Co-funded by the European Union

EUROPEAN UNION

COUNCIL OF EUROPE

CONSEIL DE L'EUROPE

Co-funded and implemented by the Council of Europe

22HU05

Local Government Public Finance Development and Municipal Capacity Building in Hungary

REPORT

SEN Pilot Project

Calculating Standard Expenditure Needs (SEN) and Standard Levels of Outputs (SLO) for benchmarking the performance of Hungarian municipalities in providing selected social services

22HU05(2024)19

This document was prepared by the Centre of Expertise for Multilevel Governance at the Congress of Local and Regional Authorities, Council of Europe, in cooperation with Vieri Ceriani (principal expert), Danilo Ballanti and Francesco Porcelli as well as the support of Gábor Péteri, Council of Europe expert. The document was produced with the financial support of the European Union and the Council of Europe.

The SEN/SLO pilot exercise formed part of the project 'Local Government Public Finance Development and Municipal Capacity Building In Hungary', co-funded by the European Commission (DG REFORM) under the Technical Support Instrument 2022 and the Council of Europe.

CONTENTS

GLOSSARY

CEMG	Centre of Expertise for Multilevel Governance at the Congress of Local and Regional Authorities, Council of Europe
Charter	The European Charter of Local Self-Government
CoE	Council of Europe
COFOG	Classification Of the Functions Of Government
EU	European Union
HLO	Historical levels of outputs
HST	Hungarian State Treasury
HUF	Hungarian Forint
IKIR	Integrated Public Services Information System, hosted by the Hungarian Ministry of Interior
IMC	Inter-Municipal Cooperation
KGR-K11	Budgetary Management System, hosted by the Hungarian State Treasury
MLO	Mandatory levels of output
MoF	Ministry of finance
MoI	Ministry of Interior
MoPARD	Ministry of Public Administration and Regional Development
NMNS	Non-Municipal/Non-State providers
OLS	Ordinary Least Squares Estimator
ÖNET	National Cooperation Council of Local Governments
RCA	Regression-based Cost Approach
Rec	Recommendation of the Committee of Ministers to member states
SEN	Standard expenditure needs
SLO	Standard levels of outputs
TÖOSZ	Hungarian National Association of Local Authorities
Y	Historical levels of expenditure

Cluster

Clusters are conceptually and statistically meaningful groups of subjects (e.g. municipalities). Clustering can be defined as the procedure that, on the basis of a set of measured variables, classifies a set of subjects into a number of different groups such that similar subjects are placed in the same group. Subjects within a cluster are very similar (but not identical) to one another and very different from the subjects in other clusters. Clustering minimises intra-group differences and maximises inter-group ones.

Standard expenditure needs

Standard expenditure needs of a local government is the level of expenditure necessary to finance a standard level of outputs, assuming efficient managerial choices. It is evaluated through statistical methods that approximate the cost function, taking also into account differences in the provision costs (e.g. labour costs) and in other context variables, and positioning within the clusters.

Standard level of outputs

Standard level of outputs of a local government is a measure of the potential demand for local services compatible with the characteristics of the local population and of the socio-economic context. It is evaluated through statistical methods that approximate the demand function for local services, taking also into account differences in context variables and positioning within the clusters.

ACKNOWLEDGEMENTS

The pilot exercise and this report greatly benefited from the contributions of the members of the reference group which was formed to support the pilot experiment: Ferenc Gyergyák (Hungarian National Association of Local Authorities - TÖOSZ), Katalin Sabján (TÖOSZ), Zoltán Kivés (Ministry of Public Administration and Regional Development), Viktória Hopka (Ministry of Finance), Teodóra Tóth (Ministry of Interior), Nóra Judit Bognárné Kiss (Hungarian State Treasury), Gabriella Vikárius (Hungarian State Treasury), and Tamás Vasvári (Local Finance Expert). The authors also want to acknowledge the support and guidance of CoE project manager, Conrad Zellmann, and appreciate the contribution of Council of Europe expert Gábor Péteri.

EXECUTIVE SUMMARY

This report presents the findings from a pilot project conducted in Hungary aimed at calculating Standard Expenditure Needs (SEN) and Standard Levels of Outputs (SLO) for benchmarking the performance of Hungarian municipalities in providing selected social services. The pilot formed part of the joint EU-CoE project, 'Local Government Public Finance Development and Municipal Capacity Building in Hungary' (2022-2024).

The SEN/SLO methodology, developed by SOSE for the Italian Government between 2011 and 2015 and also recognised as a best practice by the European Commission (DG reform), was adopted for this pilot exercise. This methodology, previously applied in Italy and Lithuania, provides a framework for understanding the standard financial requirements for local service provision, taking into account various contextual factors such as geographical location, demographics, and economic structure. The methodology also enables benchmarking of the efficiency of service delivery across local governments.

The SEN/SLO methodology can form part of comprehensive approaches in line with Recommendation CM/Rec(2023)5 of the Committee of Ministers of the Council of Europe on the principles of good democratic governance, in particular the principles of efficient, effective and sound administration and of sound financial and economic management. It is also directly relevant in the context of CM/Rec(2005)1 on the financial resources of local and regional authorities, which calls for the estimation of spending needs based on objective criteria, taking account, as far as possible, of demographic, geographical, social and economic features leading to disparities in costs, and without penalising local authorities that seek greater efficiency in service delivery, e.g. through intermunicipal cooperation arrangements. Further, the SEN/SLO approach can contribute to ensuring that policies on financial and budgetary management at local levels take into view the cost-effectiveness of services provided to the community, as recommended in CM/Rec(2004)1.

This report summarises the findings from the pilot application of the methodology to Hungarian municipalities, started in February 2024.[1] The pilot aimed at calculating Standard Expenditure Needs (SEN) and Standard Levels of Outputs (SLO) using the SOSE methodology, with the final objective of producing a four-quadrant model for benchmarking the performance of Hungarian municipalities in the provision of selected social services.

The pilot exercise focused on elderly care and social catering services classified under the Classification of the Functions of Government (COFOG). These services include long-term and temporary residential care for the elderly and dementia patients, daytime care, home help services, and social dining and catering services.

This pilot exercise was limited in scope, time and resources. It was not intended to give a precise and definitive evaluation in terms of benchmarking of Hungarian municipalities for the functions taken under examination. Further work and refinement would be needed for this purpose. Rather, the purpose of the pilot was to explore the feasibility of the application of the SEN/SLO approach to Hungarian local authorities, show the possible use of this approach and indicate potential ways forward.

The pilot has delivered a thorough evaluation of the performance of all 3.711 Hungarian municipalities on the selected functions, proving it might be a useful tool for benchmarking. The estimated results need further examination and discussion among the reference group that assisted the exercise and, more

[1] This report was prepared by Vieri Ceriani (CoE principal expert), Danilo Ballanti and Francesco Porcelli (CoE experts).

generally, among all the stakeholders. Improvements in the application of the methodology are possible and the scope of the analysis may be refined.

Overall, the pilot exercise delivered important insights into the feasibility of the SEN/SLO approach for Hungarian municipalities. From the technical perspective adopted in this pilot, Hungary is in a strong position to pursue further work to expand the analysis (e.g. to cover a fuller set of services and service providers), and to consider options to use the analysis in evaluative approaches and in policy design. As demonstrated through this pilot, the availability of data to support such efforts is already very strong and the interest and support of different stakeholders to the pilot effort has been excellent.

The detail and the accuracy of the existing statistical data played a crucial role in carrying out the pilot exercise in a very short time. In comparison, the benchmarking exercises carried out in Italy and in Lithuania have taken years instead of months. These studies were much wider in scope, since they covered all the functions performed by local administrations, but the existing datasets had to be integrated with ad-hoc questionnaires, particularly so in Italy.

As a first step in the Hungarian pilot exercise a comprehensive dataset was created, incorporating financial, demographic, and output data from various statistical sources, including the Hungarian State Treasury database, the Integrated Public Services Information System (IKIR), and the EBR42 database. The data covered all 3,177 Hungarian municipalities for the year 2022.

The comprehensive dataset covers services provided directly by municipalities or through their associations, excluding non-municipal/non-state providers due to data limitations. Since the existing official datasets do not report the expenditures of the associations of municipalities separately for each municipality, these expenditures have been apportioned among the participating municipalities using a statistical method (i.e. using as a key the share of municipal output over the total output of the association, or the share of resident population aged over 65 years).

The statistical methodology involved several key steps.

The first step was to group municipalities into clusters, based on similarities in general socio-economic characteristics. This procedure identified 5 clusters, based on different socio-economic characteristics; in line with Hungarian law and territorial organisation, the 23 districts of Budapest have been singled out as a separate sixth cluster.

Then, a synthetic measure of municipal output was developed by weighting the elementary outputs of the elementary functions, based on their impact on total historical expenditure.

The econometric analysis produced an estimation of the Standard Levels of Outputs (SLO) that reflect the expected level of service provision corresponding to the characteristics of the local population and the socio-economic context, as well as an estimation of the Standard Expenditure Needs (SEN) to be expected for the provision of standard services.

For all 3.177 municipalities, the SLO and the SEN have been confronted, respectively, with the actual output and the actual expenditure. Finally, as the concluding step of the pilot exercise, the gaps between standard and actual levels of output and expenditures have been reported in a four-quadrant model.

Figure 1 – Performance analysis, segmentation of Municipalities into four quadrants

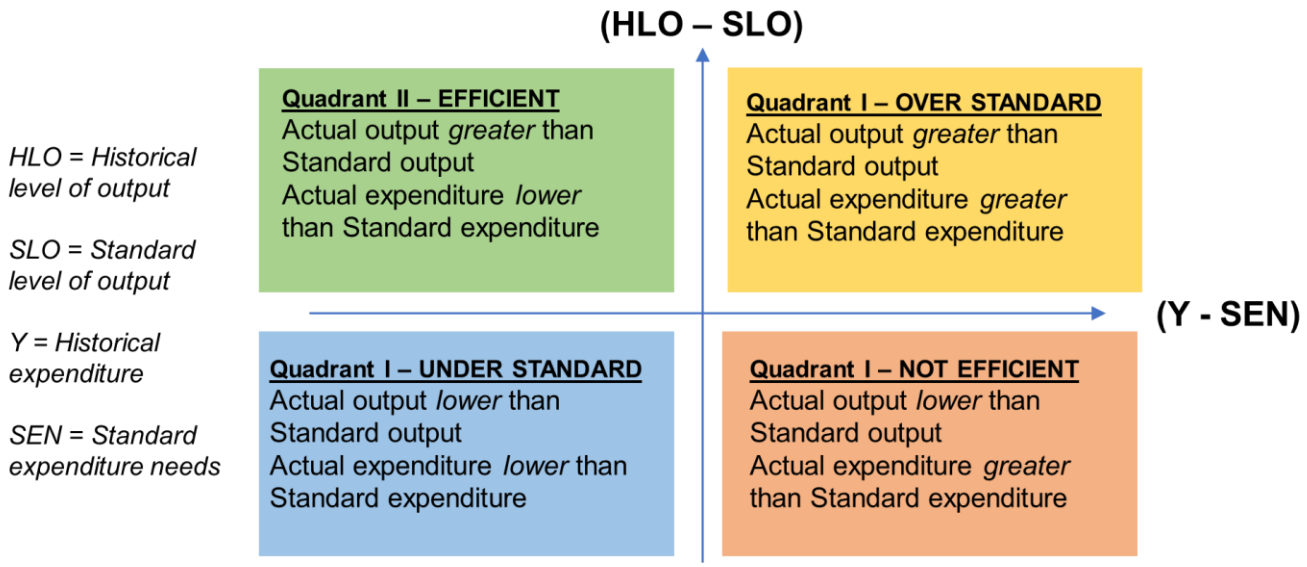


Figure 1 shows the final results of the model used for the performance analysis in the pilot exercise. It depicts the distribution of municipalities into four quadrants, based on two dimensions: the expenditure gap (difference between historical and standard expenditure) and the output gap (difference between the historical and the standard level of service). Municipalities in Quadrant I operate 'above standard' on both output and expenditure, i.e. they produce and spend more than the standard. The opposite applies to Quadrant III, where municipalities operate 'below standard' both on output and expenditure. These two cases may be considered as 'normal', in the sense that a local administration spends more (less) if it produces more (less). The two other Quadrants are more interesting. In Quadrant II, municipalities produce more than the standard but spend less than the standard: these are cases of 'efficiency' that would be worthwhile to further investigate and pinpoint as best practices. On the opposite, municipalities in Quadrant IV produce less than the standard but spend more than the standard: they are labelled as 'not-efficient' and some action for improving their performance would be desirable.

The report gives statistical evidence of the distribution of Hungarian Municipalities among the four quadrants and information on mean historical and standard outputs and expenditures, by quadrant, population size, and cluster. An attached Excel file reports the results of the model for each municipality, showing its individual position in the four quadrants.

Overall, the results show that municipalities are distributed among all the quadrants, with a concentration around the origin of the axis: i.e. most municipalities fall around the standard benchmarks, with varying degrees of deviation. A mild concentration of municipalities can be observed in Quadrants III and IV, suggesting that many municipalities provide lower outputs than local demand requires. This outcome seems to occur with relative frequency for rural areas and smaller municipalities with lower economic development. However, the results are difficult to summarise, as the model is aimed at evaluating the position of the single municipality, not of groups of municipalities. In fact, there is a wide variety of results among each group, e.g. by population size, by cluster, etc.

The report concludes with suggestions for further refinement and potential expansion in a follow-up of the pilot exercise.

As regards statistical data, it is suggested to consider substituting the **apportionment of the expenditures of the associations** with the collection of new administrative data and to expand the coverage of the analysis including **new information and data on Non-Municipal/Non-State entities**. Clearly, these actions imply increased administrative costs and accomplishments: the opportunity to undertake them should be carefully evaluated in the light of expected improvements in the analysis.

A further step for the follow-up might involve a **more careful consideration of the functions under examination**. Although the services targeted by the pilot exercise can be aggregated and summarised under the labels 'elderly care' and 'social catering', they present some heterogeneity. In general, applying the SEN/SLO methodology to each sub-function would not be very useful nor efficient. Some services are closely complementary or correlated: they are alternative and substitutive ways of providing the same kind of service to the same set of individuals. Therefore, the SEN/SLO methodology is better suited to analyse a group of elementary functions, considering a composite output that aggregates the elementary services under observation. A balance has to be found between the homogeneity of the aggregated functions and the need to avoid excessive fragmentation of the analysis, that could lead to contradictory and not very useful results in terms of benchmarking.

In this respect, the benchmark analysis of the pilot exercise could be supplemented in a follow-up with a more careful consideration of the level of homogeneity of the functions examined in this exercise and an evaluation of the opportunity of a decomposition of the 13 elementary functions that have been analysed. Probably, in the context of this pilot exercise, limiting the scope of the experiment to the functions more closely related to 'elderly care' might improve the results and provide more precise interpretations, that would be particularly appreciable in a context where Hungarian municipalities play a key role in organising and providing social services in a sector that is increasingly crucial in local welfare, given the growing share of elderly population and the increasingly complex needs linked to aging.

A more ambitious follow-up effort could expand the **analysis to cover more, or even all local service functions**. Should the findings of the pilot exercise with regard to data availability and quality hold, this would offer a full picture of the Standard Expenditure Needs (SEN) and Standard Levels of Output (SLO) and, akin to the experiences in Italy and Lithuania, might cover all the functions performed by the Hungarian local governments. Obviously, as a prerequisite for such expansion in the scope of the analysis, it would be useful to investigate and decide how to aggregate the COFOG subfunctions into reasonably meaningful consolidated groups of social services.

Another step forward for improving the results of this pilot exercise would be a **deeper analysis of voluntary functions**, i.e. investigating how far and which municipalities undertake the production of voluntary social services. Further analysis might also investigate if some municipalities do not perform (or underperform) **mandatory tasks**. Using available information, a mandatory level of output could be evaluated, and confronted with the effective historical level.

Importantly, follow-up work to this pilot could include efforts to deepen **learning on possible applications of the methodology** in central and local performance management, policy design and the financing of local services. Given the experience of other member states such as Italy and Lithuania in applying the methodology, and the interest of others in the approach (e.g. Croatia and Bulgaria), international exchange in this area could be particularly fruitful (e.g. in the context of future cooperation project).

INTRODUCTION AND CONTENTS OF THE REPORT

The piloting of a 'Baseline assessment of standard expenditure needs of local authorities' (SEN pilot) described in this report formed part of the joint EU-CoE joint project 'Local Government Public Finance Development and Municipal Capacity Building in Hungary' (2022-2024). The project aims at strengthening the administrative and financial capacity of local authorities. The beneficiary of the project is the Hungarian National Association of Local Authorities (TÖOSZ). The Hungarian Ministry of Public Administration and Regional Development and the Hungarian Ministry of Finance (MoF) are involved throughout the project notably as members of the Project Advisory Group and the Local Finance Working Group. The project is implemented by the Centre of Expertise for Multilevel Governance at the Congress of Local and Regional Authorities of the Council of Europe.

