



## Cost-utility analysis in municipalities: The case of Odunpazarı and Tepebaşı municipalities in the city of Eskisehir<sup>☆</sup>

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### A B S T R A C T

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Within municipalities, the fulfillment of the demands and requests of the public is possible through the provision of services compatible with the public's expectations and needs. Social utility is measured by the degree that municipal services positively correlate with public expectations, and maximum social utility is identified through cost utility ratios. This study focuses on cost utility analysis for the municipalities in the city of Eskisehir, and it offers recommendations regarding which municipality should be given priority in the distribution of scarce resources in a way to best meet people's expectations. The characteristics of the two municipalities were determined by Grey Relational Analysis (GRA) to draw conclusions about the level of satisfaction with a given municipality's provision of services. The utility indicators from the GRA were then related to the costs to discover the cost-utility results. The relevant findings reveal that the municipality of Odunpazarı produced greater utility than the municipality of Tepebaşı, although the former failed to generate utility in cost. On the other hand, the municipality of Tepebaşı attained the greatest utility in cost. Mass transportation appears to be the service that provides the highest levels of satisfaction in both municipalities, whereas road construction and asphalt services provide the least satisfaction, according to the public.

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### Introduction

Advances in information and production technologies have raised customer expectations and have improved the quality and the marketing of products and services. Vendors' approaches have been significantly transformed to become increasingly responsive to customers' requests and demands and to produce marketable goods. Service providers now must consider the priorities and expectations of their customers. The most efficient use of limited public resources to produce the greatest public utility should be in accordance with customer satisfaction.

Meeting the expectations of the public is essential for municipalities. However growing social, economic and ecological problems make it difficult to properly meet the public's priorities and expectations. Local municipalities, under pressure from both

regulations and scarce resources, face difficulties in improving the services they provide. Concerns over quality and customer satisfaction lead to considerations on the effective use of public resources and efficient governance and administration (Duman & Yüksel, 2008). Municipalities and public institutions have relied on different methods to improve the quality of services they provide for their local residents. The degree that these different methods ultimately support the expectations of the citizens needs to be identified and measured. The diverse and growing demands of citizens for additional services force municipalities to comply with these demands and develop different styles to offer better services.

Whether local municipalities are able to perform their mandatory duties in a way to satisfy their residents depends on the availability of necessary funds and resources for proper provision of these services. However, the central state is often unable to meet the expectations of their people because of scarce resources. Therefore, it is important to properly identify the expectations and priorities of the local residents and align them with the effective use of scarce resources to produce the greatest public utility and efficient resource allocation. Within this process, the utility ratios of municipalities need to be considered and the priorities for resource distribution to local municipalities should be identified. Cost-utility

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studies and analyses will enable municipalities to efficiently meet public demand relative to costs. Reliable information may be obtained by analyzing municipalities that are able to produce greater public utility with lower costs.

Effectively distributing public resources among local municipalities to create public utility is an important issue for the state. It is a particularly important issue for administrations elected by popular vote, as they must meet the increasing demands and expectations of the people. Considering the significance of the issue for the state, the municipal administrations and the people, it could be expected that scholars would note the cost-benefit analysis of this problem. However, there is almost no such study in the literature. To help provide this missing research, the present study seeks to reveal the cost-utility levels for the central municipality in the city of Eskisehir. To this end, utility scores were generated for use in the calculation of the cost utility ratios in two specific municipalities. The total cost values of the municipalities whose utility ratios were determined for the year 2009 were divided by the total costs of these two municipalities. This provided the cost ratios of each municipality. Based on these cost utility ratios, conclusions were drawn concerning how the social utility of each municipality could be attained with lower expenditures.

The findings of this study will greatly assist the citizens who benefit from the services provided by the municipalities. Focusing on the preferences and tendencies of the people of Eskisehir, it is possible to discover the degree that people are satisfied with the services provided by a particular municipality that expends fewer financial resources. Considering the significance of the subject matter for the municipalities and the people, it would be beneficial to conduct similar studies for other cities. To our knowledge, there is no study in the literature that focuses on this issue. This study potentially fills this gap within the literature on local administrations.

