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Executive Summary of the Thesis

The Relationship between Local Government Efficiency and Quality of Life: an Empirical Analysis of Italian Municipalities

Laurea Magistrale in Management Engineering - Ingegneria Gestionale

Author: Massaggia Pietro & Miserocchi Teo

Advisor: Prof. Tommaso Agasisti

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1. Introduction

Quality of Life (QoL) is a multidimensional concept that varies greatly by individual preference, cultural background, and local amenities. This subjectivity presents challenges in comparing QoL across different regions, necessitating objective measurements that transcend individual biases.

Historically, economists and researchers have relied on economic factors (i.e. GDP per capita) as a primary metric for social well-being. However, as highlighted by the "Easterlin Paradox," economic growth alone does not equate to increased QoL (Easterlin & O'Connor, 2020). This reveals the need for broader metrics that include other factors such as social and environmental ones. Due to this reason, several independent institutions have developed more holistic QoL indicators that more comprehensively reflect its diverse facets.

Many aspects of these non-economic QoL terms are under the "responsibility" of the public sector, especially when it comes to public or semi-public goods. Indeed, just as the Polis in Ancient Greek was central in fostering citizens well-being, or as Aristotle would say in creating *eudaumonia*, modern local governments are tasked with providing services that directly impact individual and collective QoL. While striving to deliver essential public goods that promote well-being, local governments face the dual challenge of managing costs while maximizing the value of services for citizens. This involves balancing budget constraints with public demands, ensuring an equitable distribution of resources to foster social cohesion. One way to address this objective is by measuring **technical efficiency**, which is simply the ability to maximize an output given a certain input regardless of external conditions.

This study seeks to investigate **the relationship between technical efficiency and QoL**, using **Italian municipalities as an empirical sample** representative of welfare-oriented developed countries. Additionally, the research aims to explore how other contextual factors might affect this relationship.

2. Institutional background

The Italian State is divided in five main hierarchical levels: the Central State, Regions, Provinces, Metropolitan cities, and Municipalities. Each level has distinct responsibilities in terms of delivering public services to citizens.

While sectors such as healthcare, defense, jus-

tice, and industrial support fall under the jurisdiction of higher levels of government (e.g. Central State or Regions), municipalities play a crucial role at the local level by providing essential public services, which include: **Environmental protection and Waste management, Local transportation, Urban planning, Social services provision, Education and Culture/Sports related activities.**
Local governments can operate with a considerable level of autonomy in these areas, but they must comply with national regulations and fiscal constraints. Specifically, they must balance revenues and expenditures while limiting borrowing to capital investments.

3. Literature review

In order to properly tackle the research objective, two primary literature themes have been analyzed: the empirical assessment of local government efficiency, with a specific focus on the Italian context, and the examination of how these efficiency measurements impact QoL indicators.

3.1. Local Government Efficiency

Local government efficiency presents a well developed global literature. Research on this theme is categorized into two groups: studies that assess efficiency from a global perspective and those that concentrate on specific areas such as education or social services. Most studies utilize non-parametric methods like Data Envelopment Analysis (DEA), using expenses as a common input and other variables (population, area, service related variables) as output. Particularly, in Italian Global studies, results show that Northern and Central municipalities exhibit greater efficiency than their Southern counterparts (Luca & Modrego, 2021; Vidoli et al., 2023; Agasisti & Porcelli, 2023) although some exceptions exist (lo Storto, 2016). Also, many papers find that Economies of scale are observed in smaller municipalities, while larger ones may face congestion effects (Agasisti & Porcelli, 2023; lo Storto, 2016).

3.2. Efficiency and Quality of Life

Only a few studies establish a direct link between efficiency and QoL. Notably, Bigerna and Polinori (2014) find a positive correlation between efficient resource management and higher QoL. Meanwhile, lo Storto (2016) suggests a trade-off between cost efficiency and service quality. lo Storto (2020) finds that efficiency and effectiveness support each other instead of being in conflict when it comes to social services provision. Doumpos et al. (2020) emphasize the importance of financial strength in french municipalities in determining higher QoL outcomes, and Cárcaba et al. (2022) demonstrate that well-managed municipalities in Spain correlate with higher levels of citizen happiness. Overall, the relationship between technical efficiency and QoL is intricate, shaped by both financial considerations and service quality factors.

