted as the average effect of participating in the treatment.

However, in a straightforward two-way fixed effects specification, research units whose treatment status doesn't change over time serve as the comparison group for units whose treatment status does change over time. It compares a) newly treated units relative to never-treated units, b) newly treated units relative to not-yet treated units, but also c) newly treated units relative to already treated units.

The first of these two comparisons are good in that they take the path of outcomes experienced by units that become treated and adjust it by the path of outcomes experienced by units that are not participating in the treatment. The third comparison adjusts the path of outcomes for newly treated units by the path of outcomes for already treated units. But this is not the path of untreated potential outcomes, which makes it hard to interpret β as a causal estimate.

To overcome these challenges of the two-way fixed effects regressions in DiD designs with multiple periods, therefore, Callaway and Sant'Anna (2021) propose defining group-time average treatment effects:

$$ATT(g,t)=E[Y_t(g)-Y_t(0)|G=g]$$

ATT (g, t) is the average effect of participating in the treatment for units in group g at time period t. For identification, three assumptions need to hold:

1) Staggered Treatment Adoption Assumption: this implies that once a unit participates in the treatment, it remains treated. In other words, units do not "forget" about their treatment experience.
2) Parallel Trends Assumption based on never-treated units: this implies that, in the absence of treatment, average untreated potential outcomes for the group first treated in time g and for the "never treated" group would have followed parallel paths in all post-treatment periods $t\geq g$.
3) Parallel Trends Assumption based on not-yet treated units: this implies that one can use the not-yet-treated by time s ($s\geq t$) units as valid comparison groups when computing the average treatment effect for the group first treated in time g.

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