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CONTRIBUTIONS ON THE DESIGN OF TECHNO-ECONOMIC INDICATORS IN THE FRAMEWORK OF INTEGRATED SERVICE OF LOCAL AND ZONAL INTEREST

Dorin-Vasile DEAC-ȘUTEU, Aurel Mihail ȚÎȚU

Abstract: *Public administrations in the EU need to rapidly increase their efficiency and quality of services. They are gradually applying the principles of public management and quality management to improve performance, using various institutional and administrative capacity building techniques to help national economies. The experience of the pandemic, the prolonged economic crisis, the lack of trust in public officials and institutions and the effects of demographic change can be mitigated by applying modern ICT-based methods that can ensure the quality of management decisions. Administrative simplification is a long-term process, and to meet citizens' expectations, a series of interventions are needed that can be implemented immediately and have a visible impact, measurable with modern tools. The article includes research, analysis and quantitative and qualitative indicators to assess some of the most typical implementation processes in the work of the most relevant local, regional and area public service providers.*

Key words: *Services of local and zonal interest, improvement, quality assurance and management of services, scientific research, processes and activities, indicators.*

1. INTRODUCTION

There is no universal consensus on what constitutes a "public service", and the activities that are considered to fall into this category can vary greatly from nation to nation. The public service sector in the European Union is therefore huge and complicated. The extent to which countries outsource their public services and how this is done varies greatly from country to country, but the elements that have the greatest impact are universal, as shown in Fig.1. In general, there will be greater demand on public service providers for increased resources and expertise, even if the mobility and ability of these providers to adapt flexibly to changing conditions will be increasingly limited [1].

The main objective of the project is to raise awareness of the legal framework and the principles of the EU White Charter [2] on services of general interest among a larger number of people and providers of services of public interest. The White Paper shows how important services of general interest are as part of the European model of society and how to ensure that all people have access to services of general interest [4] as a way of maintaining social and territorial cohesion and making the European economy more competitive. The specific objectives of the research are the following:

- raising awareness among the public and public service providers about professional standards and quality indicators for the provision of services of general interest;
- reducing negative public perceptions of the level of crisis management;
- raising public awareness of the need for environmentally friendly activities;

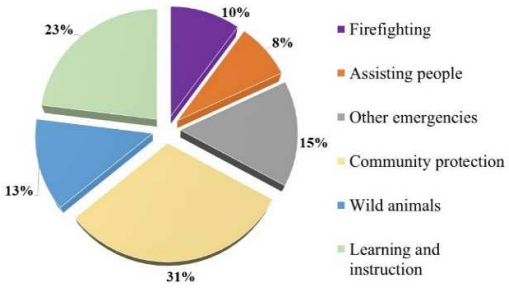

Fig. 1 Example of public interventions

- increasing public confidence in organizations providing services of general interest.

Given the organic meaning of this notion, the term "public service" [5] has been defined as "an administrative body created by the state, city, county, or municipality, with a specific competence, with financial means procured from the general patrimony of the public administration which created it, placed at the disposal of the public to satisfy on a regular and continuous basis a requirement of a general nature [6], to which private initiative could only provide an incomplete solution" [7].

2. CONCEPT OF "INTEGRATED SERVICE OF LOCAL AND REGIONAL INTEREST"

2.1 Present situation

The increasing complexity of citizens' problems and their demands for better service delivery have been the main drivers behind the "explosion" in the number and variety of public services, as depicted in Fig. 2, and the speed with

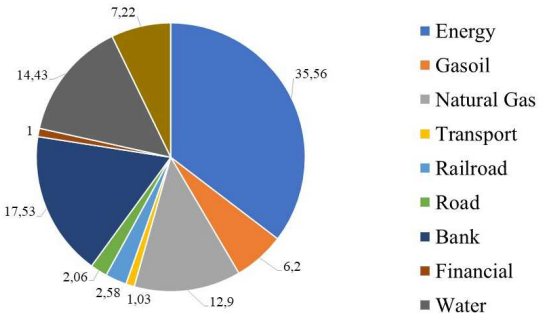

Fig. 2. List of services of general interest in Romania, year 2021, % [4].

which public services respond to citizens' requests. The government has a dual duty to meet these demands: firstly, it must respond to the needs of society, and secondly, it must meet the wishes of the public [8].