3.3. Innovative step

This paper provides a three-fold contribution to the literature.
First, it offers a **comprehensive literature review** of the **Italian studies** on **local government technical efficiency** following the Narbón-Perpiñá and De Witte (2018a) and Narbón-Perpiñá and De Witte (2018b) approach.
Secondly, it innovates in terms of research design and data used by **relating QoL aspects on six main areas** (Wealth and consumption, Business and work, Environment and Waste management services, Demographics, society, and health, Justice and security and Culture and leisure) **to local government technical efficiency**. It also uses an innovative data management by **aggregating** municipal financial data **at the provincial level**.
Lastly, this study introduces an innovative **three-stage approach**. First, it applies a bootstrapped DEA to calculate technical efficiency scores, initially using a basic model following lo Storto (2016), and then with a more complex innovative model that incorporates variable utilization as outlined by Agasisti and Porcelli (2023). In the second stage, QoL is assessed through two separate bootstrapped DEAs, one considering the totality of QoL aspects cited above and one only considering variables where local governments have a direct impact on. Finally, linear regression models are used to analyze the correlation between and within them identifying factors that may influ-

ence this relationship.

4. Methodology and Data

The methodology in this study utilizes a **bootstrapped Data Envelopment Analysis (bootstrapped DEA)** to assess both the technical efficiency of Italian local governments and QoL scores. The DEA approach involves calculating scores by comparing inputs (expenditures) and outputs (e.g. service delivery, QoL indicators) of each decision-making unit's (DMU), in this case municipalities. This approach constructs an efficiency frontier, where municipalities on it are deemed efficient, and others' scores are measured through their distance from this optimal point.
When measuring **local government technical efficiency**, the DEA model is **input-oriented** with variable returns to scale (**VRS**), reflecting the goal of minimizing costs while maintaining service levels. On the other hand, for **QoL scores** an **output-oriented** approach with **VRS** has been computed, trying to maximize the QoL factors given a fixed input equal to 1. The bootstrapping technique is used to provide confidence intervals for efficiency scores, helping to address potential variability due to finite sample sizes. This method involves repeatedly resampling the data, recalculating the efficiency scores each time, and analyzing the resulting distribution. This approach enhances the reliability of the estimates and corrects for potential biases in the original sample (Simar & Wilson, 1998; Simar & Wilson, 2000; Simar & Wilson, 2008).

In order to populate the DEAs models data were retrieved, selected and managed from four main sources: *OpenBilanci*, *ISTAT*, *Opencivitas* and *Il Sole 24 Ore*. This yielded in three main Data clusters:

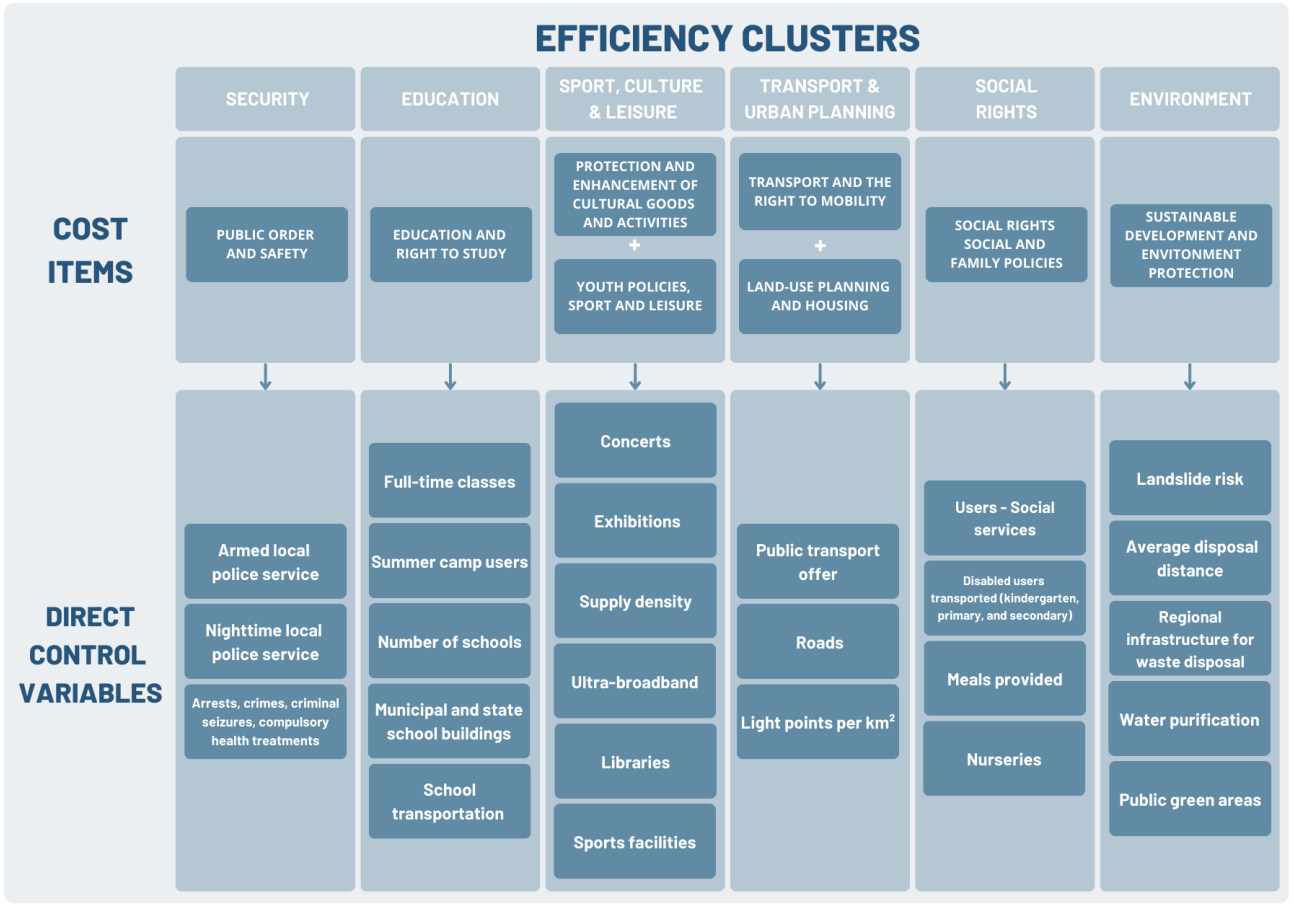
- **Financial Data**: this includes municipal expenditures sourced from *OpenBilanci*, reflecting cash inflows and outflows up to 2020 for all Italian municipalities, with breakdowns by expense type. This data helps evaluate resource utilization in relation to the services provided to citizens.
- **Socio-Economic Data**: sourced from *Opencivitas* and *ISTAT*, this dataset includes demographic, service-level, and territorial data across municipalities, excluding autonomous Regions. The data spans categories like population density, number of schools, public infrastructure, and more. It is instrumental in understanding the contextual and demographic variables impacting local efficiency but also to quantify the services level on each areas.
- **Quality of Life Data**: drawn from *Il Sole 24 Ore*'s annual QoL rankings, this dataset comprises 90 indicators, such as wealth, employment, and environmental quality, divided into six categories. These indicators allow for a nuanced assessment of citizen well-being across Italian provinces.

All variables selected and used in the models are shown in Figure 1, which illustrates how both the variables and clusters differ to minimize bias in representing the two diverse concepts.