The Standard Expenditure Needs (SEN) and the related Standard Levels of Output (SLO) methodologies have been developed drawing on international experience by Soluzioni per il Sistema Economico (SOSE), a specialist organisation set up by the Italian Ministry of Economy and Finance and the Bank of Italy.[2] The SOSE methodology has subsequently been shared with and adapted in Lithuania under an EU funded project (SRSS/S2018/028). Recently it has been explored with the Bulgarian authorities as part of a joint EC-Council of Europe project. More detailed information on the Italian and Lithuanian experiences can be found in Appendix 1.

The SEN methodology offers an approach to understand the standard expenditure requirements for the provision of services at the local level, taking account of the diverse factors that influence these costs in different localities, e.g. geographical location, demography, economic structure and others. Since 2013, In Italy it is used as a basis for fiscal equalisation of local governments. The SEN/SLO methodology can also be used to benchmark the efficiency of service delivery across municipalities.[3]

The SEN/SLO methodology can form part of comprehensive approaches in line with Recommendation CM/Rec(2023)5 of the Committee of Ministers of the Council of Europe on the principles of good democratic governance[4], in particular Principle 7 (Efficient, effective and sound administration) and Principle 10 (Sound financial and economic management). The methodology is also directly relevant in the context of CM/Rec(2005)1 on the financial resources of local and regional authorities, which calls for the estimation of spending needs based on objective criteria, taking account, as far as possible, of demographic, geographical, social and economic features leading to disparities in costs, and without penalising local authorities that seek greater efficiency in service delivery, e.g. through intermunicipal cooperation arrangements.[5] Further, the SEN/SLO approach can contribute to ensuring that policies on financial and budgetary management at local levels takes into view the cost-effectiveness of services provided to the community, as recommended in CM/Rec(2004)1.[6]

[2] The Standard Expenditure Needs approach is discussed in more detail in a SOSE presentation, in D Ballanti, R Dispotico, F Porcelli and F Vidoli (2014) A Simple Four Quadrants Model to Monitor the Performance of Local Governments, F Porcelli (2015) The Evaluation of Standard Expenditure Needs: the Case of Social Care Services in Italy and F Porcelli and F Vidoli (2019) A comprehensive model for the evaluation of standard expenditure needs and standard level of local services (gated).
[3] See Lockwood and Porcelli (2013) and Porcelli et al. (2016) for comprehensive literature on the performance analysis for local governments.

[4] CM/Rec(2023)5 https://search.coe.int/cm?i=0900001680abeb87
[5] CM/Rec(2005)1 https://search.coe.int/cm?i=09000016805db09e
[6] CM/Rec(2004)1 https://search.coe.int/cm?i=09000016805de0df

Since 2008 the European Commission (2008) recognises that monitoring the efficiency of local governments is a necessary condition for improving the quality of the public sector, and thereby achieving a sustained long-run economic growth. Moreover, as recognised by the second-generation literature on fiscal federalism, monitoring activities are necessary to help citizens to hold governments and their agencies accountable (see e.g. Hindriks and Lockwood 2009; Lockwood 2006).

Difficulties in measuring inputs and outputs in the provision of local services highlight the importance of sophisticated statistical techniques and microdata collection. Without adequate information policymakers may be unable to make decisions or, in the worst cases, may take misguided decisions or promote inadequate reforms.

This report summarises the findings from a pilot application of the methodology in Hungary, started in February 2024.[7] This pilot aimed at calculating Standard Expenditure Needs (SEN) and Standard Levels of Outputs (SLO) using SOSE methodology, with the final objective of producing a four-quadrant model for benchmarking the performance of Hungarian municipalities in the provision of selected social services.

This pilot exercise was limited in scope, time and resources. It was not intended to give a precise and definitive evaluation in terms of benchmarking of Hungarian municipalities for the functions taken under examination. Further work and refinement may be needed for this purpose. Rather, the purpose of the pilot was to explore the feasibility of the application of the SEN/SLO approach to Hungarian local authorities, show the possible use of this approach and indicate potential ways forward.

The analysis focused on care provision to the elderly and on social catering services. The specific functions have been identified on the basis of the international Classification Of the Functions Of Government (COFOG). The providers in scope of the pilot have also been identified: i.e. municipalities and associations of municipalities. Non-municipal/non-state providers have been excluded, mainly due to data limitations. The conditions under which the local provision of the selected functions is mandatory or voluntary have been identified [Chapter 1].

The first step of the analysis was the collection of statistical data and the creation of a comprehensive dataset, that constitutes the foundation for the following analysis [Chapter 2].

The report then illustrates the methodology used for the pilot exercise [Chapter 3]. In this context, the first step was grouping the municipalities into clusters. Clustering is a statistical technique that minimises the differences between municipalities in the same cluster (intra-cluster variance) and maximises the difference between clusters (inter-cluster variance). It is based on general context variables (e.g. census variables regarding population, indicators of economic activity such as the size and composition of local labour force, consumption of electricity and local tax receipts) and aims to identify patterns of local socio-economic structure and development that may influence the quantity of local services and the related expenditures, independently from the variables directly used in the regressions that estimate SLO and SEN. Also, in line with Hungarian law and territorial organisation, the 23 districts of Budapest have been singled out as a separate cluster [Chapter 3.1].

After the definition of clusters, the report outlines the estimation of Output Weights, which are essential for constructing a synthetic output indicator that reflects each municipality's contribution in the provision of the social services under examination [Chapter 3.2].

[7] The report was prepared by Vieri Ceriani (CoE principal expert), Danilo Ballanti and Francesco Porcelli (CoE experts).

The analysis then estimates through statistical regressions the Standard Level of Output (SLO) and Standard Expenditure Needs (SEN) for each municipality. These metrics are crucial for setting baseline benchmarks for both service delivery and financial expenditure [Chapters 3.3 and 3.4].

Comparing the historical data against the SLO and the SEN highlights for each municipality the gaps in output and expenditures from the standards, i.e. shows each municipality's performance relative to the expected benchmarks in both output and expenditures [Chapter 3.5].

The assessment culminates with the application of the four quadrants model, which evaluates the efficiency of outputs and expenditures across Hungarian municipalities [Chapter 4]. Figure 4 in Chapter 4 plots the distribution of Hungarian Municipalities among the four quadrants. Tables 14-24 give information on mean historical and standard outputs and expenditures, by quadrant, population size, and cluster.

A separate excel file contains a spreadsheet with the results of the model for each municipality, showing the position of each municipality in the four quadrants**.** The spreadsheet also allows to select specific municipalities and show their position in the four quadrants.

The report concludes with reflections and recommendations for possible future steps Hungarian stakeholders could take to expand on and apply the findings of this pilot exercise [Chapter 5].

1. SCOPE OF THE PILOT EXERCISE

For the pilot exercise in Hungary, a number of local elderly care and social catering have been selected as the functions in scope of the exercise. BOX 1 offers a breakdown of the specific services included in the analysis, categorised according to Classification of Functions of Government (COFOG) standards, along with brief comments on each.

BOX 1. Social services examined in the pilot exercise

102023 Long-term Residential Care for the Elderly. Focuses on providing continuous, comprehensive care to elderly individuals who require assistance with daily activities. This service is crucial for those who no longer can live independently.

102024 Long-term Residential Care for Dementia Patients. Specialised care facilities that cater specifically to the needs of individuals suffering from dementia, providing a safe and supportive environment.

102025 Temporary Care for the Elderly. Offers short-term relief for caregivers and a change of environment for the elderly, which can be beneficial to their mental and physical health.

102026 Daytime Care for Dementia Patients. Provides specialised daytime activities and care tailored to the unique needs of dementia patients, offering respite for caregivers and structured engagement for patients.

102031 Daytime Care for the Elderly. Offers support and social engagement during the day, allowing seniors to return to their homes in the evenings. This service helps maintain their independence while providing necessary care and social interaction.

102032 Temporary Care for Dementia Patients. Similar to temporary care for the elderly but specifically designed for those with dementia, addressing the unique challenges these patients face.

102040 Monetary Benefits Related to Old Age. Financial assistance programmes that help ensure elderly citizens can cover their living costs and maintain a reasonable standard of living.

102050 Programmes Aimed at the Social Integration of the Elderly. Initiatives designed to keep elderly individuals socially engaged, helping to prevent isolation and promote a sense of community.

107050 Social Dining in Public Kitchens. Provides spaces where elderly individuals can eat together, promoting social interactions and ensuring nutritional needs are met.

107051 Social Catering of Public Kitchens. Ensures that elderly individuals receive nutritious meals, which is particularly important for those who may face challenges in meal preparation.

107052 Home Help Services. Includes assistance with everyday tasks such as cleaning, cooking, and personal care, crucial for seniors maintaining their independence at home.

107053 Home Help Services with Alert Systems. Advanced home help services that include emergency alert systems to ensure rapid response in case of accidents or sudden health issues.

107055 Village and Farm Caretaker Service. Provides necessary support services in more rural settings, ensuring that elderly individuals living in these areas receive comparable care to those in urban centres.

These services are provided through different modalities, directly by municipalities, through associations of municipalities and through non-municipal/non-state providers. As explained below, regarding the providers of the services, it was agreed to limit the analysis to the services provided directly by the municipalities, or through associations of municipalities.

Non-Municipal/Non-State (NMNS) providers (such as NGOs, churches, businesses, etc.) may also carry out activities in the functions under examination. NMNS also perform activities without a mandate of the municipality, e.g. if they operate on a charitable basis outside a cooperation agreement with a municipality.

NMNS may receive grants from the national budget through the central administrations, and also receive compensations from the municipalities for their activity, if carried out under a mandate of the municipality. These compensations are recorded in the budget of the municipality as “other transfers” but are not recorded under a specific item for NMNS (they are merged with transfers to other beneficiaries). Also, municipal expenditures for “other transfers” are not classified by COFOG function.

Based on our current understanding, there is a significant complexity in including NMNS providers in the SEN analysis. A full analysis would require data on all grants from all central agencies (and potential other sources, e.g. EU) for the functions under examination, disaggregated by municipality, as well as the corresponding output data. Furthermore, both expenditures and outputs should be disaggregated by COFOG function.

For this reason (i.e. the lack of data) it has been decided to exclude the analysis of NMNS provision of services from the pilot exercise. The scope of the pilot is therefore limited to the services provided by the municipalities, either directly or through their associations. However, Chapter 5 advances some suggestions on how the coverage of the analysis could be expanded in a follow-up.

Associations of municipalities are entities with a legal personality. They are multi-service, i.e. they usually cover a number of functions. Associations have a “leading” (“seat”) municipality. Overall, in 2022 there were roughly 840 associations (based on statistics drawn from IKIR), of which 291 were active in the services under examination. Their number and their composition changes over time.

The associations have their own budgets and keep records of their outputs (number of services delivered). The budgets of the municipalities are separated from those of the associations and do not include the expenditures of the latter. Associations of municipalities may produce the services directly or through a third party, named ’institution‘, which acts as a service provider. Chapter 2 explains how a consolidated dataset for outputs and expenditures was built, joining the information on services provided directly by the municipalities and through their associations.

Hungarian municipalities perform **mandatory and voluntary functions**, as established by the current legislation. Also, some functions are transferred by the State to local authorities. In the scope of our analysis, functions may be mandatory or voluntary. Some are mandatory, one is voluntary (village and farm caretaker services), others are either mandatory or voluntary depending on the size of the municipalities. In other words, a municipality may take over the local government services which are not specifically mandatory for that type of municipality. In this case, the municipality is eligible for national budget transfers allocated to that specific task. Table 1 shows which functions are mandatory or voluntary, and under which conditions.

Table 1 - Rules for mandatory or voluntary provision of selected municipal social services[8]

COFOG	Function (HU)	Function (EN)	Mandatory	Voluntary	Conditions for mandatory/voluntary	Comments
102023	Időskorúak tartós bentlakásos ellátása	Long-term residential care for the elderly	YES	YES	Mandatory task for cities with county rights and Budapest districts	As a voluntary task, this social service may be operated by any local government.
102024	Demens betegek tartós bentlakásos ellátása	Long-term residential care for dementia patients	YES	YES	Mandatory task for municipalities with more than 3.000 permanent residents	As a voluntary task, municipalities with smaller populations can also operate this social service
102025	Időskorúak átmeneti ellátása	Temporary care for the elderly	YES	YES	Mandatory task for local governments with more than 30.000 permanent inhabitants, cities with county rights, and Budapest districts	Municipalities with smaller populations can also operate this social service as a voluntary task
102026	Demens betegek átmeneti ellátása	Daytime Care for Dementia Patients		YES		

[8] Based on information provided by the Ministry of Interior and TÖOSZ

102031	Idősek nappali ellátása	Daytime care for the elderly	YES	YES	Mandatory task for municipalities with more than 3.000 permanent residents	As a voluntary task, municipalities with smaller populations can also operate this service
102032	Demens betegek nappali ellátása	Daytime care for dementia patients	YES	YES	Mandatory task for municipalities with more than 10.000 permanent inhabitants	Local governments with smaller populations can also operate this social service as a voluntary task
102040	Időskorral összefüggő pénzbeli ellátások	Monetary Benefits Related to Old Age		YES		
102050	Az időskorúak társadalmi integrációját célzó programok	Programmes Aimed at the Social Integration of the Elderly		YES		
107050	Szociális étkeztetés népkonyhán	Social Dining in Public Kitchens		YES		Meals can be provided on an occasional basis, consumed on the spot. The primary target group is homeless people.
107051	Közkonyhák szociális étkeztetése	Social catering in public kitchens	YES	NO	Mandatory task for all municipalities	
107052	Házi segítségnyújtás	Home help services	YES	NO	Mandatory task for all municipalities	
107053	Jelzőrendszeres házi segítségnyújtás	Home help services with alert systems	YES	YES	Task of the state maintainer	Any municipality can operate this social service as a voluntary task.
107055	Falugondnoki, tanyagondnoki szolgáltatás	Village and farm caretaker service	NO	YES	Voluntary task for: - village caretaker services in settlements with less than 1.000 inhabitants, - homestead caretaker services in settlements with 70-400 inhabitants	

2. STATISTICAL DATABASE

In order to carry out the analyses and finalise the outputs of the project, the Hungarian authorities provided a series of statistical data on the municipalities, which was very informative and remarkable both in terms of quality and quantity. It covers all 3177 Hungarian municipalities. The year of reference is 2022. A joined-up dataset has been built with the information made available.

The dataset includes data on **current expenditures**, the quantity of **outputs,** structural information of **inputs**, and a wide range of **context variables** that aim to capture the socio-economic environment that surrounds the provision of local social services. This structured approach to data collection enables a multifaceted analysis of municipalities, integrating financial, demographic, fiscal, and output data.

Key data sources used in the SEN/SLO pilot include the Integrated Public Services Information System (IKIR) originally developed by the Ministry of Interior, and the EBR42 database of the Ministry of Finance.

The IKIR dataset contains exhaustive information from different official sources (EBR42, T-STAR, BP-STAR, Census, MEKH, NAV, HPA). IKIR also contains information on service outputs produced by the municipalities. Table 2 outlines the sources utilised, detailing the nature of the data and their source.

The EBR42 database focuses on the management of social services by municipalities and by associations of municipalities. In particular, it contains exhaustive information, classified according to COFOG, for functions performed by the municipalities both directly and through their associations.

Table 2 - Database contents and sources

Abbreviation	Content of database	SOURCE
HST	Financial data of municipalities and associations	Hungarian State Treasury
KTORZS	Identification of municipalities, associations and related service providers	Hungarian State Treasury
Census	Census data	IKIR (Central Statistical Office)
T-STAR, BP-STAR	Other statistical data	IKIR (Central Statistical Office)
MEKZ	Data on electricity consumption	IKIR (Hungarian Energy and Public Utility Regulatory Authority)
NAV	Fiscal tax data	IKIR (Ministry of Finance)
HIPA	Local Business Tax	Hungarian State Treasury
IKIR	Data on output produced	IKIR (Ministry of Interior)
EBR42	Social services managed directly by the municipality and/or association	Ministry of Finance

The Hungarian State Treasury's (HST) database hosts financial data of municipalities and their associations. The expenditures provided directly by the municipalities, classified under COFOG, have been taken from this database. In HST the expenditures of associations of municipalities (and of the institutions providing the services on behalf of the associations) are recorded separately, following COFOG classification.