Because of this criterion, the interests of the users will take priority over those of the intervening authority or the public [9]. If a public service is not financially viable, it is still obliged to meet a need in society. This means that the public service can continue to operate even if it loses money. When a need arises that private companies cannot meet because it conflicts with making a profit, then the government steps in [10]. One of the roles of the government is to do just that. The burden of the pandemic further burdened municipal finances, as they were tasked with covering the costs of sustaining the service in those areas [11].

2.2 Integrated Service of Local and Zonal Interest

The concept of integrating services of local and regional interest as part of services of general interest is a component of these services and is included.

This commitment is to provide and improve efficient and effective services, from cost-effective services to high standards, taking into account available financial means and tailored to the needs of users.

The notion of "integrated service of local and zonal interest" is described as a component of services that are provided in the public interest by providers who have intellectual competence and material capacity, as evidenced by documents, procurement documents, and other materials of a similar nature. This component of services is referred to as "integrated service of local and zonal interest". The line of reasoning that is stated here is the basis for this definition. In Fig. 3 depicts the level at which the integrated service of local and zonal interest (SIILZ) can be developed. This level will provide five of the processes grouped according to the legislative regulations that apply to the service being provided, as follows:

- the emergency preparedness process;
- essential information for the management process;
- the process of carrying out unplanned emergency work;
- management process activities required by specific rules;
- the environmental monitoring process.

Process optimisation should not result in adding unnecessary work for staff [12].

Establishing a baseline for the current method that the organization uses to analyze its processes is the very first step in the process of improving this technique [13].

As a consequence of this, we will have a standard that we can use to assess whether or not the actions taken by the management team to

increase productivity in the organization have been successful [14]:

- adhering to the principle of simplification of administrative procedures;
- prioritization of the organization's current activities in order of importance;
- forming connections with various other services;
- providing opportunities for citizens to engage in conversations with each other.

There is no single international or European standard that defines the quality or cost of public services [15]. Therefore, due to the nature of the law, the responsible administration is obliged to comply with it, and the level of quality in question should be considered a prerequisite of the least importance.

The public administration authority responsible for ensuring the provision of a quality service would greatly benefit from transcribing the legal requirements into a set of guidelines outlining what needs to be done to comply with the law [16]. These guidelines would explain what needs to be done to meet the requirements of the law.

In order to carry out a cost analysis, one of the standard conditions that must first be met is to define each individual component of the cost of the service.

Definitions are usually included in a document outlining the resources needed to complete a project [17]. There are a number of preconditions that must be met before public economic management can be implemented.

To meet minimum quality standards, the following must be done. The process of improving public services consists of the following steps:

- setting objectives;
- creating minimum quality standards;
- costing minimum quality standards;
- negotiating minimum quality standards and costs;
- implementation of these standards;
- setting up mechanisms to monitor compliance with minimum quality standards;
- evaluating the success of the process.

SIILZ is the result of research carried out to simplify administrative procedures and identify a collaborative solution between local public