Data merging and manipulation tackled issues related to granularity and geographical coverage. Municipalities data were aggregated at the provincial level in order to be comparable with QoL data using **2019 as reference year** and excluding from the analysis Autonomous Regions. Also, variables were normalized using Min-Max scaling, aligning the data to a standardized range, and expenditure metrics were adjusted to account for provincial cost of labor variations. Outliers and inconsistencies, such as earthquake-related costs in L'Aquila, were identified and handled to minimize their impact on analysis accuracy.

5. Conceptual Framework

Delving into the description of the conceptual framework, four DEA models have been developed (Figure 2). Then, after obtaining the technical efficiency and QoL scores, several regression models were implemented to investigate the statistical significance of the relationship between them with and without the inclusion of contextual factors.
The first technical efficiency model (M1) follows the one proposed by lo Storto (2016) having the aggregated selected nominal expenses as input and the area and the population as outputs. On the other hand, the second technical efficiency model (M2), uses the aggregated selected adjusted expenses (excluding all the expenses in



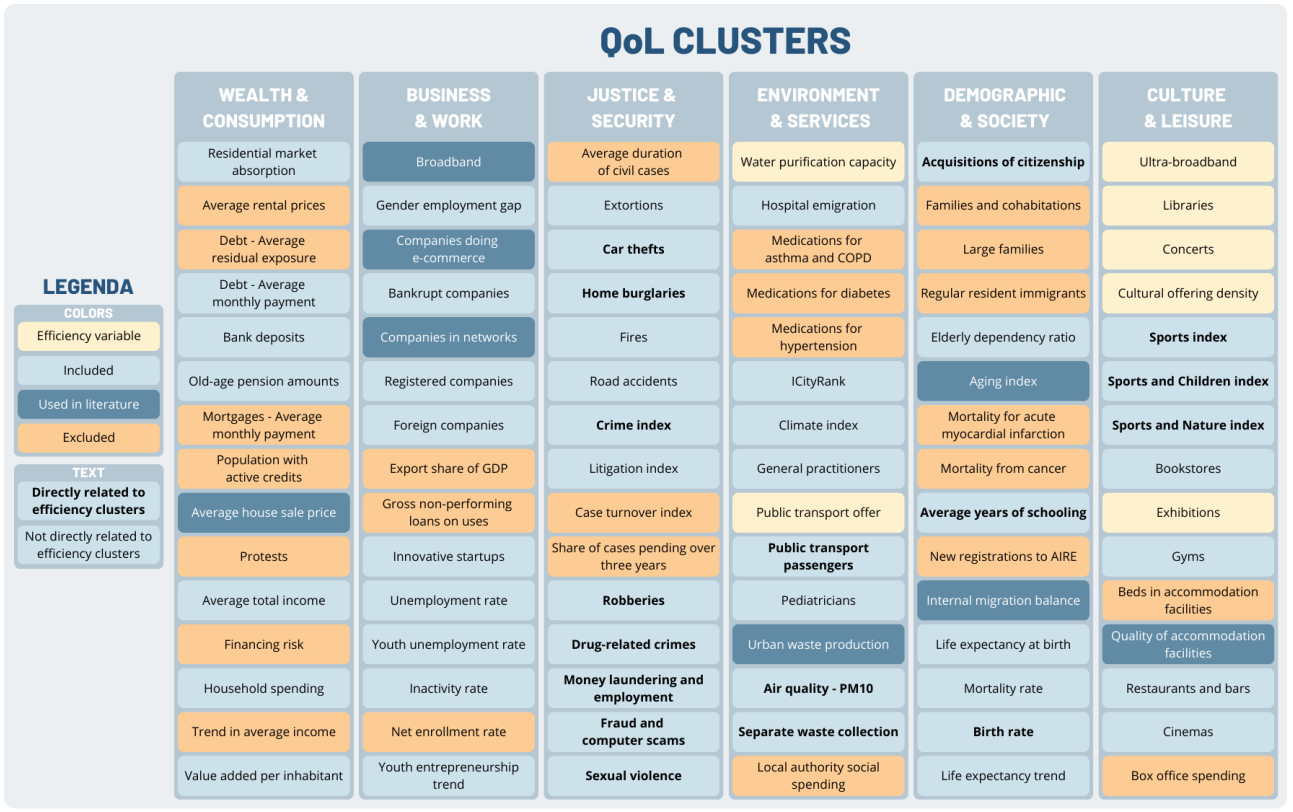


Figure 1: Variable Selected

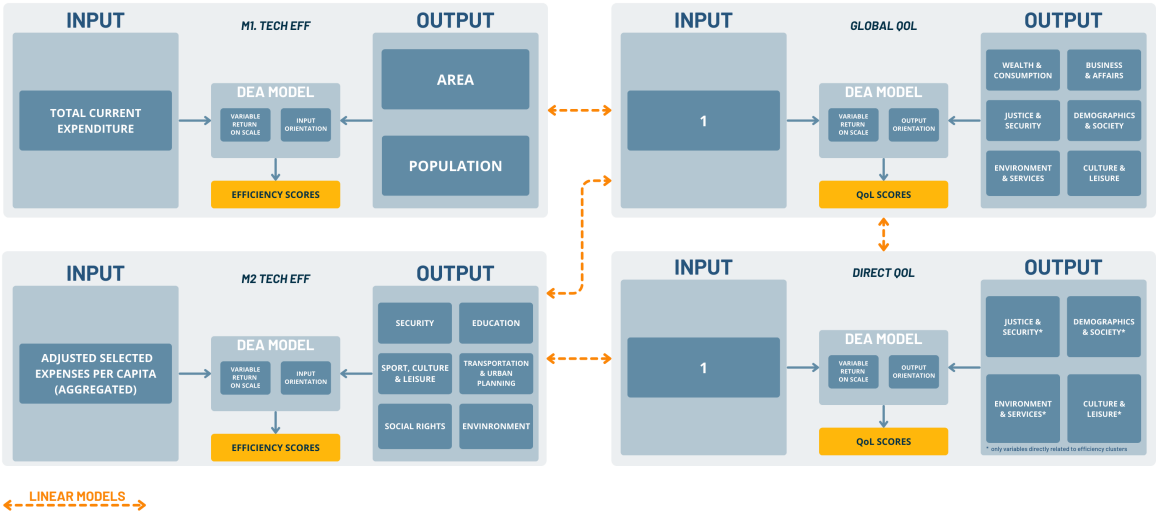


Figure 2: Research framework highlighting the linear models implemented between scores

which the municipality has no direct accountability and adjusting them for the cost of labour) as input and six variables, comprehending the mean of indicators showed in Figure 1, as outputs.