KTORZS identifies municipalities and their associations, maps the composition of the associations and links the associations to their service providers (if any).

Census data provided by the Central Statistical Office has been drawn from IKIR, while T-STAR and BP-STAR from the same source provide additional statistical data for broader policy analysis.

Further, the MEKH database records electricity consumption data and is provided from the Hungarian Energy and Public Utility Regulatory Authority. Tax revenues for the personal income tax are available through NAV, sourced from the Ministry of Finance. The HIPA database from the Hungarian State Treasury offers information on the receipts of the local business tax. These data reflect local economic activities and revenue capabilities.

2.1 Output variables

The output variables convey information on the quantity of the social service provided, i.e. the number of beneficiaries. Table 3 lists these variables by source (EBR42, T-STAR, and BP-STAR). It reports the total (national) number of beneficiaries, as well as their share of the resident population. The dataset on outputs is structured on two entries: the type of service and the name of the municipality where the service is provided. The original data provide direct information on where the services are provided, also for services produced by the associations of municipalities.

Table 3 - Output variables by source and number of beneficiaries

SOURCE	VARIABLE	Number of beneficiaries	% of	% of pop.
			population	over 65
EBR42	Support for social catering - number of beneficiaries (EBR42)	265,902	2.70%	13.45%
EBR42	Support for social catering - performance of tasks by association - number of beneficiaries (EBR42)	11,488	0.10%	0.58%
EBR42	Support for day-time institutional care for the elderly - number of beneficiaries (EBR42)	46,173	0.50%	2.34%
EBR42	Support for day-time institutional care for the elderly - performance of tasks by an association - number of beneficiaries (EBR42)	50,305	0.50%	2.54%
EBR42	Support for day-time institutional care of demented persons - performance of tasks by association - number of beneficiaries (EBR42)	3,536	0.00%	0.18%
EBR42	Domestic assistance support - social assistance - number of beneficiaries (EBR42)	11,488	0.10%	0.58%
EBR42	Support for domestic assistance - personal care - number of beneficiaries (EBR42)	51,545	0.50%	2.61%
EBR42	Support for domestic assistance - personal care - performance of tasks by association - number of beneficiaries (EBR42)	89,065	0.90%	4.51%

T-STAR, BP-STAR	Home care recipients served with regular support - number of beneficiaries (T-STAR, BP-STAR)	18,703	0.20%	0.95%
T-STAR, BP-STAR	Number of residents in care homes for the elderly (T-STAR, BP-STAR)	1,807	0.00%	0.09%
T-STAR, BP-STAR	Number of people cared for in homes for the elderly (T-STAR, BP-STAR)	51,636	0.50%	2.61%
T-STAR, BP-STAR	Number of persons cared for in institutions providing temporary accommodation (T-STAR, BP-STAR)	10,896	0.10%	0.55%
T-STAR, BP-STAR	Number of persons cared for in institutions providing temporary accommodation managed by local governments (T-STAR, BP-STAR)	4,407	0.00%	0.22%
T-STAR, BP-STAR	Number of people cared for in institutions providing long-term residential and temporary accommodation (T-STAR, BP-STAR)	85,511	0.90%	4.33%
T-STAR, BP-STAR	Number of people cared for in long-term residential and temporary accommodation institutions managed by the municipality (T-STAR, BP-STAR)	23,125	0.20%	1.17%
T-STAR, BP-STAR	Number of residents aged 65 and older in long-term residential and temporary accommodation facilities managed by the municipality (T-STAR, BP-STAR)	18,929	0.20%	0.96%

2.2 Expenditure variables

Expenditure variables are organised according to COFOG functions. As mentioned, the expenditures provided directly by the municipalities are recorded in the HST database. In HST the expenditures of the associations of municipalities (and of the “institutions” providing the services on behalf of the associations) are recorded separately. They follow the COFOG classification, but are registered solely at the municipality acting as ‘leader’ (‘seat’) of the association: i.e. all the expenditures of the association are attributed to the ‘seat’ municipality.

Hence, the existing official dataset does not contain a combined, homogeneous treatment of municipalities and associations for expenditure data. For the services produced directly by the municipalities, the expenditures are attributed to each municipality. However, if the service is produced by an association, its expenditures are attributed to the ‘seat’ municipality and are not registered in the other municipalities participating in the association[9].

This feature produces an inconsistency in the data to be used in the analysis, that may be quite relevant for the functions under examination. Table 4 shows that the expenditures of the associations are above 20% of the total expenditure in most of the cases: for one function, they reach 55%.

Table 4 - Expenditure of associations and municipalities in selected social services (year 2022)

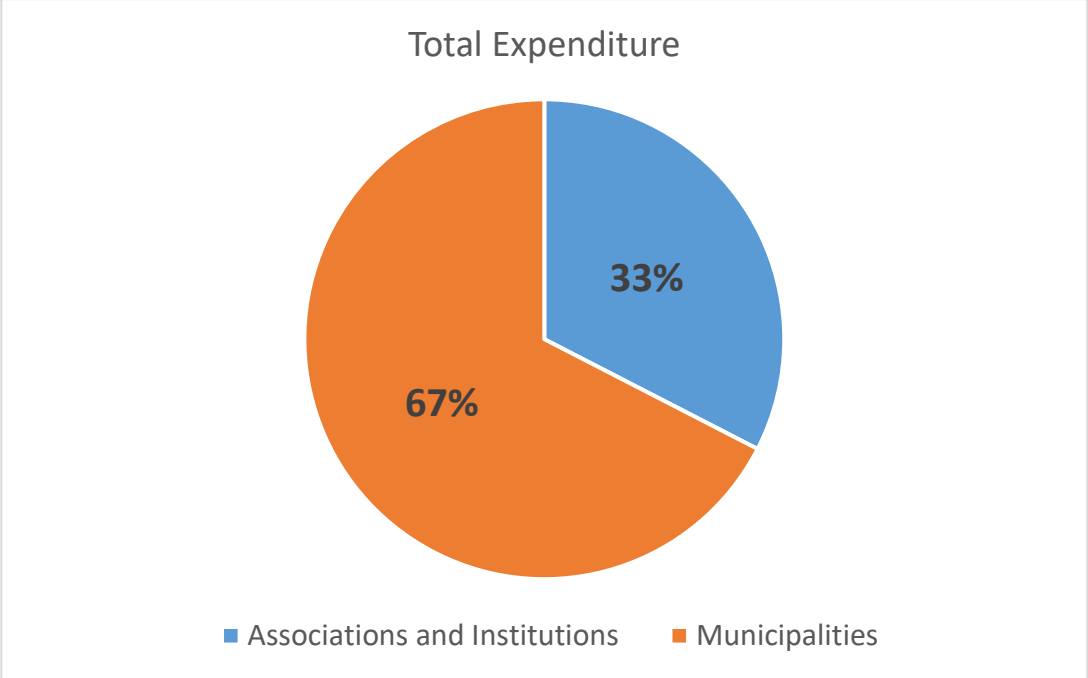
Priority Social function	Association and Institutions	Municipalities

[9] Municipalities belonging to an association are not permitted to register their expenditures and incomes under specific social care COFOG classification, due to a fundamental policy decision: only the "final user" (in this case, the association or its institution) can utilise the technical COFOG, in order to prevent the multiplication of expenditures and incomes at the general government level.

		Number	Total Expenditures HUF	Number	Total Expenditures HUF
1	**102023 - Long-term residential care for the elderly**	83	17,170,546,878	271	47,134,915,806
	102024 - Long-term residential care for dementia patients	38	3,332,324,659	114	11,964,217,432
	102031 - Daytime care for the elderly	218	6,889,475,972	464	9,436,084,162
	107051 - Social catering of public kitchens	280	11,487,425,287	1,615	20,528,699,880
	107052 - Home help services	269	17,195,499,720	681	14,254,909,730
	107055 - Village and farm caretaker service	41	596,632,526	1,837	13,127,986,456
2	**102025 - Temporary care for the elderly**	16	854,715,178	68	3,758,883,383
	102026 - Temporary care for dementia patients	5	73,677,876	10	139,134,908
	102032 - Daytime care for dementia patients	38	883,722,798	64	865,051,680
	102040 - Monetary benefits related to old age	..	,,	1	21,710,458
	102050 - Programmes aimed at the social integration of the elderly	1	6,015,760	34	279,273,253
	107050 - Social dining in public kitchens	5	37,136,439	15	245,268,179
	107053 - Home help services with alert systems	114	692,570,039	112	874,756,841
ALL		**386**	**59,219,743,132**	**3,177**	**122,630,892,168**

The pie chart in Figure 1 shows the distribution of total expenditures between municipalities and the associations (either directly or through ‘institutions’) and confirms that the role of the associations is relevant, reaching one third of the total expenditures.

Figure 1 – Composition of Total Expenditures between Municipalities and Associations



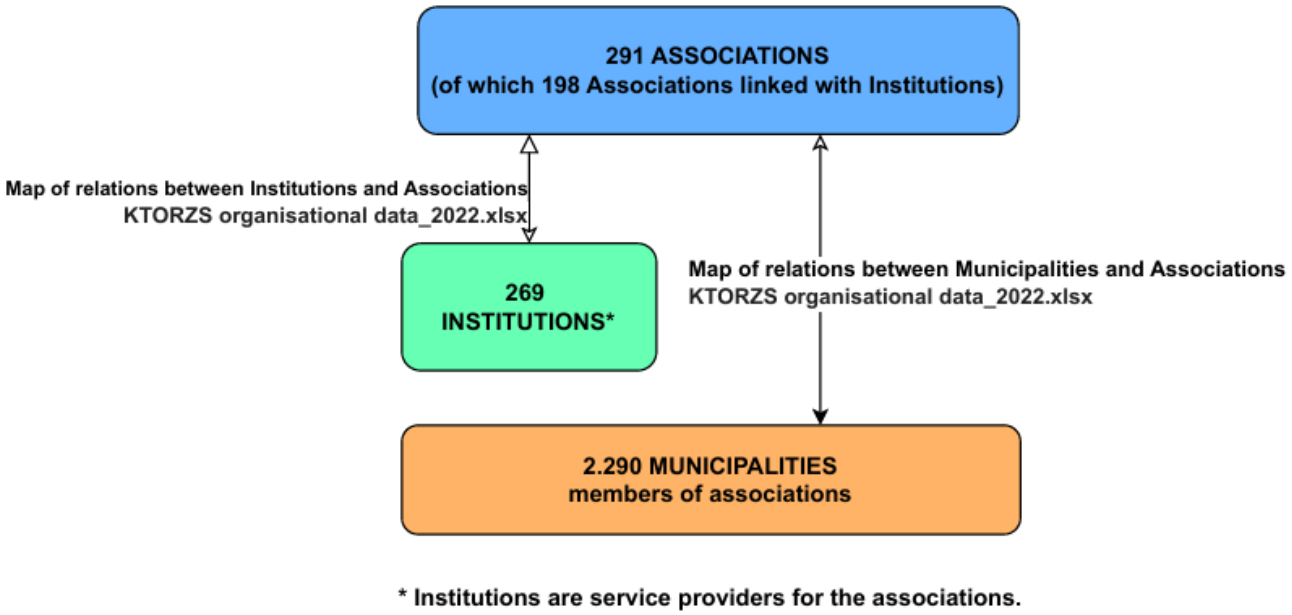
2.2.1 Apportionment of associations' expenditure

To overcome the inconsistency mentioned above, the information on the organisation of associations in the KTORZS dataset has been used. This dataset contains information on each association and its composition: For each association it is possible to know the names of the 'seat' municipality and of the other participating municipalities. Also, it is possible to know if an 'institution' acts as service provider to an association. In summary, we have:

- A list of the associations that are active in the selected functions;
- A list of the associations which provide the function directly and of the associations which operate through an 'institution';
- A list of the municipalities participating in each association that is active in the functions under examination, and the name of the 'seat' municipality.

This information provides a clear picture of how Hungarian municipalities are connected with associations and 'institutions'. The following diagramme (Figure 2) shows that 2,290 municipalities active in the selected functions are members of associations, participating in a network of 291 associations, of which 93 act directly and 198 use 'institutions' to provide the social services under examination. These 'institutions', totalling 269, operate as service providers under the associations' umbrella. Overall, these figures give evidence of a robust framework for delivering social welfare programmes in associated form.

Figure 2 – Relations between municipalities, their associations, and "institutions"



Using the available information, the expenditures of each association recorded in HST dataset (separately for each COFOG function) have been apportioned among the participating municipalities, using as a key either the number of outputs provided in each municipality participating in the association or the number of inhabitants above 65 years of age resident in each municipality participating in the association. For both variables the apportionment key is the share of each municipality over the association's total. Table 5 and BOX 2 show which variable was used for apportioning each selected function.

Table 5 - Apportionment of associations' expenditures among participating municipalities

COFOG function	Variables used for apportioning the associations' expenditures among participating municipalities	Expenditure of Associations (HUF)	Number of Associations	Number of Municipalities
102023 - Long-term residential care for the elderly	Number of residents aged 65 and over in institutions providing long-term residential accommodation (T-STAR,BP-STAR)	17,170,546,878	69	772
102024 - Long-term residential care for dementia patients	Number of people cared for in institutions providing long-term residential and temporary accommodation (T-STAR, BP-STAR) + number of residents aged 65 and over in institutions providing long-term residential accommodation (T-STAR,BP-STAR)	3,332,324,659	36	417
102025 - Temporary care for the elderly	Number of persons cared for in institutions providing temporary accommodation (T-STAR, BP-STAR)	854,715,178	16	216
102026 - Temporary care for dementia patients		73,677,876	4	72
102031 - Daytime care for the elderly	Support for day-time institutional care for the elderly - performance of tasks by an association - number of beneficiaries (EBR42)	6,889,475,972	174	1.827

102032 - Daytime care for dementia patients	Support for day-time institutional care of demented persons - performance of tasks by association - number of beneficiaries (EBR42)	883,722,798	33	391
102040 - Monetary benefits related to old age[10]		..	..	..
102050 - Programmes aimed at the social integration of the elderly	Number of population aged 65–X from permanent population (T-STAR, BP-STAR)	6,015,760	1	16
107050 - Social dining in public kitchens	Support for social catering - performance of tasks by association - number of beneficiaries (EBR42)	37,136,439	5	87
107051 - Social catering of public kitchens		11,487,425,287	251	2,182
107052 - Home help services	Support for domestic assistance - personal care - performance of tasks by association - number of beneficiaries (EBR42)	17,195,499,720	235	2,482
107053 - Home help services with alert systems		692,570,039	88	1,154
107055 - Village and farm caretaker service	Number of population aged 65–X from permanent population (T-STAR, BP-STAR)	596,632,526	36	305
ALL		59,219,743,132	291	2,290

BOX 2. Apportionment of associations' expenditure among participating municipalities

Long-term Residential Care for the Elderly and Dementia Patients

For long-term residential care services, including care for the elderly (both general and those with dementia), the expenditure is apportioned based on the number of residents aged 65 and over in institutions providing long-term residential accommodation. Specifically, for the service coded 102023 (Long-term residential care for the elderly), a total expenditure of HUF 17,170,546,878 was allocated across 69 associations and 772 municipalities. The number of people guided this allocation cared for in long-term residential and temporary accommodation institutions managed by each municipality.

Similarly, for service 102024 (Long-term residential care for dementia patients), HUF 3,332,324,659 was apportioned based on the number of residents aged 65 and older in long-term residential and temporary accommodation facilities managed by the municipalities. This was distributed across 36 associations and 417 municipalities.

Temporary Care Services

For temporary care services, the approach differed slightly. For service 102025 (Temporary care for the elderly), HUF 854,715,178 was allocated based on the number of persons cared for in institutions providing temporary accommodation, managed by local governments. This involved 16 associations and 216 municipalities. The service coded 102026 (Temporary care for dementia patients) had an expenditure of HUF 73,677,876, allocated without a specific variable provided in the table, involving 4 associations and 72 municipalities.

Daytime Care Services

Daytime care services for the elderly and dementia patients were apportioned based on the number of beneficiaries. For service 102031 (Daytime care for the elderly), HUF 6,889,475,972 was allocated across 174 associations and 1,827 municipalities. The number of beneficiaries was used as the apportioning variable. Similarly, for service 102032 (Daytime care for dementia

[10] Data on expenditures, number of associations and municipalities are missing in the original official dataset. However, the variable is present.

patients), HUF 883,722,798 was allocated using the same beneficiary-based method, involving 33 associations and 391 municipalities.

Social Catering and Home Help Services

For social dining and home help services, the expenditure apportionment was also based on the number of beneficiaries. For instance, service 107050 (Social dining in public kitchens) had an expenditure of HUF 37,136,439 allocated across 5 associations and 87 municipalities, guided by the number of beneficiaries. Home help services coded 107052 had a significant allocation of HUF 17,195,499,720, distributed across 235 associations and 2,482 municipalities.