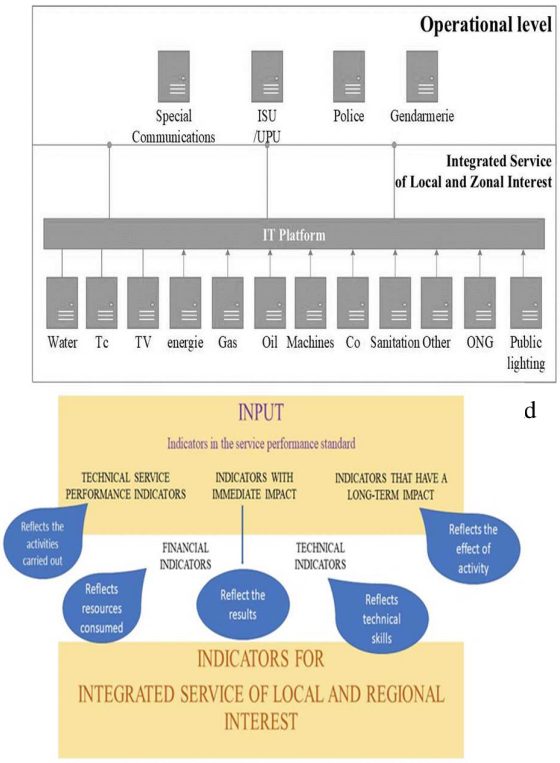

Fig. 4 Organization model of indicators for SIILZ, authors' contribution

service providers so as to improve the efficiency and effectiveness of the services provided. The research took into account situations generated by bad weather, the behaviour of authorities during the pandemic, on the segment not covered by specific emergency situations. Common processes carried out by the organisations involved were identified and measures to simplify a horizontal information flow that can be implemented without an investment effort by the provider were established, as shown in Figure 4.

In order to live up to citizens' expectations, we need a set of measures that can be implemented immediately and have a clear effect [18]. For these reasons, several survey sessions were initiated in the form of questionnaires, on the basis of which the most relevant intentions extracted from respondents were selected.

Because of the potential for providers to work together and share activities, resources and staff, there is also an improvement in the methods used to determine and calculate indicators [19].

3. PROJECTED INDICATORS FOR SIILZ

Lists of indicators have been incorporated into performance requirements, local laws, and other documents as input to the Integrated Local and Area Service, shown in Fig. 5. Key Performance Indicators for the integrated service have been developed using these documents as a basis. This is done so that local, and regional service providers' objectives for integrating information systems can be reflected, and tracked to ensure progress is being made [20].

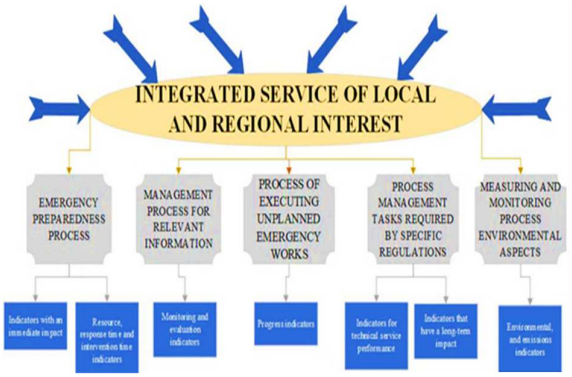

Fig. 5 Structure of indicators for SIILZ, authors' contribution

Harmonization between the indicator grouping model, and the classification of indicators monitored and reported in projects funded under the operational programmes currently being implemented has the potential to attract funding for project implementation at the local, county, area, etc. The indicators required are shown in Figure 6.

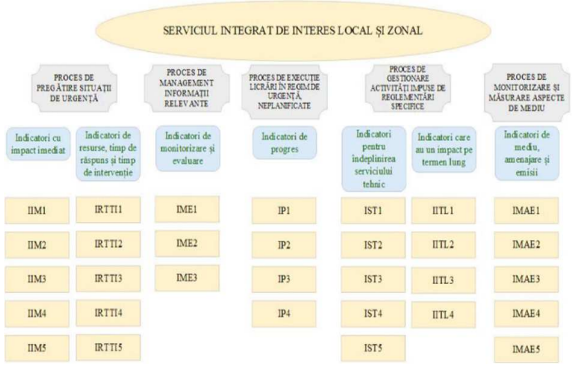

Fig. 6. Design of indicators for each process designed, authors' contribution

3.1 Indicators with immediate impact

Measuring and monitoring, IIM shown in Fig.6 actions that have an immediate impact are the objectives of using immediate impact indicators. According to Law 215/2014, as amended, on the social economy, one of the principles of the social economy is to allocate the majority of profits or financial surpluses to the fulfillment of objectives to general interest of a community or for the public benefit of the community in general. Immediate impact indicators provide information on the total benefits that will arise in the long term as a result of implementing the actions that have been taken.