Two models assess QoL. The Global QoL Model (Global QOL) uses output-oriented DEA with six clusters—wealth, work, justice, demographics, environment, and culture—as outputs, focusing on maximizing these positive indicators. The Direct QoL Model (Direct QoL) narrows outputs to those directly linked to government efficiency clusters, offering a targeted view of QoL derived specifically from local government activities.

6. Results & Discussion

This papers' models highlighted interesting results which were tried to be discussed relating them to the existing literature.

From a technical efficiency perspective, M1, with an average score of 61.83%, found that Southern Italian municipalities generally demonstrated higher technical efficiency than those in the North (Average North: 56.42% and Average South 75.46%) consistent with lo Storto (2016). However, unlike prior studies no significant economies or diseconomies of scale were observed. In contrast, M2, average score of 69.27%, showed some differences along the zones, with Northern and Souther municipalities performing significant positive and negative variation respectively. Again no significant effect of scale was found.

More interesting though is the relationship between the two efficiency scores and Global QoL. M1 found a significant negative relationship with QoL, whereas M2 presented an ambiguous and less significant correlation. This contrast suggests that the impact of technical efficiency on QoL depends heavily on how these measures are defined and the model structure used. Although **technical efficiency may serve as a useful proxy, it might not fully capture all inefficiencies** in local government operations. To better assess the capacity of local governments to create value to communities and citizens, a variety of additional metrics from a New Public Management perspective should be considered.