Additional Services

Other services like village and farm caretaker services (service 107055) had expenditures apportioned based on the population aged 65 and over from the permanent population. This service had an allocation of HUF 596,632,526 involving 36 associations and 305 municipalities.

This apportionment, based on a statistical method, overcomes the inconsistency in our dataset and, in this pilot exercise, enables consolidation of the expenditures carried out directly by the municipalities with the expenditures that are carried out through an association.

Another option would have been to run the experiment separately for the two 'sectors': one for the municipalities and another for the 'associations'. However, this approach would be inconsistent with the philosophy and the goals of a benchmarking exercise and would produce distorted and partial results which could not be meaningfully compared. Chapter 5 advances some suggestions on how the statistical apportionment used in this pilot exercise could be substituted with the collection of more precise administrative data from the associations.

2.2.2 Overall expenditures of municipalities and associations

Table 6 gives overall information on the direct expenditures of municipalities in the selected functions, while Table 7 conveys the same information for the expenditures of associations (and their 'institutions'). Most of the current expenditure (over 50%) is for staff remuneration. The long-term residential care for the elderly and for dementia patients takes a large share (almost half) of the total current expenditure, although it is carried out by a relatively small number of municipalities and associations.

Table 6 - Composition of direct municipal expenditure by function (year 2022)

Priority	Social function	Municipalities	Total Expenditures	Current Expenditure (=20+21+60+ 120+190), 2022	Capital Expenditure (=201+206+268)	Full-time staff (=309)	Staff Expenditure (=15)
		Number	HUF	HUF	HUF	Number	HUF
1	102023 - Long-term residential care for the elderly	271	47,134,915,806	45,576,019,783	1,558,896,023	5,221	26,590,119,921
	102024 - Long-term residential care for dementia patients	114	11,964,217,432	11,777,511,416	186,706,016	1,284	6,809,791,789
	102031 - Daytime care for the elderly	464	9,436,084,162	9,000,200,494	435,883,668	1,239	5,714,105,382
	107051 - Social catering of public kitchens	1,615	20,528,699,880	20,186,838,107	341,861,773	996	4,025,523,949
	107052 - Home help services	681	14,254,909,730	14,166,815,451	88,094,279	2,486	11,235,623,533
	107055 - Village and farm caretaker service	1,837	13,127,986,456	11,285,525,200	1,842,461,256	1,670	6,923,629,501
2	102025 - Temporary care for the elderly	68	3,758,883,383	3,653,207,015	105,676,368	391	2,173,092,732
	102026 - Temporary care for dementia patients	10	139,134,908	139,116,523	18,385	15	86,205,844

	102032 - Daytime care for dementia patients	64	865,051,680	793,432,068	71,619,612	123	554,025,249
	102040 - Monetary benefits related to old age	1	21,710,458	1,910,502	19,799,956	0	0
	102050 - Programmes aimed at the social integration of the elderly	34	279,273,253	260,129,109	19,144,144	4	27,164,143
	107050 - Social dining in public kitchens	15	245,268,179	244,217,064	1,051,115	12	59,145,224
	107053 - Home help services with alert systems	112	874,756,841	846,958,480	27,798,361	78	479,797,377
ALL		**3,177**	**122,630,892,168**	**117,931,881,212**	**4,699,010,956**	**13,519**	**64,678,224,644**

Most municipalities and associations offer home care services such as Daytime care for the elderly (102031), Social catering of public kitchens (107051), and Home help services (107053). In small municipalities, the Village and farm caretaker service (107055) is also provided: it regards a quite relevant number of municipalities and a consistent amount of expenditures. The social services included in Priority 2 (102025 - Temporary care for the elderly, 102026 - Temporary care for dementia patients, 102032 - Daytime care for dementia patients, 102040 - Monetary benefits related to old age, 102050 - Programs aimed at the social integration of the elderly, 107050 - Social dining in public kitchens, 107053 - Home help services with alert systems) are additional services offered by only a few municipalities and represent a small portion of total expenditure.

Table 7 - Composition of associations' expenditure by function (year 2022)

Priority	**Social Function**	**Associations and Institutions**	**Total Expenditures**	**Current Expenditure (=20+21+60+120+190)**	**Capital Expenditure (=201+206+268**	**Number of full-time staff (=309)**	**Staff Expenditure (=15)**
		Number	**HUF**	**HUF**	**HUF**	**Number**	**HUF**
1	**102023 - Long-term residential care for the elderly**	83	17,170,546,878	16,865,637,149	304,909,729	2,194	9,457,618,473
	102024 - Long-term residential care for dementia patients	38	3,332,324,659	3,302,931,582	29,393,077	442	1,916,757,236
	102031 - Daytime care for the elderly	218	6,889,475,972	6,542,341,606	347,134,366	1,088	4,258,598,350
	107051 - Social catering of public kitchens	280	11,487,425,287	11,435,980,990	51,444,297	432	1,955,817,806
	107052 - Home help services	269	17,195,499,720	17,136,142,129	59,357,591	3,542	14,279,473,121
	107055 - Village and farm caretaker service	41	596,632,526	568,954,191	27,678,335	84	340,556,994
2	**102025 - Temporary care for the elderly**	16	854,715,178	849,266,380	5,448,798	112	531,256,655
	102026 - Temporary care for dementia patients	5	73,677,876	73,619,221	58,655	15	43,732,331
	102032 - Daytime care for dementia patients	38	883,722,798	867,275,220	16,447,578	131	603,118,426
	102050 - Programmes aimed at the social integration of the elderly	1	6,015,760	6,015,760	0	0	2,610,000
	107050 - Social dining in public kitchens	5	37,136,439	37,122,567	13,872	2	5,608,049
	107053 - Home help services with alert systems	114	692,570,039	685,420,461	7,149,578	43	252,234,976
ALL		**386**	**59,219,743,132**	**58,370,707,256**	**849,035,876**	**8,085**	**33,647,382,417**

2.3 Context variables

The statistical database used for the pilot exercise also comprises general context variables. They have been drawn from various sources and cover different aspects: census variables regarding the resident population and its composition; number of commuters; number of employed per sector of activity; number of job seekers; other indicators of economic activity (such as consumption of electricity and local tax receipts); geographical characteristics (e.g. area of the municipality, number of buildings). They convey information on the general socio-economic structure of the municipalities that may influence the quantity of local services and the related expenditures. Many of the context variables are used for the cluster analysis, but some other also enter the regression equations for the estimation of SLO and SEN.

A list of the variables in the data set and a description of their use in the methodological steps of the analysis is contained in Table A1 of Appendix A2.

3. METHODOLOGICAL STEPS

This chapter details the methodological steps undertaken in the pilot exercise to evaluate the performance of Hungarian municipalities in providing the selected social services.[11]

3.1 Cluster analysis

Cluster analysis is a statistical procedure aimed to identify homogeneous groups of municipalities by analysing a comprehensive set of context variables. It is particularly effective in grouping municipalities into clusters based on similarities in their local socio-economic structures and stages of development. It provides a synthesis of the socio-economic patterns expressed by a variety of context variables that may influence the quantity of local services and the related expenditures, independently from the variables directly used in the regressions that estimate SLO and SEN.

The first goal of a cluster analysis is to minimise the differences within each cluster, known as intra-cluster variance, ensuring that municipalities grouped together share closely related socio-economic characteristics and developmental profiles.

Simultaneously, cluster analysis aims to maximise the differences between each cluster, referred to as inter-cluster variance. This differentiation is crucial as it highlights distinct economic and developmental patterns among the various groups of municipalities. By doing so, cluster analysis not only categorises municipalities into meaningful groups with similar (but not identical) socio-economic and development traits but also underlines the aspects that differentiate each cluster from the others.

A good clustering method will produce high-quality clusters with high intra-group similarity and low inter-group similarity. The greater the similarity within a group and the greater the difference between groups, the better is the clustering.

Cluster analysis represents a fundamental component of the pilot exercise that has proved useful in providing structural information both in the “ex-ante” phase (estimation phase) and in the “ex-post” phase for the analysis and segmentation of results. In addition, within and between cluster analysis provides a remarkable qualitative achievement of the project itself.

[11] The theoretical framework behind the methodological approach used in this pilot experiment is explained in detail in OECD (1981), OECD (2008), Porcelli (2015), Porcelli et al. (2016), Porcelli and Vidoli (2020).

Clustering is mainly a task of exploratory data mining and statistical data analysis, revealing associations, patterns, relationships, and structures in large data sets. Cluster analysis is not one specific algorithm, but a general task that can be solved by various algorithms differing in their interpretation of what constitutes a cluster and how to efficiently identify them. Clustering can be formulated as a multi-objective optimisation problem, and the appropriate algorithm and parameter settings depend on the individual data set and the intended use of the results. This process is iterative, often requiring modifications to data processing and model parameters until the desired properties are achieved.

BOX 3 - The SAS FASTCLUS estimation procedure

For our analysis, we decided to use the SAS FASTCLUS procedure due to its efficiency in handling large datasets. This procedure integrates an effective method for identifying initial clusters with a standard iterative algorithm aimed at minimising the sum of squared distances from the cluster means. Rooted in methodologies such as the Hartigan (1975) leader algorithm and the MacQueen (1967) k-means algorithm, PROC FASTCLUS employs nearest centroid sorting. This involves selecting initial cluster seeds as the first guess for the cluster means, assigning each observation to the nearest seed to form temporary clusters, updating the seeds to be the means of these temporary clusters, and repeating the process until convergence.

The iterative process includes selecting initial seeds, assigning data points to the nearest seed, recalculating the centroids, checking for stabilisation, and repeating these steps until the clusters stabilise. The efficiency of PROC FASTCLUS lies in its quick convergence through nearest centroid sorting and iterative refinement. By minimising the sum of squared distances from the cluster means, the algorithm ensures compact and distinct clusters. Techniques used in PROC FASTCLUS are discussed in several key references, including works by Anderberg (1973), Hartigan (1975), Everitt (1980), and Spath (1980), providing a broader context and validation for the methods employed. In summary, SAS FASTCLUS is a powerful tool for achieving efficient and accurate clustering results, integrating established algorithms and iterative refinement to handle large datasets effectively.

The clustering procedure for Hungarian municipalities has employed a detailed set of variables (see Table 8), which are crucial for differentiating these administrations on the basis of socio-economic and demographic characteristics. This method integrates data from several sources to capture a holistic view of each municipality. Employment and occupational data from the Census 2011, including sectors such as agriculture, industry, and services, not only show where residents work but also highlight the commuting patterns that link municipalities economically. This approach is expanded by incorporating energy use statistics from MEKH 2022, providing insights into the economic activities through residential and non-residential electricity consumption metrics. Financial metrics like total personal taxable income of employed workers and municipal business tax receipts, sourced from NAV and HIPA for the year 2022, offer an indirect measure of the local level of economic activity. Additionally, the social support indicated by the number of registered job seekers receiving aid, as recorded in T-STAR and BP-STAR databases, adds a crucial social dimension to the analysis.

Using these variables, municipalities are grouped into clusters that reflect their similar economic structures, workforce distributions, and financial standings, enhancing the understanding of each cluster’s characteristics.

Table 9 and Figure 3 depict the results of the clustering procedure for the Hungarian municipalities. The procedure has grouped municipalities into six distinct clusters, each presenting specific economic and demographic characteristics.

Table 8 – Variables used to identify the municipal clusters

SOURCE	VARIABLE
CENSUS	Agriculture and forestry resident employees (Census_2011)
CENSUS	Industrial and construction resident employees (Census_2011)
CENSUS	Commercial and service resident employees (Census_2011)
CENSUS	Intellectual occupations resident employees (Census_2011)
CENSUS	White-collar resident Workers (Census_2011)
CENSUS	Other resident employees (Census_2011)
CENSUS	Agriculture and forestry commuting employees (Census_2011)
CENSUS	Industrial and construction commuting employees (Census_2011)
CENSUS	Commercial and service resident commuting employees (Census_2011)
CENSUS	Intellectual occupations resident commuting employees (Census_2011)
CENSUS	White-collar resident commuting Workers (Census_2011)
CENSUS	Other resident commuting employees (Census_2011)
MEKH	Residential electricity customers (MEKH_2022)
MEKH	Non-residential electricity customers (MEKH_2022)
MEKH	Electricity consumption per residential customer kWh (MEKH_2022)
MEKH	Electricity consumption per non residential customer kWh (MEKH_2022)
NAV	Total income from employment of taxpayers filing personal income tax returns - per inhabitant (HUF) (NAV 2022)
HIPA	Local Business Tax revenues per inhabitant 2022 (HUF)
T-STAR, BP-STAR	Number of registered job seekers receiving social support (T-STAR, BP-STAR)

Cluster 1, labelled as "**Municipalities with medium economic development**", encompasses a substantial number of municipalities, notably those with smaller populations (ranging from 1 to 4999 residents), indicating a prevalent pattern of medium-scale economic activities across smaller municipalities.

Cluster 2, defined as "**Agricultural municipalities**", includes municipalities that are likely to have an agricultural economic base, as suggested by the characteristics of their labour force, and show smaller population sizes.

Cluster 3, "**Municipalities with higher economic development**" includes a higher number of municipalities in larger population groups, with a robust socio-economic environment and industrial or service-oriented economic structures.

Conversely, Cluster 4, "**Low economic development municipalities**" predominantly consists of smaller municipalities, with limited economic activities and development.

Cluster 5 includes "**Municipalities with significant commuter workers**" reflecting areas where a notable portion of the population commutes, likely to nearby urban and/or economically vibrant areas, suggesting these municipalities serve as residential hubs for working populations.

Cluster 6 uniquely comprises the **23 districts of Budapest**, highlighting the capital's distinct administrative status, with substantial population and economic concentration.

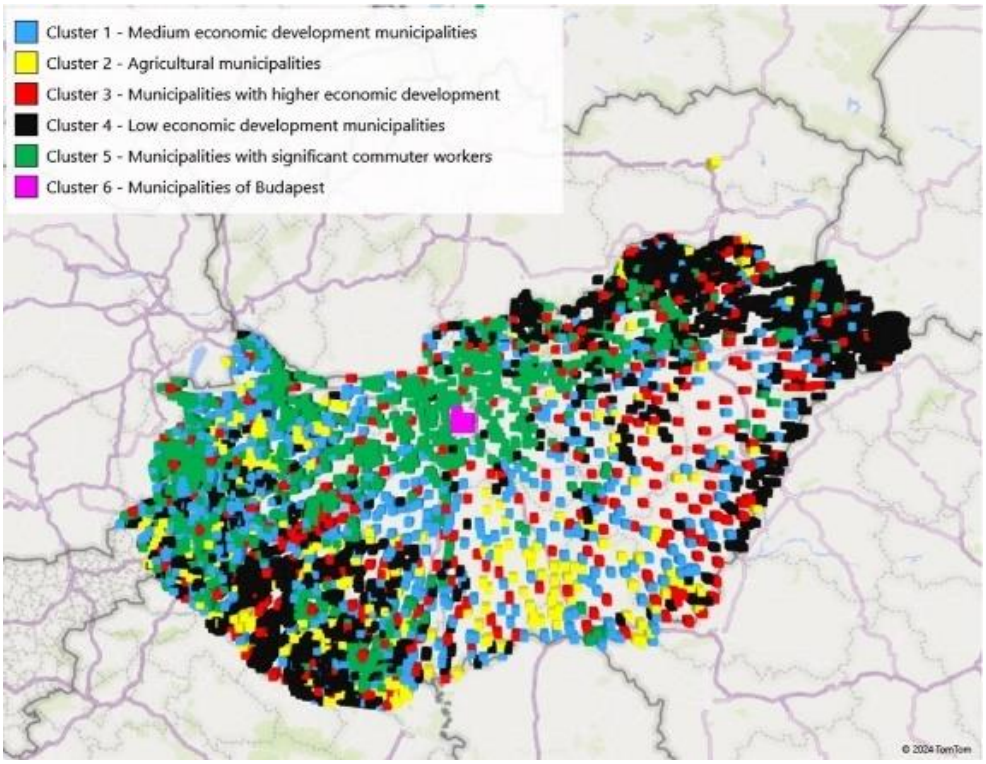
Figure 3 provides a geographical representation of these clusters across Hungary, illustrating the spatial distribution and density of each cluster. This visualisation shows not only the geographic spread of each cluster but also allows for a visual assessment of regional economic disparities and concentrations.

The combined data from Table 9 and Figure 3 reveal a picture of Hungary's municipal landscape, emphasising differences in economic activity, population size, and commuter dynamics.