3.1.1. Indicator on the number of unscheduled interruptions, and limitations in the supply of public service due to the operator/supplier by type of activity:

$$IIM_1 = \frac{N\ int.}{N\ u.a.} \quad (1)$$

IIM_1 = indicator of the number of unscheduled outages and curtailments;
N_{intr} = number of interruptions;
$N_{u.a}$.= number of users affected;
Status:
🟢 =0 (excellent) (on target or above);
🟥 ≥1 (weak).

3.1.2 Indicator of the number of streets or other objectives affected by unscheduled outages:

$$IIM_2 = \frac{N\ s.o.}{N\ u.a.} \quad (2)$$

IIM_2= indicator of the number of targets affected;
$N_{s.o.}$= number of streets or targets;
$N_{u.a.}$ = number of users affected;
Status:
🟢 =0 (excellent) (on target or above);
🟥 ≥1 (weak).

3.1.3 Indicator on the number of joint interventions carried out by joint teams of 2 or more providers, reported to the unfavorable code:

$$IIM_3 = \frac{N\ intv.}{N\ f.} \quad (3)$$

IIM_3 = indicator on the number of interventions;
N_{intv} = number of interventions;
$N_{f.}$ = number of suppliers;
Status:
🟢 ≤1 (excellent) (in target or above);
🟥 ≥1 (weak).

3.1.4 Indicator on the number of multidisciplinary teams allocated per event, reported to the unfavorable code:

$$IIM_4 = \frac{N\ echipe}{N\ f.} \quad (4)$$

IIM_4 = indicator on the number of teams;
N_{echipe} = number of teams;
$N_{f.}$ = number of users affected;

Status:
🟢 =1 (excellent) (on target or above);
🟥 ≤1 (weak).

3.1.5 Indicator on the number of substantiated written complaints on operator non-compliance with licence requirements:

$$IIM_5 = \frac{N\ ses}{N\ u.a.} \quad (5)$$

IIM_5 = indicator for the number of unscheduled outages and curtailments;
N_{ses} = number of referrals;
$N_{u.a.}$ = number of users affected;
Status:
🟢 =0 (excellent) (on target or above);
🟥 ≥1 (weak).

3.2 Resource, response time, and intervention indicators

The resource indicators, IRTTI shown in Fig. 6, are those that measure the amount of resources available, and the degree to which resources are consumed at any given time in activities. This type of indicator takes into account available resources, including human, organizational, material, and time resources.

3.2.1 Indicator of the time taken to answer a call, using different dialing methods:

$$IRTTI_1 = \frac{T\ notif}{M\ a.} \quad (6)$$

$IRTTI_1$ = indicator of the time taken to answer a call;
T_{notif} = team notification time;
$M_{.a.}$ = how to call.
Status:
🟢 =1 (excellent) (on target or above);
🟥 ≤1 (weak).

3.2.2 Indicator on response time to accidental interruptions, by category of users:

$$IRTTI_2 = \frac{T\ rez}{C\ u.a.} \quad (7)$$

$IRTTI_2$ = indicator for the response time to accidental interruptions;
T_{rez} = resolution time;
$C_{u.a.}$ = category of users affected;
Status:
🟢 ≤1 (excellent) (in target or above);
🟥 ≥1.

3.2.3 Indicator on the response time to a referral regarding the interruption/limitation of the provision of activities, if any, unduly ordered by the provider:

$$IRTTI_3 = \frac{T\ react}{C\ u.a.} \quad (8)$$

$IRTTI_3$ = indicator of response time to referral;
T_{react} = team departure time;
$C_{u.a.}$ = category of users affected;
Status:
🟢 =1 (excellent) (on target or above);
🟥 ≤1 (weak).