The QoL analysis reveals a notable difference between the Global and Direct QoL scores across Italian provinces. Northern provinces typically score higher on Global QoL (North 93.23 %, South 85.77 %), which includes economic factors, whereas this regional gap disappears in Direct QoL scores that exclude economic variables, underscoring the substantial impact of economic conditions on QoL. The strong correlation between Global QoL and GDP per capita, as well as the positive relationship with the per capita expenditure, indicates that higher economic resources are linked to boosts in well-being, which is aligned with the literature that suggests increased spending enhances QoL (Perugini, 2024; Doumpos et al., 2020).

The summary of the Linear model connecting

Global QoL and Direct QoL (Figure 3) further clarifies these dynamics, showing that **while both Direct QoL and GDP per capita positively correlates with Global QoL, the relevance of Direct QoL lessens as GDP per capita rises.** This suggests that in wealthier regions, economic factors might outweigh the influence of local government performance on QoL. Conversely, **in less affluent areas, public sector contributions become more critical to QoL,** highlighting the heightened importance of government services in economically disadvantaged regions.

Summary 6.5 linear model		
	Estimate Std.	Pr(>|t|)
Intercept	-2.406e+00	**<4.26e-12 *****
QoL direct	1.454e+00	**<5.48e-06 *****
GDP per capita	8.657e-05	**<1.10e-12 *****
QoL direct:GDP per capita	-3.847e-05	**0.000466 *****
Signif. codes:	*0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*	
Adjusted R-squared: 0.5739		

Figure 3: Summary model 6.5

Moving on to the comparison of technical efficiency and QoL, M1 and the Global QoL model exhibit a marked negative correlation, which could have been inferred from their differing relationships with per capita expenditure. As discussed in the previous section, while QoL tends to increase with higher expenditures, M1 shows an inverse trend, displaying a negative correlation with per capita expenditure of approximately -70%. This substantial negative correlation suggests that the technical efficiency model (M1) may be too much biased by expenditure levels, disproportionately penalizing decision-making units (DMUs) with higher spending regardless of the outputs they produce.
Moreover, **M1 not only fails to fully capture the complexities of public service provision and its impact on citizens**, but, given that increased expenditure is often associated with improvements in well-being, this model may be inadequate for studying this concept as **it could lead to classify as highly efficient those DMUs that excessively reduce spending**, instead of those actually improving their performances providing better services but spending a few more.
On the other hand, M2, which incorporates more variables and increases the complexity of the model, shows an ambiguous and less significant positive relationship with Global QoL scores (Figure 4).