Table 9 – Distribution of municipalities among the six clusters

Population Size	Cluster						ALL CLUSTER
	Cluster 1 Medium economic development	Cluster 2 Agricultural municipalities	Cluster 3 High economic development	Cluster 4 Low economic development	Cluster 5 Significant commuter workers	Cluster 6 Districts of Budapest	
	N	N	N	N	N	N	N
1-499	135	165	15	542	234	..	1,091
500-999	187	64	25	206	191	..	673
1000-4999	274	54	112	283	378	..	1,101
5000-9999	20	1	64	23	37	..	145
10000-49999	4	..	79	16	28	5	132
50000-89999	..	..	8	..	1	12	21
90000-199999	..	..	8	..	..	6	14
All	620	284	311	1,070	869	23	3,177

Figure 3 – Clusters of Hungarian municipalities



3.2 The composite indicator of outputs

The composite indicator of outputs aims to synthesize multiple output measures into a single, comprehensive indicator that captures the overall activity of municipalities in providing social services. This composite indicator is crucial for the analysis. It provides a single synthetic measure of the outputs of a set of social services which are reported with different metrics, using as weights their relative share in total expenditure.

3.2.1 Methodology of the output composite indicator

The construction of the composite indicator involves the following steps:

1. The first step is to identify and list all relevant output variables that reflect the services provided by the municipalities. These variables include the number of beneficiaries for various social services such as elderly care, dementia care, social catering, and home help services. Table 3 in the statistical database Chapter provides a detailed list of these variables.

2. The estimation of the weights for the output variables is based on the following econometric model reported in equation (1):

$$Yt_i = \alpha + \sum_j \beta_j Output_{i,j} + \varepsilon_i \quad (1)$$

   where:

   - *i* is the ith municipality;
   - *j* is the jth output variable;
   - Yt_i is the historical total current expenditure;
   - ε_{i_i} is the error component of the model.

   The estimation of the betas (β_j) involves running a regression analysis on the historical expenditure data against the various output variables. The coefficients obtained from this regression ($\widehat{\beta_j}$) indicate the marginal impact of each output variable on the total historical expenditure. Higher beta values signify that the respective output variable has a greater influence on municipal expenditure, thereby warranting a higher weight in the composite indicator.

3. Each output variable is assigned a weight to reflect its relative importance with respect to a specific output that we have identified as numeraire; in doing so, the composite indicator will be expressed in the unit of measure of the numeraire. These weights are derived from the estimated coefficients ($\widehat{\beta_j}$) in the econometric model obtained using OLS estimator with robust standard errors. Specifically, the weights are calculated as follows in equation (2):

$$w_j = \frac{\widehat{\beta_j}}{\widehat{\beta_{numeraire}}} \quad (2)$$

   In equation (2), we show that weights are normalised by dividing them by the specific weight of an output chosen as the numeraire. The numeraire acts as the 'counter', i.e. the accounting measure. This allows the composite indicator to be interpreted in terms of the number of social service users expressed in the numeraire metric. The "Support for day-time institutional care for the elderly" has been chosen as the numeraire. The choice of the numeraire does not affect the results as it simply defines the unit of measurement for the composite indicator of outputs.

4. Using these estimated weights, the historical level of outputs per inhabitants for each municipality is calculated. This is done by summing the weighted output variables as reported in equation (3):

$$HLO_i = \frac{\sum_j w_j Output_{i,j}}{population_i} \quad (3)$$

where HLO_i is the historical level of outputs per inhabitants for the i-th municipality, and $Output_{i,j}$ the j-th output variable for the i-th municipality.

The composite historical level of outputs (HLO) is thus a single value that represents the aggregated output of a municipality, taking into account the various services provided and their respective relative importance.

The composite indicator provides a robust and comprehensive measure of municipal services provision. Using a composite indicator simplifies the complex task of evaluating multiple service outputs, offering a clear and actionable metric necessary for assessing the efficiency of municipal service delivery.

3.3.2 Estimate of the output composite indicator

Table 10 provides an overview of the results of the estimation of the weights of each elementary output associated with municipal services.

Column (1) of Table 10 reports the parameters' estimates of the model in equation (1). These estimates can be interpreted as the average variable cost of each service measured in HUF. This means that the values represent the average cost incurred by municipalities for delivering each specific service. This interpretation forms the basis for the identification of the output weights assigned to different outputs to compute the composite indicator discussed in Section 3.2.1 The transformation of the model-estimated coefficients in weights is reported in Table 11.

Column (2) of Table 10 reports the Standard Errors, indicating the statistical accuracy of the estimates. This variability is crucial for assessing the reliability of the estimates used in the analysis.

The value of the t statistic in column (3) of Table 10 helps determine the significance of each output in the cost function, with a higher absolute value indicating a stronger influence.

Finally, column (4) of Table 10 presents the p-values associated with the t statistics, where a p-value below 0.10 suggests that the coefficient is statistically significant. All variables result very statistically significant. This helps confirm the reliability of the results, ensuring that the variables significantly impact the cost associated with each service output.

Table 10 - OLS point estimates of equation (1) for the estimation of the outputs' weights

Label	Parameter Estimate (1)	Robust Standard Error (2)	t Value (3)	Pr > |t| (4)
Intercept	6211018	699803	8,88	<.0001
Utilization of homes for the elderly in the proportion of patients and beds [%] (T-STAR, BP-STAR)	-121247	22087	-5,49	<.0001
Average daily turnover of soup kitchens - number of beneficiaries (T-STAR, BP-STAR)	-3332	1545	-2,16	0,0311
Number of residents aged 65 and older in long-term residential and temporary accommodation facilities managed by the municipality (T-STAR, BP-STAR)	2924612	208018	14,06	<.0001
Number of persons cared for in institutions providing temporary accommodation (T-STAR, BP-STAR) + Number of persons cared for in institutions providing temporary accommodation managed by local governments (T-STAR, BP-STAR)	207957	66216	3,14	0,0017
Number of people cared for in institutions providing long-term residential and temporary accommodation (T-STAR, BP-STAR)	90046	17824	5,05	<.0001
Number of people cared for in long-term residential and temporary accommodation institutions managed by the municipality (T-STAR, BP-STAR)	503020	184388	2,73	0,0064
Number of residents in care homes for the elderly (T-STAR, BP-STAR)	528127	201699	2,62	0,0089
Number of people cared for in homes for the elderly (T-STAR, BP-STAR)	75171	29600	2,54	0,0111
Home care recipients served with regular support (T-STAR, BP-STAR)	385796	46750	8,25	<.0001
Support for social catering - number of beneficiaries (EBR42)	103985	3968	26,20	<.0001
Support for social catering - performance of tasks by association - number of beneficiaries (EBR42)	81044	3155	25,69	<.0001
Support for day-time institutional care for the elderly - number of beneficiaries (EBR42)	159344	7647	20,84	<.0001
Support for day-time institutional care for the elderly - performance of tasks by an association - number of beneficiaries (EBR42)	62425	7428	8,40	<.0001
Support for day-time institutional care of demented persons - performance of tasks by association - number of beneficiaries (EBR42)	350248	62933	5,57	<.0001
Support for home assistance - social assistance - number of beneficiaries + Support for domestic assistance - personal care + Support for domestic assistance - personal care - by association - number of beneficiaries (EBR42)	57585	5996	9,60	<.0001

Table 11 - Composition of output weights

Output variables	Standard value (HUF)	Output Weights
Number of residents aged 65 and older in long-term residential and temporary accommodation facilities managed by the municipality (T-STAR, BP-STAR)	2924612	18.35
Number of persons cared for in institutions providing temporary accommodation (T-STAR, BP-STAR)	207957	1.31
Number of persons cared for in institutions providing temporary accommodation managed by local governments (T-STAR, BP-STAR)	207957	1.31
Number of people cared for in institutions providing long-term residential and temporary accommodation (T-STAR, BP-STAR)	90046	0.57
Number of people cared for in long-term residential and temporary accommodation institutions managed by the municipality (T-STAR, BP-STAR)	503020	3.16
Number of residents in care homes for the elderly (T-STAR, BP-STAR)	528127	3.31
Number of people cared for in homes for the elderly (T-STAR, BP-STAR)	75171	0.47
Home care recipients served with regular support (T-STAR, BP-STAR)	385796	2.42
Support for social catering - number of beneficiaries (EBR42)	103985	0.65
Support for social catering - performance of tasks by association - number of beneficiaries (EBR42)	81044	0.51
Support for day-time institutional care for the elderly - number of beneficiaries (EBR42)	**159344**	**1.00**
Support for day-time institutional care for the elderly - performance of tasks by an association - number of beneficiaries (EBR42)	62425	0.39
Support for day-time institutional care of demented persons - performance of tasks by association - number of beneficiaries (EBR42)	350248	2.20
Support for home assistance - social assistance - number of beneficiaries (EBR42)	57585	0.36
Support for domestic assistance - personal care + Support for domestic assistance - personal care - by association - number of beneficiaries (EBR42)	57585	0.36
Support for domestic assistance - personal care - by association - number of beneficiaries (EBR42)	57585	0.36

The analysis of the coefficients of this regression shows that providing services through an association has lower costs than providing similar services by individual municipalities. This might be due to various factors, such as economies of scale, or more flexible and results-oriented management.

3.3 Measuring the standard level of services

Measuring the standard level of services (SLO) is a fundamental step in assessing municipalities' performance. The SLO represents the expected level of service provision, considering the characteristics of the local population and the socio-economic context. Establishing these standards enables a meaningful comparison between actual service delivery and the expected benchmark.

3.3.1 Methodology of the standard level of outputs

The process of measuring the standard level of services involves the following steps:

1. The estimation of the standard level of services (SLO) is derived from the fitted values of the model in equation (4):

$$\log(HLO_i) = \alpha + \sum_j \beta_j Context_{i,j} + \sum_k \delta_k Cluster_{i,k} + \varepsilon_i \quad (4)$$

   where:

   - *i* is the ith municipality;
   - *j* is the jth demand context variable;
   - *k* is the kth Cluster of municipality;
   - HLO_i is the composite Historical Level of Outputs;
   - $Context_j$ are the Context Variables;
   - $Cluster_k$ are the Cluster of municipalities;
   - ε_i is the error component of the model.

   We specified a log-linear model using the logarithm of HLO as the dependent variable. This transformation is necessary because the distribution of HLO has many values close to zero, making it highly skewed. By applying the log transformation, we achieve a more symmetric distribution, which helps obtain robust estimates using the OLS estimator. Additionally, the log-linear specification ensures that the model's fitted values will be strictly positive, thereby generating a positive SLO for each municipality.
2. The fitted values from this model are then used to derive the Standard Level of Outputs (SLO): actually, these fitted values are the SLO. They reflect the expected service provision under standard conditions. The formula for SLO_i is reported in equation (5):

$$SLO_i = exp\left(\hat{\alpha} + \sum_j \hat{\beta}_j Context_{i,j} + \sum_k \hat{\delta}_k Cluster_{i,k} + \frac{\sigma^2}{2}\right) \quad (5)$$

   where $\hat{\alpha}$, $\hat{\beta}_j, \hat{\delta}_k$ are point estimates of the model coefficients obtained using OLS estimator with robust standard errors, σ^2 is the variance of the error term, and the addition of $\frac{\sigma^2}{2}$ to the exponent accounts for the effect of the variance of the error term on the expected value of $\log(HLO_i)$, thus ensuring that the predictions are unbiased estimators of the true mean of HLO_i on the original scale. This correction is critical for accurate prediction. This method ensures that the transformed predictions compensate for the logarithmic transformation's skew and provide a more correct reflection of the expected value of the original variable HLO_i.

Given its specific context and cluster characteristics, SLO_i provides a benchmark level of service that each municipality is expected to provide.

3.3.2 Estimate of the standard level of outputs

Table 12 provides insights into the econometric model used to estimate the Standard Level of Outputs (SLO) for municipal services and is crucial for understanding how various independent variables influence the delivery of municipal services under the log-linear model specified in equation (4) of the report.

We have used context variables, cluster dummies and dummies that identify the effective production of each selected function as explanatory variables.

Context variables are critical in explaining the variations in service demand across municipalities. These variables include population size, age distribution, income levels, employment rates, and other socioeconomic indicators. By incorporating these variables, the model can accurately capture the factors that drive the need for various services. In particular, the context variables are the percentage of persons aged above 65 of the total population, the percentage of widows of the population aged 15 years and over, and finally, the difference in migration flows.

The cluster analysis, described in section 3.1, groups municipalities based on similarities in their economic and demographic characteristics. By including cluster variables in the model, we account for structural differences between municipalities that might affect service provision but are not captured directly by the context variables used directly as regressors in the estimation of equation 5.

The dummies for the effective production of each selected function are useful to capture the complexity of the services provided by each municipality, bearing also in mind that for some municipalities the provision of some selected services is voluntary.

Column (1) of Table 12 presents the parameter's estimates, which can be interpreted for small coefficients, as the expected percentage variation in output per unit change in each independent variable, given the log-linear nature of the model (the exact computation is $\left(e^{\beta_j} - 1\right) \times 100$). This measure directly indicates how sensitive the service outputs are to changes in specific variables. For instance, a 1 percent increase in the share of the population above 65 leads to an increase in the HLO of approximately 1.2 percent. This sensitivity analysis helps pinpoint which factors most significantly impact the service delivery.

The Standard Errors reported in column (2) quantify the precision of the point estimates, providing a measure of the estimate's variability when the model is applied to different data samples. This variability is essential for assessing the reliability of the estimates used in decision-making processes.

Column (3) lists the values of the t statistic, which are used to test the hypothesis that each coefficient is significantly different from zero. This statistical test is vital for determining whether the independent variables included in the model have a meaningful impact on municipal service outputs.

Column (4) displays the p-values associated with the t-statistics. A p-value below 0.10 typically indicates that the coefficient is statistically significant, suggesting strong evidence against the null hypothesis (that the coefficient is zero). This convention allows policymakers and analysts to confidently discern which factors are truly influential in determining service levels across municipalities.

Table 12 - OLS point estimates of equation (4) for the estimation of the SLO

Variable	Parameter Estimate (1)	Robust Standard Error (2)	t Value (3)	Pr > |t| (4)	Standardised Estimate (5)

Intercept	0.66008	0.05535	11.93	<.0001	0
% of persons aged 65–X from permanent population [% per pop.] (T-STAR, BP-STAR), standardised with respect to the mean of the variable	0.01200	0.00456	2.63	0.0086	0.05217
Widows of population aged 15 years and over [%] (Census), standardised with respect to the mean of the variable	0.04451	0.00653	6.82	<.0001	0.13419
Difference in migration since the previous census [%] (Census), standardised with respect to the mean of the variable	0.01188	0.00173	6.86	<.0001	0.11601
Municipalities with higher economic development	1.04492	0.07754	13.48	<.0001	0.24681
Municipalities of Budapest	0.56454	0.26315	2.15	0.0320	0.03760
Medium economic development municipalities	0.39591	0.05841	6.78	<.0001	0.12579
Agricultural municipalities	0.36292	0.07866	4.61	<.0001	0.08288
Municipalities lagging behind economically	0.35147	0.05408	6.50	<.0001	0.13307
Municipalities with significant commuter workers	0	..	..	..	..
102023 - Long-term residential care for the elderly	2.16695	0.18724	11.57	<.0001	0.18422
102024 - Long-term residential care for dementia patients	1.62896	0.30750	5.30	<.0001	0.08352
102025 - Temporary care for the elderly	1.55375	1.11670	1.39	0.1642	0.02214
102031 - Daytime care for the elderly	0.52709	0.15741	3.35	0.0008	0.05372
102032 - Daytime care for dementia patients	3.23701	1.08628	2.98	0.0029	0.04612
102050 - Programmes aimed at the social integration of the elderly	0.49683	0.34975	1.42	0.1556	0.02235
107050 - Social dining in public kitchens	1.36853	1.08747	1.26	0.2083	0.01950
107051 - Social catering of public kitchens	1.07096	0.06745	15.88	<.0001	0.30525
107052 - Home help services	1.05878	0.07919	13.37	<.0001	0.24179
107053 - Home help services with alert systems	0.81361	0.18547	4.39	<.0001	0.07637
107055 - Village and farm caretaker service	0.22874	0.05366	4.26	<.0001	0.09146

Finally, column (5) in Table 12 includes the standardised values of the coefficients. These standardised coefficients facilitate a direct comparison of the marginal effects of different variables on service outputs, independent of their original units of measurement. The coefficients are obtained by transforming all the original variables: each variable is adjusted by subtracting its mean and then dividing by its standard deviation. Consequently, the standardised coefficients indicate the change in output in terms of standard deviations of each variable. This approach allows to understand the relative importance of each variable in explaining its marginal effect on output. For example, among the context variables, the largest marginal effect on output is produced by the percentage of widows, followed by the percentage change in migration since the previous census and the percentage of persons aged 65 and older. However, the variables that produce the highest variation in output are the cluster dummies and the presence of the following services: social catering in public kitchens, home help services, and long-term residential care for the elderly.