3.2.4 Indicator on the response time to a referral for interruption/limitation of activities, if any, ordered by the supplier without justification:

$$IRTTI_4 = \frac{T\ notif}{C\ u.a.} \quad (9)$$

$IRTTI_4$ = indicator for the response time to accidental interruptions;
T_{notif} = team notification time;
$C_{u.a.}$ = category of users affected;
Status:
🟢 =1 (excellent) (on target or above);
🟥 ≤1 (weak).

3.2.5 Indicator on the number of announced unscheduled outages by user category:

$$IRTTI_5 = \frac{N\ intr}{C\ u.a.} \quad (10)$$

$IRTTI_5$ = indicator for the number of accidental unscheduled outages;
N_{intr} = number of interruptions;
$C_{u.a.}$ = category of users affected;
Status:
🟢 =0 (excellent) (on target or above);
🟥 ≥1 (weak).

3.3 Indicators with immediate impact

The monitoring and evaluation indicators, IME shown in Fig. 6, express the direct outputs of the activities. Specifically, the outputs refer to everything that has been achieved through the consumption of resources. Outputs can be quantified when services are delivered to beneficiaries.

3.3.1 Correlation indicator between the number of multidisciplinary teams allocated, relative to the unfavorable code:

$$IME_1 = \frac{N\ echipe}{N\ z.c.} \quad (11)$$

IME_1 = indicator for determining the correlation between the number of multidisciplinary teams allocated, in relation to the unfavorable code (code orange, code red);
$N_{echipe=}$ number of teams/supplier;
$N_{z.c.}$ = number of days of unfavorable situation;
Status:

=1 (excellent) (on target or above);
≤1 (weak).

3.3.2 Indicator on the number of complaints on quality of service parameters, by type of users and type of activity:

$$IME_2 = \frac{N\ reclm}{N\ z.c.} \quad (12)$$

IME_2 = indicator on the number of complaints on quality of service parameters, by type of user and type of activity;
N_{reclm} = number of complaints;
$N_{z.c.}$ = number of days of unfavorable situation.
Status:
=1 (excellent) (on target or above);
≤1 (weak).

3.3.3 Indicator on the number of institutions involved in providing assistance according to the service requested:

$$IME_3 = \frac{N\ echipe}{N\ intr.} \quad (13)$$

IME_3 = indicator on the number of complaints on quality of service parameters, by type of user, and type of activity
$N_{echipe=}$ number of teams/supplier;
$N_{intr.}$ = number of interruptions;
Status:
=1 (excellent) (on target or above);
≥1 (weak).

3.4 Progress indicators

Progress indicators, IP shown in Fig. 6, are intended to track how things are going in terms of execution of activities, and completion of intermediate deliverables. Progress indicators are useful for demonstrating both the success of the implementation process, and the efficiency with which certain activities are funded.

3.4.1 Indicator on the activity performed (e.g. number of kilometres of road constructed or rehabilitated) by event category:

$$IP_1 = \frac{N\ obiect}{N\ ev.} \quad (14)$$

IP_1 = indicator on the number of complaints on quality of service parameters, by type of user, and type of activity
$N_{obiect\ =}$ quantitative number/objective;
N_{ev} = number of events;
Status:
=0 (excellent) (on target or above);
≥1 (weak).

3.4.2 Indicator on the number of landmarks put back into use, e.g.: parapets, efficiently distributed lighting products:

$$IP_2 = \frac{N\ invest}{N\ ev.} \quad (15)$$

IP_2 = indicator on the number of complaints on quality of service parameters, by type of user, and type of activity
$N_{invest=}$ number of objectives modernized;
N_{ev} = number of events;
Status:
=1 (excellent) (on target or above);
≤1 (weak).

3.4.3 Indicator on the number of outages with exceeded scheduled duration in relation to the number of scheduled outages or the average duration of scheduled outages in relation to the number of users affected by these outages by user category:

$$IP_3 = \frac{N\ reclam}{N\ ev.} \quad (16)$$

IP_3 = indicator on the number of complaints on quality of service parameters, by type of user, and type of activity
$N_{reclam=}$ number of complaints;
N_{ev} = number of events;
Status:
=0 (excellent) (on target or above);
≥1 (weak).