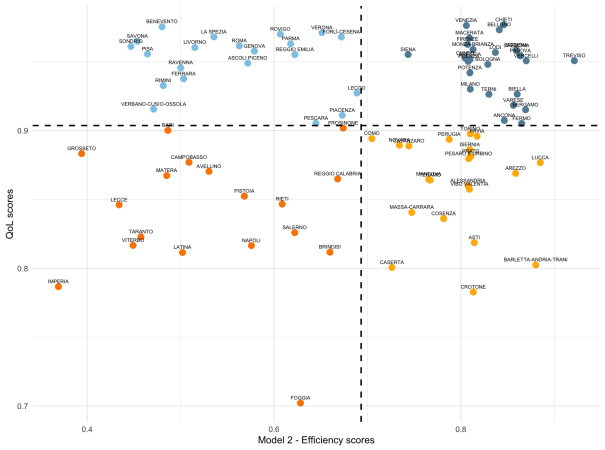


Figure 4: M2 - Global QoL relationship

Not always when technical efficiency increases QoL behaves similarly and vice versa. Also, even if it does not prove causality, the significant positive relationship (p-value 0.0304) between Model 2 technical efficiency scores and Direct QoL scores (in accordance with Bigerna and Polinori (2014) and Cárcaba et al. (2022) findings) indicates that when technical efficiency increases also QoL standards in categories who are directly influenced by municipalities operations rise. This denote that **the ambiguous relation between Global QoL scores and technical efficiency is likely to be derived by factors that local government cannot control, which enable certain provinces to experience a boost, or fall, in their QoL.** For instance, these can be private sector related factors, as the wealth of the population according to the positive GDP impact on QoL seen in the previous section, or healthcare matters and other services whose responsibility is of higher governmental level, like the Region or the State itself.
A clustering analysis (Figure 5) further breaks down these findings. "High-Low" provinces, such as those in Calabria, show high efficiency but low QoL, likely due to limited economic opportunities and underdeveloped private sectors that local government efficiency alone cannot offset. Conversely, "Low-High" provinces, such as those in Emilia-Romagna, exhibit high QoL despite lower efficiency, benefiting from strong private sector contributions and regional gover-

nance as found in Luca and Modrego (2021). The clusters also emphasize the influence of metropolitan cities, where provinces like Florence and Bologna (in the "High-High" cluster) demonstrate how metropolitan authority and resources contribute significantly to QoL.

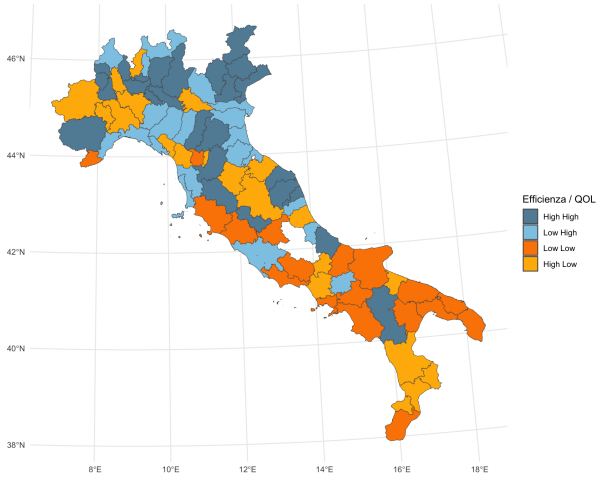


Figure 5: Efficiency - QoL Clusters map

6.1. Additional Investigations

In addition to the main analysis, the study explored two other themes: **vertical technical efficiency scores** and the **use of capital municipality as a proxy for the entire province**, as in Bigerna and Polinori (2014) . Regarding the first, correlations between vertical efficiency scores show limited synergies between different public services, with mostly low positive correlations, highlighting low synergies in the mix of services local governments offers. Then, capital municipality's spending offers a viable proxy in cases where detailed data is lacking; the study finds that the reliability of this approach diminishes in provinces with a larger number of municipalities.

7. Concluding Remarks

This dissertation highlighted the ambiguous relationship between local government efficiency and QoL across Italian provinces. This relationship results complex and not homogeneous, as economic factors like GDP per capita seem to influence their linkage, increasing the relevance of the role that local government efficiency have in less prosperous areas. The study finds that higher technical efficiency scores do not necessarily translate to improved QoL, as evident in the regional divide between Northern and Southern provinces regardless of municipalities' performances. Instead, four main clusters have been identified. For each of them tailored managerial and policy recommendations to enhance local government effectiveness and, consequently, try to improve QoL, have been proposed. For instance "High-Low" provinces could reallocate budgets to programs that may indirectly support other sectors, like economic development and healthcare. On the other hand, "Low-High" could prioritize cost-effective strategies like digital administration, procurement reform, and implementing efficiency frameworks as suggested in McKinsey & Company (2017), while "Low-Low" provinces should do both.
Even if presents insightful results, this study comes with several limitations. The single-year data scope and aggregation at the provincial level may obscure municipal-specific details. It suggests that future studies should adopt a multi-year perspective to capture longer-term impacts of local government investments on QoL. Additionally, future works should explore a wider range of efficiency metrics, integrating New Public Management principles, which evaluate not only cost efficiency but also public value delivery. Finally, causation rather than correlation should be analyzed and expanded to an European perspective. This may assist policymakers in aligning Quality of Life standards across regions, thereby facilitating the realization of the EU's "United in Diversity" mission.

8. Acknowledgements

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