3.4 Measuring the standard expenditure needs

Measuring the standard expenditure needs (SEN) is the second component of evaluating municipal service provision's financial efficiency and adequacy. SEN represent the level of expenditure necessary to finance a standard level of services, accounting for differences in provision costs and assuming

efficient management practices. Establishing these standards sets a benchmark that allows for a meaningful comparison with the actual municipal expenditures.

3.4.1 Methodology of the standard expenditure needs

The process involves the following steps:

1. The estimation of SEN is based on an econometric model that links historical expenditure to the historical level of outputs (HLO), input prices, and context variables. The model is specified as follows in equation (6):

$$Y_i = \alpha + \lambda\, HLO_i + \rho\, InputPrice_i + \sum_j \beta_j Context_{i,j} + \sum_k \delta_k Cluster_{i,k} + \varepsilon \qquad (6)$$

   where:

   - Y_i is the ith historical current per-capita expenditure;
   - *i* is the ith municipality;
   - *j* is the jth demand context variable;
   - *k* is the kth Cluster of municipality;
   - HLO_i is the Historical Level of Output (Composite Output per inhabitants);
   - $InputPrice_i$ is the Average labour costs of municipal social service employees;
   - $Context_j$ are the Context Variables;
   - $Cluster_k$ are the Cluster of Municipalities;
   - ε_i is the error component of the model.

   The model estimates how the expenditure is influenced by the level of services provided, the cost of inputs (mainly the cost of labour), and the socio-economic context, captured both directly (some context variables enter directly equation 6) or through the clusters' dummies.

2. Using the estimated coefficients ($\hat{\lambda}, \hat{\rho}, \hat{\beta}_j, \widehat{\delta_k}$) from equation 6, obtained using OLS estimator with robust standard errors, the standard expenditure needs for each municipality are calculated in the following equation (7):

$$SEN_i = \hat{\alpha} + \hat{\lambda}\, SLO_i + \hat{\rho}\, InputPrice_i + \sum_j \hat{\beta}_j Context_{i,j} + \sum_k \widehat{\delta_k} Cluster_{i,k} \qquad (7)$$

   where SLO_i is the Standard Level of Output (composite output per inhabitants).

This provides a benchmark level of expenditure that each municipality should afford to provide the standard level of services, given its specific context and cost structure.

3.4.2 Estimate of the standard expenditure needs

Table 13 shows the parameters' estimates of SEN reported in equation (6) and quantifies how independent variables impact municipal spending.

Input prices are crucial for understanding the cost variations in service provision. This includes the average labour costs for municipal social service employees, which can significantly impact overall expenditure.

Similar to the SLO estimation, context variables and cluster analysis play a vital role in the SEN model. Context variables include demographic, economic, and geographic factors affecting the cost of services. Cluster analysis groups municipalities with similar socio-economic profiles, allowing the model to account for structural differences influencing expenditure needs. In particular, the context variables used directly in the regression are the percentage of one-person households above 65, and the percentage of elderly people above 65. Clusters' dummies prove to be statistically very significant and play an important role.

Column (1) in Table 13 expresses the parameter estimates in HUF per capita. Each estimate reflects the expected change in per capita expenditure resulting from a unit change in the associated variable. This interpretation directly ties financial resource allocation to specific measurable factors. For instance, if a variable such as the number of elderly residents per capita has a high point estimate, it indicates that increases in the elderly population significantly raise per capita expenditure. From a quantitative perspective, each point estimate reported in column (1) represents the incremental change in per capita expenditure associated with a one-unit increase in the corresponding variable while holding all other variables constant. For example, increasing SLO by 1 unit generates a SEN of 1,074 HUF; similarly, a 1 percent increase in one-person households above 65 increases SEN by 1,822 HUF per capita. Moreover, a 1 percent increase in the percentage of elderly people above 65 with working family members generates an increase in SEN of 13,007 HUF per capita. On average, the parameter estimates of the cluster dummy show the change in SEN per capita associated with each cluster. Municipalities in low economic development cluster or agricultural cluster show higher per capita costs than those in high economic development cluster or Budapest cluster. For example, the same set of services will cost roughly 14,000 HUF more per capita in a municipality with low economic development compared to Budapest districts.

Table 13 - OLS point estimates of equation (6) for the estimation of SEN

Label	Parameter Estimate HFU per capita (1)	Robust Standard Error (2)	t Value (3)	Pr > |t| (4)	Standardized Estimate (5)
Intercept	22011	685.89988	32.09	<.0001	0
SLO - Social services summary output, standardised with respect to the mean of the variable	1074	20	52.67	<.0001	0.61703
Percentage of one-person households > 65 years [% pop.] (Census), standardised with respect to the mean of the variable	1822	282	6.45	<.0001	0.08651
Average social personnel expenditure (HUF), standardised with respect to the mean of the variable	0.000505	0.000141	3.59	0.0003	0.04113
Percentage of elderly people > 65 years of age with working family members commuting [% su pop.] (Census), standardised with respect to the mean of the variable	13007	444	29.29	<.0001	0.38642
Municipalities with low economic development	13035	905	14.40	<.0001	0.20342

Agricultural municipalities	6553	1359	4.82	<.0001	0.06178
Municipalities with medium economic development	2739	1040	2.63	0.0085	0.03596
Municipalities with high economic development	1887	1397	1.35	0.1771	0.01830
Districts of Budapest	-1153	4422	-0.26	0.7942	-0.00307

The Standard Errors listed in column (2) represent the statistical precision of each point estimate. They provide an indication of the estimates' reliability, which is crucial for making informed decisions based on this model. A lower standard error suggests a higher reliability of the point estimate, giving policymakers confidence that the observed effects are not due to random variations in the data sample.

Column (3) includes the t-statistic values, which test the null hypothesis that the coefficient of the variable is zero. This statistic is essential for determining the statistical significance of each variable's impact on municipal expenditures. A higher absolute value of the t-statistic strengthens the case for a variable's significant influence on spending.

Column (4) displays the p-values associated with the t-statistics, where a p-value below 0.10 typically suggests statistical significance. This conventional threshold helps determine which variables significantly affect municipal spending.

Lastly, column (5) in Table 13 includes the standardised values of the coefficients. These standardised coefficients facilitate a direct comparison of the marginal effects of different variables on service outputs, independent of their original units of measurement. The coefficients are obtained by transforming all the original variables: each variable is adjusted by subtracting its mean and then dividing by its standard deviation. Consequently, the standardised coefficients indicate the change in expenditure in terms of standard deviations of each variable. This approach allows to understand the relative importance of each variable in explaining its marginal effect on expenditure. For example, as expected the variable that explains most of the expenditure variation is the SLO, followed by the percentage of elderly people above 65, and the inclusion in the cluster of municipalities with low economic development.

3.5 The Four Quadrant Model for performance assessment

The performance evaluation considers two indicators: the expenditure gap as defined in equation (8) and the level of services (output) gap as outlined in equation (9). Both indicators are calculated based on the difference between actual and standard values, with all measurements expressed in per capita terms.

$$Expenditure\ gap_i = Y_i - SEN_i \quad (8)$$

$$Output\ gap_i = HLO_i - SLO_i \quad (9)$$

where:

- i is the ith municipality;
- Y_i is the historical current per-capita expenditure;
- SEN_i is the Standard Expenditure Needs;
- HLO_i Is the Historical Level of Output;
- SLO_i I s the Standard Level of Outputs.

The gaps may be positive, showing that actual outputs or expenditures are above standards, or negative if actual outputs or expenditures are below standard.

The performance analysis has segmented the municipalities into four groups, as described in Figure 1, which is reported in the Introduction. It considers two dimensions: the expenditure gap measured on the horizontal axis and the output gap measured on the vertical axis.

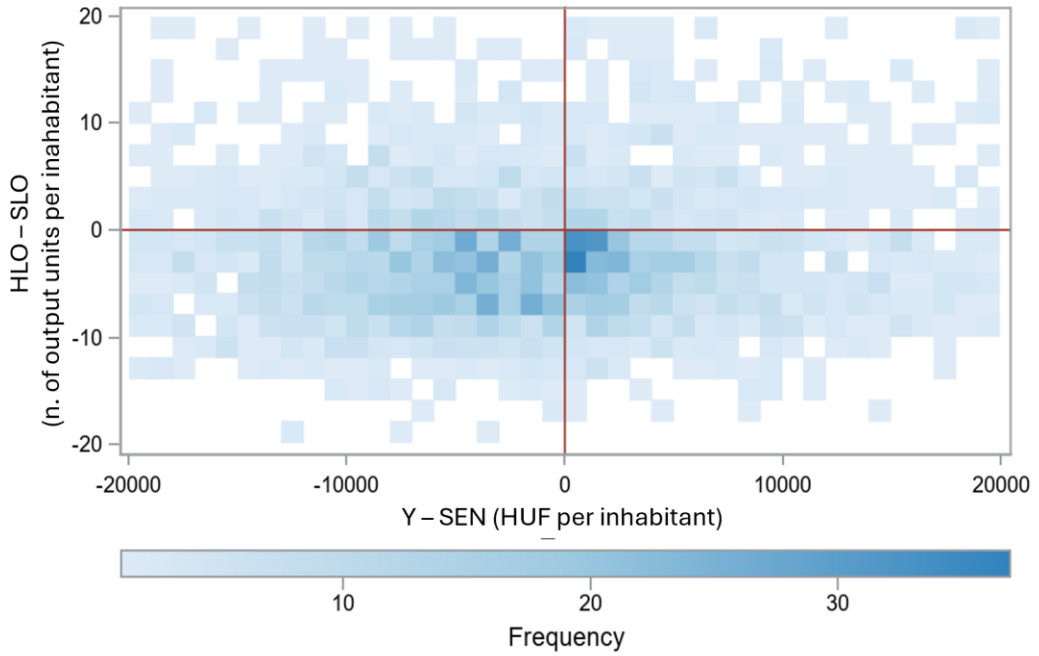
4. RESULTS OF FOUR QUADRANT PERFORMANCE MODEL

The Four Quadrant Model can be used to plot local authorities for benchmarking purposes. Local authorities in Quadrant I (OVER STANDARD) spend more than the standard and, at the same time, produce more services than the standard level of output. On the other hand, local authorities in Quadrant III (UNDER STANDARD) are spending less than the standard but are also providing fewer services than the standard. These cases can be seen as municipalities that, compared to the standard, produce more while spending more, or produce less while spending less. More interestingly, local authorities located in Quadrant II (EFFICIENT) can be considered as potential benchmarks for identifying best practices, since they provide services above the standard level of output and spend less than the standard level of expenditure. On the other hand, municipalities in Quadrant IV (labelled as NON-EFFICIENT) might consider actions to improve their performance, since they exhibit outputs below standard and expenditures above standard.

Figure 4 provides a visual representation of the distribution of Hungarian municipalities across the four quadrants, illustrating their relative performance in terms of expenditure gaps (Y-SEN) expressed in HUF per inhabitants on the x axis and output gaps (HLO - SLO) on the y axis in terms of number of units of output per inhabitant. The figure employs a heatmap to indicate the frequency of municipalities falling into specific areas of the quadrant space: darker shades represent higher frequencies, highlighting where municipalities are concentrated.

Although we observe a distribution of municipalities across all quadrants, the heatmap shows a concentration around the origin of the axis: i.e. most municipalities fall around the standard benchmarks, with varying degrees of deviation. This central tendency highlights the general alignment of municipal expenditures and service outputs with the established standards. Moreover, a mild concentration of municipalities can be observed in Quadrants III and IV, suggesting that many municipalities provide lower outputs than local demand requires. The data presented in Tables 14 through 24 show the diverse performance of Hungarian municipalities across the Four Quadrants Model. Each table offers some interesting insights.

Figure 4 – Hungarian municipalities by four performance quadrants



A separate excel file contains a spreadsheet with the results of the performance analysis for each municipality. It reports the gap between Historical Expenditure (Y) and Standard Expenditure Needs (SEN) and the gap between the Historical Level of Services (HLO) and the Standard Level of Service (SLO). This spreadsheet is the final outcome of the pilot exercise, highlighting each municipality's position in the four quadrants. The spreadsheet also allows to select specific municipalities and show their position in the four quadrants.

The results are difficult to summarise, as the model is aimed at evaluating the position of the single municipality, not of a group of municipalities. In fact there is a wide variety of results among each group, i.e. by population size, by cluster, etc. Nevertheless, some general remarks can be put forward.

Table 14 provides a comparative analysis of municipalities in Hungary, categorised into four distinct quadrants based on their fiscal behaviour and service output relative to predefined standards. This table quantifies these findings by listing the number of municipalities in each quadrant, their percentage of the total, and average historical and standard values for expenditures and outputs. Quadrant I includes 14.20% of total municipalities that exceed expenditure and output standards. Quadrant II, labelled 'Efficient', encompasses 16.70% of total municipalities that surpass output standards while spending less than expected, demonstrating high efficiency; among these municipalities, it is possible to find benchmarks for local authorities to identify best practices. The largest group, Quadrant III, comprises 40.80% of municipalities: they fall short in both spending and output standards. Finally, Quadrant IV includes 28.40% of all municipalities: since they spend more than the standard but produce less outputs than the standard, they are labelled as 'non-efficient'.

Table 15 provides a comparative analysis of municipalities by population size across all quadrants, assessing their expenditure and output results in terms of both historical and standard measures. The table highlights the differences in the mean values for expenditures and outputs in the various dimensional groups. The municipalities are segmented by their population size, from the smallest (1-499) to the largest (90,000-199,999), highlighting the variance in fiscal behaviour and service output

relative to their demographic dimension. For instance, the smallest municipalities, that encompass 34.34% of the total, show an average historical expenditure notably higher than their standard needs, coupled with relatively lower outputs, which may reflect higher operational costs or inefficiencies due to scale. In contrast, municipalities with 1,000 to 4,999 residents, that make up a significant portion of the total (34.66%), show a closer alignment between historical expenditures and standard needs with outputs that almost match the expected standards, suggesting more balanced fiscal management and service delivery.

Table 16 organises Hungarian municipalities into clusters based on their economic characteristics and compares their financial and output delivery performance. Each cluster, from 'Low development' to 'Budapest districts', reflects distinct characteristics influencing its economic activities and service outputs. The largest cluster, 'Low development', includes 33.68% of municipalities, indicating a significant portion with higher historical expenditures than the standard needs yet with outputs closely aligned to the expected standards. This may point to fiscal strains or higher service delivery costs inherent in these local administrations. Conversely, although smaller, the 'High development' cluster shows municipalities exceeding on average both their expenditure and output standards.

The comparative analysis of Hungarian municipalities across Tables 17 to 20 allows insights into the financial behaviours and service provision by population size and performance quadrants. Across all quadrants, there is a clear indication that population size plays a role in influencing municipal performance in terms of expenditure and service delivery. Although none of the large municipalities (above 50000 inhabitants) are classified as efficient (Quadrant II), we observe an even distribution of the best-performing local authorities across the rest of the population brackets. Smaller municipalities often face greater extremes, either outperforming in service delivery at a higher cost or significantly underperforming. This observation reinforces that this pilot exercise is targeted to determine the individual position of the single municipality and is not useful for searching common results within a specific group of municipalities.

The comparative analysis of Hungarian municipalities across Tables 21 to 24 provides a detailed view of how clusters correlate with municipal financial management and service delivery performance. Unlike the previous analysis based on population, cluster distribution appears to have lower influence on performance, with some exceptions. For instance, districts in Budapest are predominantly concentrated in the under-standard quadrant, failing to meet the standard values for both expenditure and output. None of the Budapest districts is included in the efficient quadrant, where instead there is a noticeable presence of municipalities from low-development and agricultural clusters[12]. Municipalities in the other clusters show a high variability of results, often positioning at the extremes, confirming that the method used in the pilot exercise is tailored for analysing the position of the single municipality, not of groups of municipalities.

[12] A caveat must be raised on the results of the pilot exercise for the districts of Budapest. In this exercise the districts are considered as separate municipalities, alike all other Hungarian municipalities, ignoring that the municipality of Budapest may supplement or coordinate their activities. This aspect might be better considered in a follow-up exercise.