3.4.4 Indicator on the number of interruptions of public service provision due to user non-compliance with the conditions of use:

$$IP_4 = \frac{N\ zi\ dep}{N\ ev.} \quad (17)$$

IP_4 = indicator of the number of interruptions to the provision of the public service due to non-compliance by the user with the conditions of use;
$N_{zi\ dep=}$ number of days overrun;
N_{evinm} = number of events;
Status:
=0 (excellent) (on target or above);
≥1 (weak).

The indicators for the other groups shown in the Fig.6 refer mainly to established categories and will be the subject of future work

4. CONCLUSIONS

Most of the uses or attempts to use measures in public decision making that could put some pressure on them were listed in the report, and

the use of information technology tools could facilitate compliance [21].

Based on newly acquired knowledge, and experience, once the idea, and commitment have been established, data can be generated, and the process can be initiated and evaluated.

Some of the indicators defined above may need to be reformulated or may be more representative than others in terms of the timeline noted or may be more useful in some cases than others, assumptions influenced by the degree of specialization each provider possesses.

These differences are due to the properties of the measurements, specifically the standard of the procedures, and the applicability of the concepts. There are certain applications that require more data than others, such as when the stakes are higher or when a greater degree of unanimity is required before taking action.

The quality and costs of public services are not regulated by any European or international standard [22].

Therefore, the content of the law requires compliance by the responsible administration, and the quality standard in question should be considered as the minimum necessary [23].

Since the definition of indicators was aimed at measuring objectives, and their consequences, referring to more specific terms or refining the formulas will not change the way indicators have been classified.

In this paper, the authors set out to provide a synthetic, and comparative approach to the evaluation of usable services in the sphere of services of public interest.

The paper is part of a broader research project on improving management in public services of local and zonal interest, defined by the EU White Paper, which aims to design processes for a new concept called Integrated Service of Local and Zonal Interest, made available to citizens, institutions, associations, and other stakeholders through a platform on the PaaS principle to be developed in future work.

5. REFERENCES

[1] The European Trade Union Institute (ETUI), https://www.etuc.org/en/public-services-services-general-economic-interest-sgeis, 2023

[2] Androniceanu, A. *Public management - case studies from public administration institutions and authorities* Bucharest: Editura Universitară, 2008

[3] CEMR, CEMR *European Charter on Services of General Interest at local and regional level*, from EUR-Lex: https://www.ccre.org/img/uploads/piecesjointe/filename/charter_sgi_RO.pdf, March, 2009

[4]Deac-Șuteu, Dorin-Vasile, Moisescu, Radu-Costin, Olteanu, Constantin-Dorin, Titu, Aurel-Mihail, *Leading the digital transformation of knowledge-based organizaions through consumption-based It service models for data management*. ECAI, Ploiesti, 2022.

[5]Dincă, D., *Innovation and Creativity in Public Administration*. Journal of Economics and Local Administration No. 6, p. 4, 2007.

[6]Funabashi, M., & Grzech, A., *Challenges of Expanding Internet: E-Commerce, E-Business and E-Government*. Poznan: Springer, 2015.

[7]Ion Ivan, L. S. *Integration of e-commerce applications. Romanian Journal of Information* Technology and Automatic Control, ISSN 1220-1758, vol. 19(2), 23-42, 2009.