## Materials and method

Cost utility analysis refers to the evaluation of alternatives according to a comparison of their costs and their utility or value (Levin & McEwan, 2001). Cost utility analysis uses information on the preferences of individuals to express their overall satisfaction with either a single measure or multiple measures of effectiveness. In cost utility analysis, program stakeholders are asked to assign a numerical value representing the desirability of each possible outcome of a program. The evaluator aggregates these ratings to obtain an overall utility for the outcome. The term "utility" is used to measure the extent to which an alternative satisfies an attribute or criterion. It is simply a way of expressing worth, psychological value, or satisfaction in a common numerical metric (Lewis, Johnson, Erickson, & Bruininks, 1994). Cost-utility ratios are calculated by dividing the cost of a program by its utility score. The smallest ratios provide the greatest utility for the lowest cost (Levin & McEwan, 2001).

The primary benefit of a cost utility approach is the way it considers individual preferences and varied outcomes. However, the results are hard to reproduce among different evaluators (Levin & McEwan, 2001). Only in rare cases does a single measure of effectiveness fully describe a program's outcomes. Utility is the preference or satisfaction that individuals have for each outcome (Davis, 2004; Girginer, 2001). The level of public satisfaction of a utility provided by the municipalities was reviewed in the study. In the first part of the study, a public survey was taken with the participation of local residents over the age of 18. They were picked at random, using a layered sampling technique, in each neighborhood of the municipalities, and they were asked to identify their level of satisfaction with the municipal services. GRA was employed

for every respondent to detect the grey relational levels for all expressions of the service types in the survey (mass transportation, road construction, asphalt, water, sewage, garbage collection, cleaning and social and cultural affairs). The averages of the preference values for each service type were calculated after the GRA to obtain the utility coefficients that express the social utility of and the public satisfaction with the municipal services.

Factors affecting the satisfaction of the services provided by the municipalities, the relations between these factors, the operation of the system and the system's structure are all vague. Because these are the characteristics of grey systems, GRA was used in the assessment of the study's utility ratios. In addition, GRA (one of the alternative approaches that can be used in situations where the normality assumption does not apply) is used when there are few observations within the context of multiple variables. For many statistical methods that apply to data retrieved through scales, such as Likert scales, the data should comply with the following assumptions: normal distribution, homogeneity of variances, independence of the units and their randomization. GRA is a significant method by which reliable and significant results can be obtained via methods such as Likert scales because GRA considers the individual responses for each judgment and separately evaluates each response (Wu, 2002). This study uses a Likert type scale consisting of judgment statements to identify satisfaction with the municipal services. This is another important reason for using GRA to identify utility ratios.

In the first part of the study, utility figures and values are retrieved through GRA. The second part of the study evaluates the cost utility ratios of each municipality in an attempt to determine which one secures the maximum satisfaction based on the minimum cost. The second part also assesses the specific amount of increase required by each unit to support overall customer satisfaction with the municipal services in the city of Eskisehir relative to overall costs. This subsequently detects whether the central municipalities are efficient in terms of utility ratios. It also leads to the identification of the amount of spending needed to make sure that the municipalities that are not cost-effective provide services that increase utility. The study also identifies the municipalities that need to be supported by the state treasury. This study identifies the municipality that needs to receive increased funds reserved for Eskisehir municipalities to more efficiently support customer satisfaction.

## Grey relational analysis

The term "grey system" was first published in a paper by Professor Deng Ju-Long. He presented the idea of the "Control Problem of Unknown Systems" in his paper at the Sino-US Conference on Control System held in Shanghai in 1981. His paper on "Control Problems of Grey Systems" has been published in the *Journal of System and Control Letters*, noting that the grey system theory is a formal declaration within the academic community. The basic concept of grey system theory is that known information is white, while unknown information is black, and the uncertain information between the known (white) and the unknown (black) is grey. Grey system analysis is mainly used to uncover the nature of a system that lacks complete information. It emphasizes information supplemented to the system. The full use of white information has been identified by conducting systematic relational analysis and model construction. Grey system analysis helps change a system state from grey to white through prediction and decision methods that explore and explain the system (Lee, 2002). The theory is now widely applied in finance, engineering control and the commercial world. Most studies that use grey analysis support short-term and stable trend prediction (Chang, Lai, & Yu, 2005).

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