Table 14 - Expenditure and output results (HUF) - municipalities in the four quadrants

Quadrants	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
Quadrant I OVER STANDARD	452	14.20%	59,498	44,009	27.36	9.09
Quadrant II EFFICIENT	529	16.70%	25,758	38,290	17.74	7.89
Quadrant III UNDER STANDARD	1,295	40.80%	14,324	22,300	3.20	9.07
Quadrant IV NON EFFICIENT	901	28.40%	32,450	19,615	2.44	7.64
ALL	3,177	100.0%	27,795	27,290	8.84	8.47

Table 15 - Expenditure and output results (HUF) - municipalities by population size (all Quadrants)

Population size	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1-499	1,091	34.34%	44,438	39,525	6.76	6.55
500-999	673	21.18%	22,989	27,519	9.20	7.56
1000-4999	1,101	34.66%	17,344	17,737	10.21	10.25
5000-9999	145	4.56%	18,426	18,862	11.90	12.10
10000-49999	132	4.15%	15,358	16,904	9.52	10.56
50000-89999	21	0.66%	15,975	15,074	8.78	6.98
90000-199999	14	0.44%	15,895	17,642	8.11	7.10
ALL	3,177	100.00%	27,795	27,290	8.84	8.47

Table 16 - Expenditure and output results (HUF) - municipalities by cluster (all Quadrants)

Cluster	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1) Medium development	620	19.52%	24,637	24,646	10.38	9.76
2) Agricultural	284	8.94%	34,545	34,628	9.18	8.86
3) High development	311	9.79%	29,148	28,455	17.04	15.74
4) Low development	1,070	33.68%	36,874	35,097	8.82	8.58
5) Commuter workers	869	27.35%	16,466	16,982	4.74	4.71
6) Budapest districts	23	0.72%	17,000	18,447	8.23	7.80
ALL	3,177	100.00%	27,795	27,290	8.84	8.47

Table 17 - Expenditure and output results (HUF) - municipalities by population size (Quadrant I - Over Standard)

Population size	Quadrant I - OVER STANDARD					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1-499	249	22.8%	65,883	33,564	22.15	6.54
500-999	127	18.9%	49,473	22,068	30.32	7.97
1000-4999	187	17.0%	53,535	23,342	33.13	11.03
5000-9999	42	29.0%	38,441	21,859	23.59	11.84
10000-49999	15	11.4%	35,858	19,787	22.80	10.47
50000-89999	2	9.5%	31,825	21,812	16.64	11.32
90000-199999	1	7.1%	33,754	23,308	15.05	10.01
ALL	623	19.6%	56,098	26,977	27.20	8.65

Table 18 - Expenditure and output results (HUF) - municipalities by population size (Quadrant II – EFFICIENT)

Population size	Quadrant II – EFFICIENT					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1-499	87	8.0%	28,798	40,603	12.32	7.52
500-999	78	11.6%	19,350	27,028	14.69	8.20
1000-4999	138	12.5%	13,609	21,994	15.64	8.38
5000-9999	20	13.8%	10,464	17,789	11.92	6.03
10000-49999	14	10.6%	9,845	17,805	10.46	6.57
50000-89999	..	..	..	..	..	..
90000-199999	..	..	..	..	..	..
ALL	337	10.6%	18,516	27,539	14.13	7.90

Table 19 - Expenditure and output results (HUF) - municipalities by population size (Quadrant III - Under Standard)

Population size	Quadrant III - UNDER STANDARD					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1-499	377	34.6%	23,300	37,346	1.39	6.06
500-999	359	53.3%	12,455	23,085	2.55	7.56
1000-4999	724	65.8%	8,220	20,824	3.63	9.41
5000-9999	78	53.8%	9,019	26,765	5.71	16.48
10000-49999	97	73.5%	12,104	32,301	7.31	21.30
50000-89999	16	76.2%	10,894	27,014	7.21	17.39
90000-199999	12	85.7%	13,518	32,441	7.70	21.08
ALL	1,663	52.3%	12,881	26,149	3.26	9.44

Table 20 - Expenditure and output results (HUF) by population size (Quadrant IV - NON EFFICIENT)

Population size	Quadrant IV – NON EFFICIENT					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1-499	378	34.6%	54,992	33,814	0.71	4.99
500-999	109	16.2%	29,430	19,775	2.59	6.30
1000-4999	52	4.7%	24,145	19,210	4.94	8.93
5000-9999	5	3.4%	28,903	24,129	10.24	15.61
10000-49999	6	.5%	29,573	20,177	9.80	11.37
50000-89999	3	14.3%	32,504	26,930	11.95	14.52
90000-199999	1	7.1%	26,560	19,736	6.11	12.56
ALL	554	17.4%	46,384	29,384	1.73	5.85

Table 21 - Expenditure and output results (HUF) - municipalities by cluster (Quadrant I - OVER STANDARD)

Cluster	Quadrant I - OVER STANDARD					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1) Medium development	145	23.4%	50,536	23,144	28.63	9.26
2) Agricultural municipalities	64	22.5%	58,406	30,871	26.48	7.98
3) High development	75	24.1%	64,486	29,944	39.03	18.79
4) Low development	180	16.8%	73,935	35,052	31.81	7.66
5) Commuter workers	158	18.2%	36,105	18,335	15.38	4.67
6) Municipalities of Budapest	1	4.3%	33,754	23,308	15.05	10.01
ALL	623	19.6%	56,098	26,977	27.20	8.65

Table 22 - Expenditure and output results (HUF) - municipalities by cluster (Quadrant II – EFFICIENT)

Cluster	Quadrant II – EFFICIENT					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1) Medium development	42	6.8%	17,545	23,936	19.36	8.94
2) Agricultural municipalities	38	13.4%	20,952	29,756	16.62	8.30
3) High development	25	8.0%	14,141	22,131	18.10	12.35
4) Low development	161	15.0%	21,181	32,385	13.74	8.08
5) Commuter workers	71	8.2%	13,284	19,400	9.19	5.11
6) Municipalities of Budapest	..	..	..	..	..	..
ALL	337	10.6%	18,516	27,539	14,13	7,90

Table 23 - Expenditure and output results (HUF) - municipalities by cluster (Quadrant III – UNDER STANDARD)

Cluster	Quadrant III – UNDER STANDARD					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1) Medium development	353	56.9%	12,834	23,141	3.52	9.22
2) Agricultural municipalities	115	40.5%	19,413	33,101	1.46	6.47
3) High development	191	61.4%	15,365	37,528	9.15	25.52
4) Low development	504	47.1%	16,794	32,754	2.50	7.40
5) Commuter workers	483	55.6%	6,399	15,358	1.84	5.90
6) Municipalities of Budapest	17	73.9%	9,894	24,528	7.22	14.22
ALL	1.663	52.3%	12,881	26,149	3.26	9.44

Table 24 - Expenditure and output results (HUF) - municipalities by cluster (Quadrant IV – NON EFFICIENT)

Cluster	Quadrant IV – NON EFFICIENT					
	Municipalities		Historical expenditures	Standard Expenditure Needs	Historical Level of Outputs	Standard Level of Outputs
	Number	%	Mean	Mean	Mean	Mean
1) Medium development	80	12.9%	33,500	23,358	2.87	7.25
2) Agricultural municipalities	67	23.6%	45,433	33,538	1.71	6.17
3) High development	20	6.4%	47,024	31,244	8.57	16.56
4) Low development	225	21.0%	63,431	36,234	1.09	5.49
5) Commuter workers	157	18.1%	29,114	20,759	0.92	3.90
6) Municipalities of Budapest	5	21.7%	37,810	25,206	10.29	13.49
ALL	554	17.4%	46,384	29,384	1.73	5.85

5. CLOSING REMARKS AND SUGGESTIONS FOR FOLLOW-UP

The purpose of the SEN pilot was to: i) explore the feasibility of the application of the SEN/SLO approach to Hungarian local authorities; ii) show the possible use of the approach; iii) indicate potential ways forward. This pilot exercise was limited in scope, time and resources. It was not intended to give a precise and definitive evaluation in terms of benchmarking of Hungarian municipalities for the functions taken under examination. Further work and refinement may be needed for this purpose.

In these regards, the pilot exercise delivered important insights into the feasibility of the SEN/SLO approach. From the technical perspective adopted in this pilot, Hungary is in a strong position to pursue further work to expand the analysis (e.g. to cover a fuller set of services and service providers), and to consider options to use the analysis in evaluative approaches and in policy design. As demonstrated through this pilot, the availability of data to support such efforts is already very strong and the interest and support of different stakeholders to the pilot effort has been excellent.

The detail and the accuracy of the existing statistical data played a crucial role in carrying out the pilot exercise in such a short time. In comparison, the benchmarking exercises carried out in Italy and in Lithuania have taken years instead of months. These studies were much wider in scope, since they covered all the functions performed by local administrations, but the existing datasets had to be integrated with ad-hoc questionnaires (particularly so in Italy).

The pilot has delivered a thorough evaluation of the performance of all 3.711 Hungarian municipalities, proving it might be a useful tool for benchmarking. That said, the estimated results need further examination and discussion among the reference group that assisted the exercise and, more generally, among all the stakeholders. Improvements in the application of the methodology are possible and the scope of the analysis may be refined.

In light of the pilot experience, this chapter provides a set of technical suggestions aimed at enhancing the scope and accuracy of future follow up efforts. As an overall recommendation, the expert team encourages Hungarian stakeholders to pursue further work on the SEN/SLO approach.

Data

Follow-up efforts could address the issue of the **apportionment of the expenditures of the associations** among participating municipalities and their consolidation with direct municipal expenditures, under the COFOG classification. This issue has been dealt with in the present pilot exercise with a statistical procedure of apportionment (see Chapter 2.2.1). Substituting this procedure with the collection of new administrative data could be considered. The new administrative data should apportion the expenditures of the associations (following COFOG classification) among each participating municipality. The administrative costs of the collection of this additional information should be evaluated in the light of the expected improvements in accuracy in respect of the methodology used in the pilot exercise.

Another possible follow-up issue concerns the **treatment of Non-Municipal/Non-State (NMNS) entities** that have been excluded from the pilot exercise (for the reasons indicated in Chapter 1). Nevertheless, there is a clear connection between the activity of the NMNS in the selected social functions and the activity of local public authorities in the same areas: the former support (or may even substitute) the latter.

Taking NMNS on board would require a full analysis of all grants from all central agencies (and potential other sources, e.g. EU) for the functions under examination, disaggregated by municipality, as well as the corresponding output data. Furthermore, both expenditures and outputs of the NMNS should be disaggregated by COFOG function. To address this, a thorough preliminary investigation of the available data should be carried out. If the data are unavailable or their coverage is unsatisfactory, the following actions could be undertaken:

1. Initiate a **Specialised Survey** targeting NMNS to delineate their structural and functional frameworks, identifying all the elements of financial and service delivery operations.
2. Develop **Recording Protocols**, i.e. establish standardised protocols for recording financial transactions and service metrics for each function, separately for each municipality. This involves developing guidelines that comply with COFOG classifications, to ensure data consistency and reliability.
3. Enhance **Data Interoperability**, i.e. implement systems and standards that promote interoperability among the different data systems, to achieve the necessary data integration and aggregation.
4. Introduce data **System Improvements**, i.e. upgrade NMNS data systems to support the detailed tracking and reporting of expenditures and service outputs.
5. Support **Personnel Training**, i.e. provide adequate training of NMNS staff for the new reporting tasks.

Clearly, these actions would carry some administrative burden and cost, and the opportunity to undertake them should be carefully evaluated in the light of expected improvements in the analysis.

Scope

As mentioned, the pilot exercise was limited in scope, time and resources. Over a remarkably short period, it established both the feasibility and the relevance of the approach. In a follow-up, a refined and expanded scope of analysis would increase the relevance for performance management and financing of local services.

A first step for the follow-up might be a more careful consideration of the functions under examination. The services targeted by the pilot exercise are those in the 13 functions listed in Box 1 (Chapter 1).

Although they can be aggregated and summarized under the labels ‘elderly care’ and ‘social catering’, they present some heterogeneity. In general, applying the SEN/SLO methodology to each sub-function would not be very useful nor efficient. Some services are closely complementary or correlated: they are alternative and substitutive ways of providing the same kind of service to the same set of individuals. Therefore, the SEN/SLO methodology is better suited to analyse a group of elementary functions, considering a composite output that aggregates the elementary services under observation. The functions to be aggregated should be as homogeneous and related as possible. A balance has to be found between the homogeneity of the functions and the need to avoid excessive fragmentation of the analysis, that could lead to contradictory and not very useful results in terms of benchmarking.

In this respect, the benchmark analysis of the pilot exercise could be supplemented in a follow-up with a more careful consideration of the level of homogeneity of the functions examined in this exercise and an evaluation of the opportunity of a decomposition of the 13 elementary functions that have been analysed. Probably, in the context of this pilot exercise, limiting the scope of the experiment to the functions more closely related to ‘elderly care’ might improve the results and provide more precise interpretations. After all, Hungarian municipalities play a key role in organizing and providing social services for older people. The planning of these services is a central theme in local welfare, given the growing elderly population and the increasingly complex needs linked to aging (e.g. strengthening home and long-term care systems, improving the quality of services, also through the training of social workers, promoting digital inclusion and the use of assistance technologies). Balancing limited resources with growing demand is also connected to the rules for mandatory or voluntary provision of services.

A more ambitious follow-up effort could expand the **analysis to cover more, or even all local service functions**. Should the findings of the pilot exercise with regard to data availability and quality hold, this would offer a full picture of the Standard Expenditure Needs (SEN) and Standard Levels of Output (SLO) and, alike the experiences in Italy and Lithuania, might cover all the functions performed by the Hungarian local governments. Obviously, as a prerequisite for such expansion in the scope of the analysis, it would be necessary to investigate and decide how to aggregate the COFOG subfunctions into reasonably meaningful consolidated groups of social services.

Building on such an expanded analysis, the **integration of SEN/SLO data in relevant data platforms**, in particular IKIR and the Local Government Data Platform (LGDP) could be envisaged to assist local governments in benchmarking their service delivery efforts.

Another important step forward for improving the results of this pilot exercise would be a **deeper analysis of voluntary functions**, i.e. investigating how far and which municipalities undertake the production of voluntary social services. Further analysis might also investigate if some municipalities do not perform (or underperform) **mandatory tasks**. Using available information, a mandatory level of output could be evaluated, and confronted with the effective historical level. A new four-quadrant model could also be built, substituting the standard level of output (SLO) with a mandatory level of output (MLO).

Learning

Importantly, follow-up work to this pilot could include efforts to deepen **learning on possible applications of the methodology** in central and local performance management, policy design and the financing of local services.

Given the experience of other member states such as Italy and Lithuania in applying the methodology, and the interest of others in the approach (e.g. Croatia and Bulgaria), international exchange in this area could be particularly fruitful (e.g. in the context of future cooperation projects).

APPENDIX

A.1 International experiences in the application of the SEN - SLO methodology

The Pilot exercise for Hungarian municipalities is focused on calculating S**tandard Expenditure Needs (SEN)** and **Standard Levels of Outputs (SLO)** with the final objective of producing a four-quadrant model for benchmarking the performance of Hungarian municipalities in providing selected social services. The technical approach is based on what the literature calls the SOSE methodology (Porcelli 2015). The Italian Government has developed this methodology since 2011 as the central pillar of a new fiscal equalization system based on formula grants constructed in line with Low 42/2009 and articles 117 and 119 of the Constitution. Between 2018 and 2020, the same methodology was adopted by the Lithuanian government as a building bloc of a Structural Reform Support Programme finance by the European Commission (DG Reform) that identified the SOSE approach as a well-established practice in evaluating expenditure needs and revenue capacity of various typologies of local governments. This Appendix provides some more detailed information on the Italian and Lithuanian experiences.

The Italian experience

The methodological approach to evaluate SEN and SLO elaborated by SOSE, though based on best practices consolidated at the international level (Blochliger et al. 2007, Boadway 2004, Dafflon and Mischler 2007), introduces various innovative elements. The SOSE methodology relies on four main pillars. The first one concerns the construction of a database on the activities of local authorities, which includes the information on inputs and outputs for each service collected through the submission of questionnaires. The second pillar concerns the valuation of SEN through statistical and econometric techniques in line with the **Regression Cost Base Approach (RCA)**. A similar estimation strategy adopted for SEN is used to calculate the SLO. The third pillar involves the design of a procedure that may stimulate efficient spending through the inclusion of "target" variables in the estimation of SEN and the construction of a system of performance indicators. The fourth pillar concerns elaborating a variety of Business Intelligence Models to provide local authorities and citizens with an innovative online information/management tool for monitoring the composition of SEN and SLO, as well as their own performance levels in relation to management indicators. Such a tool is devised to facilitate awareness of local authorities' positioning with respect to other local authorities.