[8] Barometer, A. R. *Global risks*, https://www.agcs.allianz.com/news-and-insights/reports/allianz-risk-barometer.html, January 2020

[9] E. European Union, *Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of network and information security within the Union*, https://eur-lex.europa.eu/legal-, content/RO/TXT/?uri=CELEX%3A32016L1148, July 2016

[10] Levanon, G., *Remote Work: The Biggest Legacy of Covid-19*, https://www.forbes.com/sites/gadlevanon/2020/11/23/remote-work-the-biggest-legacy-of-covid-19/?sh=2e182dfd7f59, November 2020

[11] Arligton, V., *Gartner CFO Survey Reveals 74% Intend to Shift Some Employees to*

Remote Work Permanently, https:// www.gartner.com/en/newsroom/press-releases/2020-04-03-gartner-cfo-surey-reveals-74-percent-of-organizations-to-shift-some-employees-to-remote-work-permanently2, April 2020

[12] Dinha, F., *The Hidden Cost of Remote Work*, https://www.forbes.com/sites /forbestechcouncil/2021/03/30/the-hidden-cost-of-remote-work/?sh=639e2fd66947, March 2021

[13] Deac-Suteu, D.-V., Titu, M.-A., Stanciu, A., *The Reference Architecture of An Integrated Service Middleware Hub in The Environment of Knowledge-Based Organizations*, ECAI, Cluj Napoca, 2021.

[14] Postelnicu, P. I. *Database of civil servants and civil servants* Journal of Economics and Local Administration no. 9, 8, 2017.

[15] Oroveanu, M., *General theory of public service*. Romanian law studies, 219-226, 1994

[16] Mitu, N., Public sector performance. Journal of Economics and Local Government, no. 2, 8, 2017.

[17] Donders, K., *Introduction, Aims and Methodology. In: Public Service Media and Policy in Europe*, Palgrave Macmillan, London, 2012.

[18] Christiansen, B., *Cultural and Technological Influences on Global Business*. Berlin: IGI Global, 2016.

[18] Gusan, V., Titu, A.M., Deac-Suteu, D. V., *Application of FMEA risk analysis in the context of organizations providing integral services of local and regional interest in Romania*. Iași: IManEE 2022, 2022

[19] Matei, A., *Performance of public services. Static models and qualitative approaches*, 2001

[20] OECD Governance, *Serving Citizens Measuring the Performance of Services for a Better User Experience*, https://www.oecd.org/governance/, 2022

[21] Josephson, Michael S. *Preserving the Public Trust: The Five Principles of Public Service Ethics*, The Josephson Institute and Unlimited, May 15, 2005, ISBN-13: 978-1588321343, 2005

[22] Popa, F., *Quality management. Monitoring, measurement, analysis and evaluation*, p. 3. Retrieved May 5, 2022, from ProQuest: https://www.proquest.com/openview/e46cf8e031ee200980307595238d4542/1?pq-origsite=gscholar&cbl=1046413, 2022

[23] Ranta, A. E., *Public service management*. Retrieved from https://rtsa.ro, 2004

Contribuții privind elaborarea indicatorilor tehnico-economici în cadrul Serviciului integrat de interes local și zonal

Administrațiile publice din UE trebuie să crească rapid eficiența și calitatea serviciilor. Acestea aplică treptat principiile managementului public și ale managementului calității pentru a îmbunătăți performanțele, utilizând diverse tehnici pentru a dezvolta capacitatea instituțională și administrativă de a sprijini economiile naționale. Experiența pandemiei, criza economică prelungită, lipsa de încredere în funcționarii și instituțiile publice și efectele schimbărilor demografice pot fi atenuate prin aplicarea unor metode moderne, bazate pe TIC, care pot asigura calitatea deciziilor de management. Articolul include cercetări, analize și indicatori cantitativi și calitativi pentru evaluarea unora dintre cele mai tipice procese de execuție în activitatea celor mai relevanți furnizori de servicii publice locale, regionale și zonale.

Dorin-Vasile DEAC-ȘUTEU, ScD. Student, National University of Science and Technology POLITEHNICA Bucharest, Faculty of Industrial Engineering and Robotics, 313 Splaiul Independenţei, 6th District, Bucharest, Romania, fam.deac@gmail.com

Aurel Mihail ȚÎȚU, Professor, PhD, Lucian Blaga University of Sibiu, 10 Victoriei Street, Sibiu, Romania, The Academy of Romanian Scientists, 3 Ilfov Street, Bucharest, Romania, mihail.titu@ulbsibiu.ro