In the end of 2013, the Italian government produced the first wave of the assessment of SEN for 6702 municipalities. This marked the beginning of a radical reform of intergovernmental relations in Italy, taking the first step towards the construction of a new and more efficient mechanism for the distribution of equalisation grants to finance the essential functions of municipalities (34 billion euros). The essential functions of Italian municipalities include twelve services: tax office, technical office, civil registry, general services, public roads safety and maintenance, local public transport, land management and planning, waste management, general social services, nursery services, local police, complementary services in education. In relation to the available information and to the nature of the analysed services, for the majority of services SEN have been computed estimating an expenditure function, while in three cases (complementary education services, nursery services, and waste collection) SEN have been computed estimating a cost function (for more details see Porcelli et. al. (2016)).

As part of this process, the Italian government decided to integrate the information provided by official sources (Budget Sheets, National Institute of Statistics, Ministry of Education, Land Registry Office, etc.) with new data, requesting all local authorities to fill a specific questionnaire for each service. In this way, a new database was built collecting, for the first time, detailed information on outputs, inputs, methods of management, and organizational decisions made in the production of local services. The survey questionnaires, in addition to representing valuable information in themselves, represent an innovation in international techniques to evaluate SEN.

Starting in 2015, the equalization system known as the Municipal Solidarity Fund was reformed, gradually changing the allocation criteria of equalization grants. The equalization of the gap between standard expenditure needs and fiscal capacity became the new guideline for each municipality, in line with the formula reported in (A1):

$$MSF\ transfers_i = (1-\alpha)\ (HR_i - IMU_i) + \alpha\ (SEN_i - FC_i) + NG_i \qquad [A1]$$

where: HR_i = *2011 Historical resources;* IMU_i = *New real estate property tax 2013 standard revenue;* SEN_i = *Standard expenditure needs;* FC_i = *Fiscal Capacity*[13]*;* NG_i = *grants without equalisation purpose;* $\alpha \in [0,1]$ = *rate of transition from historical expenditure (resource) to SEN.* The transitional period will end in 2030 when equalization grants will exclusively close the fiscal gap between standard expenditure and fiscal capacity. Therefore, the parameter α of equation (A1) will continuously increase the fiscal gap's equalized percentage, rising from the 10% considered in 2015 to 100% in 2030. The Italian equalization system smooths the transition period from the old equalization system based on historical expenditure to the new system based on SEN: the equalization rate reaches 100% gradually. The system is "close-ended" since the total amount of resources is defined every year from the sum of total fiscal capacity and central government resources, that correspond respectively to 95% and 5% of the total macro-budget; as a consequence of the small proportion of central government resources in the composition of the macro-budget the flow of intergovernmental grants is mainly horizontal.

After the computation of Standard Expenditure Needs, the Italian government decided to publish online the data collected through the questionnaires, the SEN evaluation results, and a system of performance indicators. This has been done using a business intelligence web portal named *Opencivitas* to provide local authorities with an innovative online management tool and let citizens know how local public services are provided. *Opencivitas* allows each local authority to display its data and compare it with those of other authorities with similar characteristics. The website www.opencivitas.it was opened on July 16, 2014, and has been updated annually since 2018.

In particular, OpenCivitas allows the joint analysis of the *expenditure gap* (the difference between historical expenditures and standard expenditures) and the *output gap* (the difference between historical outputs and the standard level of outputs) to evaluate local governments' performance mapping each local administration into a four quadrants model, the same reported in this pilot exercise for Hungarian municipalities. The rationale behind the positioning of local authorities in the four quadrants is based on

[13] Starting in 2015, all municipal tax revenue sources were standardized using two methods: the Representative Tax System (RTS) for the property tax and the local income tax, which represent 80% of total municipal fiscal capacity; the Regression-based Fiscal Capacity Approach (RFCA) for tariffs a methodology developed after the RCA method used in the literature concerning expenditure needs (for more details, consider Di Liddo et al. 2016).

the consideration that the standard level of services provides a measure of the potential demand corresponding to standard expenditures. The primary purpose of this tool is to help local administrators improve their service delivery performance. Still, it is not intended as an auditing mechanism to impose sanctions on local authorities that show lousy performance.

Since 2022, in the aftermath of the pandemic, the total amount of equalization grants allocated in the Municipal Solidarity Fund was increased, initially by 405 million euros, to grow progressively to over 1.9 billion euros from 2030 onwards. These funds are reserved for financing and developing municipal social and educational services, whether provided individually or in association. Using the SOSE methodology, the additional resources have been directly allocated to each municipality based on the standard expenditure needs, multiplying the standard cost by a standard level of services that the central government identified as being in line with constitutional mandates to achieve uniform provisions across the whole country (e.g., in the case of childcare services, the minimum standard was set at 33% of the target population, namely the population aged between 3 and 36 months) that each municipality has to provide as a mandatory minimum level. Therefore, additional grants have been earmarked for municipalities that have not yet complied with the constitutional mandates to achieve specific service goals to ensure the nationwide provision of the minimum level of social care and early childhood educational services. To ensure that each municipality allocates additional grants to comply with the objectives, the central government has developed a detailed reporting system to monitor the achievement of the service goals assigned to each municipality. Municipalities below the minimum standard should increase the quantity and quality of socio-educational services: e.g. for childcare services they should gradually reach the indicated goal of 33% of users over the total resident population of children aged 0-36 months; in the case of social services, they should increase the quality of the service providing more hours of assistance to elderly people, also hiring more social workers. Moreover, the law provides for the imposition of commissionership on municipalities that fail to achieve their assigned goals.

The Lithuanian experience

To ensure the sustainability of intergovernmental fiscal relations, Lithuania has requested support from the European Commission under Regulation (EU) 2017/825 on the establishment of the Structural Reform Support Programme ("SRSP Regulation").[14] Following the Lithuanian request, the European Commission selected the SOSE methodology (recognized as a best practice in Europe for the evaluation of SEN) to develop the requested technical support for Lithuania, in agreement with the Italian Ministry of Economy and Finance.

[14] The Agreement, entitled "*Municipal Debt Restructuring and Asset Management Facility Evaluation of the long run sustainability of the municipal financial structure in Lithuania*" (reference number SRSS/S2018/028), was officially signed in December 2018 between the Italian General Accounting Office of the State and the SRSS of the European Commission. From December 2018, the activity in favour of the Lithuanian government has been carried out by SOSE through the coordination of the Italian Ministry of Economy and Finance, in strict cooperation with the Lithuanian authorities and under the supervision of DG Reform.

Between 2018 and 2020, using the SOSE methodology a specific model for Lithuania local authorities has been implemented to evaluate the sustainability of the current financial structure of each Lithuanian municipality through five main action lines.[15]

Current expenditure analysis, based on the evaluation of standard expenditure needs and the standard level of services in the sectors of General administration, Housing and utilities, Recreation, culture and religion, Education and Social security.

Revenue analysis, based on the evaluation of the fiscal capacity related to the municipalities' own-source of revenues (property tax, land tax and fees).

Performance analysis, based on the comparison between the expenditure gap (difference between standard and actual expenditure) and output gap (difference between standard and actual level of services) in a four-quadrant model of performance evaluation.

Fiscal gap analysis, based on the evaluation of the vertical and horizontal fiscal gaps considering the difference between standard expenditure needs and fiscal capacity and taking into account the actual level of equalization grants.

Infrastructural gap analysis, based on the computation of a synthetic index of the local capital endowment in the sectors of heating, water management, education, recreation & culture and road network.

At the end of the analysis simulations of the current financial structure of Lithuanian municipalities have been obtained in a dynamic environment through the construction of a **micro-simulation model**. In this way, the models developed by SOSE have provided a toolbox that policymakers can use to evaluate the fiscal gap of each municipality under different policy goals. In particular, policymakers can formulate different assumptions on the standard level of services, standard level of expenditure, and fiscal capacity. Subsequently, they can identify the direction and the cost of possible reforms of the existing equalization system.

The simulations can be interpreted as short-run policy scenarios focused on the computation of the fiscal gap for each municipality. The analysis aims to evaluate the level of the vertical and horizontal fiscal imbalances that should be equalised to provide a similar minimum standard level of services in all municipalities, assuming the same level of fiscal effort exerted by all local authorities. In conclusion, the policy scenarios are focused on the current financial structure of each municipality, and the analysis highlights which local authorities are underfinanced.

[15] The final SOSE report "Municipal debt restructuring: design a tool for the evaluation of the long run sustainability of LG's financial structure" was delivered in December 2020 and is available at: https://ppplietuva.lt/uploads/documents/files/Projekto%20ataskaita_Savivaldybių%20paskolų%20restruktūrizavimas%20ir%20efektyvaus%20turto%20valdymo%20priemonių%20sukūrimas.pdf

A.2 Dataset structure

Table A1 details the dataset structure used throughout the pilot exercise. It lists the types of data collected, their sources, and the specific metrics used. It shows the comprehensive nature of the data collected, reflecting the effort to consider all the relevant variables related to the general scope of the pilot exercise, i.e. benchmarking the performance of Hungarian municipalities in selected social services through a data-driven approach. The amplitude of the dataset and the accuracy of the recorded variables is a prerequisite for the robustness of the findings of the pilot exercise.

Table A1 - List of variables included in the dataset and used in the analysis

SOURCE	VARIABLE	Cluster Analysis	Cost Function	SLO Function	Expenditure Function
HST	Population number	X	X	X	X
CENSUS	Agriculture and forestry resident employees (Census_2011)	X			
CENSUS	Industrial and construction resident employees (Census_2011)	X			
CENSUS	Commercial and service resident employees (Census_2011)	X			
CENSUS	Intellectual occupations resident employees (Census_2011)	X			
CENSUS	White-collar resident Workers (Census_2011)	X			
CENSUS	Other resident employees (Census_2011)	X			
CENSUS	Total commuting working employees (Census_2011)				X
CENSUS	Agriculture and forestry commuting employees (Census_2011)	X			
CENSUS	Industrial and construction commuting employees (Census_2011)	X			
CENSUS	Commercial and service resident commuting employees (Census_2011)	X			
CENSUS	Intellectual occupations resident commuting employees (Census_2011)	X			
CENSUS	White-collar resident commuting Workers (Census_2011)	X			
CENSUS	Other resident commuting employees (Census_2011)	X			
CENSUS	One-person households (Census_2011)				X
CENSUS	Widows of population aged 15 years and over (Census_2011)			X	
T-STAR, BP-STAR	Men aged 65–X (T-STAR, BP-STAR 2021)			X	X
T-STAR, BP-STAR	Women aged 65-X (T-STAR, BP-STAR 2021)			X	X
CENSUS	Difference in migration since the previous census (Census_2011)			X	
MEKH	Residential electricity customers (MEKH_2022)	X			
MEKH	Non-residential electricity customers (MEKH_2022)	X			
MEKH	Electricity consumption per residential customer kWh (MEKH_2022)	X			

MEKH	Electricity consumption per non-residential customer kWh (MEKH_2022)	X			
NAV	Total income from employment of taxpayers filing personal income tax returns in the settlement - per capita [HUF] (NAV 2022)	X			
HIPA	Local Business Tax per capita 2022 (HUF)	X			
T-STAR, BP-STAR	Number of registered job seekers receiving social support (T-STAR, BP-STAR)	X			
T-STAR, BP-STAR	Average daily turnover of soup kitchens - number of beneficiaries (T-STAR, BP-STAR)		X		
T-STAR, BP-STAR	Utilization of homes for the elderly in the proportion of patients and beds [%] (T-STAR, BP-STAR)		X		
EBR42	Support for social catering - number of beneficiaries (EBR42)		X		
EBR42	Support for social catering - performance of tasks by association - number of beneficiaries (EBR42)		X		
EBR42	Support for day-time institutional care for the elderly - number of beneficiaries (EBR42)		X		
EBR42	Support for day-time institutional care for the elderly - performance of tasks by an association - number of beneficiaries (EBR42)		X		
EBR42	Support for day-time institutional care of demented persons - performance of tasks by association - number of beneficiaries (EBR42)		X		
EBR42	Domestic assistance support - social assistance - number of beneficiaries (EBR42)		X		
EBR42	Support for domestic assistance - personal care - number of beneficiaries (EBR42)		X		
EBR42	Support for domestic assistance - personal care - performance of tasks by association - number of beneficiaries (EBR42)		X		
T-STAR, BP-STAR	Home care recipients served with regular support (T-STAR, BP-STAR)		X		
T-STAR, BP-STAR	Number of residents in care homes for the elderly (T-STAR, BP-STAR)		X		
T-STAR, BP-STAR	Number of people cared for in homes for the elderly (T-STAR, BP-STAR)		X		
T-STAR, BP-STAR	Number of persons cared for in institutions providing temporary accommodation (T-STAR, BP-STAR)		X		
T-STAR, BP-STAR	Number of persons cared for in institutions providing temporary accommodation managed by local governments (T-STAR, BP-STAR)		X		
T-STAR, BP-STAR	Number of people cared for in institutions providing long-term residential and temporary accommodation (T-STAR, BP-STAR)		X		

T-STAR, BP-STAR	Number of people cared for in long-term residential and temporary accommodation institutions managed by the municipality (T-STAR, BP-STAR)		X		
T-STAR, BP-STAR	Number of residents aged 65 and older in long-term residential and temporary accommodation facilities managed by the municipality (T-STAR, BP-STAR)		X		
Calculated	Average social personnel expenditure (HUF), standardised with respect to the mean of the variable		X		X
Calculated	Municipalities Cluster			X	X
Calculated	Spline of population			X	
Calculated	Flag of COFOG codes			X	
Calculated	Social services summary output, standardised with respect to the mean of the variable				X

REFERENCES

- Anderberg, M.R. (1973). Cluster Analysis for Applications. Academic Press, New York.
- Blochliger, H., Merk, O., Charbit, C., Mizell, L., 2007. Fiscal equalization in oecd countries. Tech. rep., OECD network on fiscal relations across levels of government, Working paper, n. 4.
- Boadway, R., 2004. The theory and practice of equalization. CESifo Economic Studies 50, 211 –254.
- Dafflon, B., Mischler, P., 2007. Measuring Local Government Expenditure Needs. The Copenhagen Workshop 2007, Ch. Expenditure needs equalisation at the local level: methods and practice.
- Di Liddo G., Longobardi E. and Porcelli F., 2016. "Measuring Horizontal Fiscal Imbalances: the case of Italian Municipalities". Local Government Studies, 42(3):385-419.
- European Commission (2008), Public Finances in EMU 2008. Directorate-General for Economic and Financial Affairs.
- Everitt, B.S. (1980). Cluster Analysis. Heinemann Educational Books Ltd., London.
- Hartigan, J.A. (1975). Clustering Algorithms. Wiley, New York.
- Hindriks J, Lockwood B. (2009) Decentralisation and electoral accountability: incentives, separation and vote welfare. Eur J Polit Econ 25:385–397.
- Lockwood B. (2006) Fiscal decentralisation: a political economy perspective. In: Ahmad E, Brosio G (eds) The handbook of fiscal federalism. Edward Elgar, Northampton, MA.
- Lockwood B., and Porcelli F. (2013). "Incentive Schemes for Local Government: Theory and Evidence from Comprehensive Performance Assessment in England". The American Economic Journal: Economic Policy, 5(3):1–36.
- MacQueen, J. (1967). Some Methods for Classification and Analysis of Multivariate Observations. In Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability, Volume 1, pp. 281-297. University of California Press, Berkeley, CA.
- OECD (1981), Measuring local expenditure needs: The Copenhagen workshop. OECD Urban Management Studies, no. 4.
- OECD (2008), Handbook on constructing composite indicators: methodology and user guide. OECD publishing.
- Porcelli F. (2015). The Evaluation of Standard expenditure needs of Municipalities: The Case of Social Care Services in Italy. The Italian Journal of Public Economics, 3:123-157.
- Porcelli F., Vidoli F., Dispotico R., and Ballanti D. (2016). Measuring public sector performance: a four quadrants model to monitor local governments' efficiency. in "Public Sector Economics and the Need for Reforms", MIT Press.
- Porcelli F. and Vidoli F. (2020). A comprehensive model for the evaluation of standard expenditure needs and standard level of local services, Local Government Studies, 46:5, 734-762, DOI: 10.1080/03003930.2019.1682558.
- SOSE (2020). Municipal debt restructuring: design a tool for the evaluation of the long run sustainability of LG's financial structure, available at: https://ppplietuva.lt/uploads/documents/files/Projekto%20ataskaita_Savivaldybių%20paskolų%20restruktūrizavimas%20ir%20efektyvaus%20turto%20valdymo%20priemonių%20sukūrimas.pdf
- Spath, H. (1980). Cluster Analysis Algorithms for Data Reduction and Classification of Objects. Ellis Horwood Ltd., Chichester.