THE BUCHAREST UNIVERSITY OF ECONOMIC STUDIES

Council for Doctoral Studies

Management Doctoral School

MANAGERIAL PROPOSALS FOR IMPROVING THE QUALITY OF URBAN TRANSPORT SERVICES IN BUCHAREST

SUMMARY

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1. CONTENTS

2. KEY WORDS

Public transport, management, research, quality, Bucharest, TQM.

3. SUMMARY

The main objective of the current paper is to study the public transport in Bucharest. The key findings of this study are the analyzes of the main challenges that public transport authorities in Bucharest needs to solve in order to improve their services.

This study examines an adequate methodology which can have a positive influence on increasing the general quality for the public transport infrastructure.

Therefore, the research will conduct a series of studies on urban public transportation topic, both nationally and internationally.

Furthermore, the analysis will include the following main aspects:

- The literature reviews regarding quality issues in public transport: the most important characteristics, quality indicators for transport systems, case studies from international projects.
- The public transport quality influence upon user satisfaction, as well as the transport network impact on the quality of urban life.
- A detailed analysis of the public transport system in Bucharest.
- A comparative study on urban public transport systems in Bucharest and Berlin.
- A comparative analysis of the public transport systems in the 41 administrative regions of the country, with an emphasis on Bucharest-Ilfov county .
- Major solutions and strategies used by public transport authorities worldwide.

Furthermore, will be presented a summary of the research, with emphasis on the applicable studies, which improve the scientific literature in the current topic.

1. **Analysis of passenger's satisfaction regarding the public transportation mode in Bucharest**

In order to analyze the passengers' satisfaction with public transportation mode choices in Bucharest: surface and underground systems, it was necessary to identify the most important factors influence the user perception and satisfaction.

The study also highlighted the considerable differences between the passenger perceived quality of underground and surface networks, differences which are mainly caused by systems infrastructure.

After researching the literature review, both at international and national level, six groups of criteria have been established for a further study. Each group has a direct or indirect influence upon users perceived satisfaction regarding the public transport system quality from Bucharest:

- Convenience of service;
- Comfort;
- Service reliability;
- Safety and security;
- Communication with passengers;
- Price and affordability.

The quality of transport services should be studied from two different perspectives. First of all, using the users of the public transport network perception, and secondly, from the perspective of the public transport operators. Therefore, in a later chapter, the quality of transport services was analyzed from the point of view of local transport authorities.

2. Comparative analysis of the transport systems in the European Union

In order to conduct a comprehensive analysis on the public transport system in Bucharest it is imperative to study the transport network in Bucharest in direct comparison with other transport systems in the European Union.

Therefore, it was necessary to present an overall public transport situation at European level as well as the evolution of the indicators considered representative.

First of all, the study analyzed the population growth in the European Union, as well as the demographic behavior of individuals.

In conclusion, according to the official data provided by the United Nations (UN), the current population growth rate is 1.13% per year. Under these circumstances, total population growth is about 80 million people each year.

Moreover, the total population of the world has doubled over a period of only 40 years. By all means, in 1959 the global population reached the historic threshold of 3 billion people, while by 1999 there was a record level of 6 billion people.

Secondly, according to The 2015 Revision of the World Population Prospects [1] (United Nations, 2015), the global population is following a strong upward trend, and by the year 2038 it will reach an impressive total of 9 billion individuals.

For example, according to the official statistics provided by the International Public Transport Association, 57 billion journeys were registered in 2012 using public transport systems only on the European continent.

In addition, the growth rate of urban populations is higher than the national average, representing a further challenge for the public transport system in Bucharest.

One of the conclusions was that public transport needs to adapt constantly, depending on political, social or economical changes. This is supported by the entire scientific literature as well as the authorities in the field: "Public transport must perform better, be more efficient, meet changing expectations, be more customer-oriented and adopt a business-oriented approach [2] Association of Public Transport, 2015) ".

3. Comparative study of transport systems in two European capitals: Bucharest and Berlin, Germany

Within this chapter were analyzed comparatively the particularities of public transport networks in two European capitals. For this purpose, the city of Berlin has been selected because it has similar characteristics to those of Bucharest:

- European Capital;
- It is the largest city of the country in terms of population: 3,292,365 individuals according to the latest official census of 05/09/2011 (Berlin Population, 2016);
- It has the largest geographic area in the country: 892 square km;
- Presents the highest population density in the country: approximately 3,809 people / square km;
- Provides both surface public transport network and underground network;
- The city has a rate of 342 cars/1,000 inhabitants, similar to that of Bucharest;
- It is the most important political center in the country, being the headquarters of the Government.

Additionally, the Berlin metropolis has to face significant challenges, similar to the those encountered in Bucharest.

First of all, the city benefits from a very complex passenger transport management system, but the characteristics of the environment are constantly modifying. The limits of the city are

changing simultaneously with the increase in the number of residents, attracted by the rapid economic growth.

Secondly, the officially registered population remained relatively stable in the 1991-2012 period: approximately 3.4 million official inhabitants, while the number of individual houses increased significantly, recording an increase of 34% over a 15 year period. In conclusion, this has a direct impact on urban agglomeration, which means more intensive use of personal ways of transportation.

In order to conduct this research, were used the official reports published in the period 2001-2013 [3] by the Ministry of Urban Development of the State of Berlin, the official statistics of the National Institute of Statistics, the activity reports of transport operators, as well as other scientific research.

Furthermore, the study analyzed the comparison between the official populations registered in both European capitals in order to observe the evolution, which has direct effects on the use of public transport networks.

4. Analysis on the efficiency of the public transport in Bucharest compared to the other regions in Romania. Case study: DEA method.

The information presented in this chapter concerned the public transport networks in Romania, in particular conducting a detailed analysis of the transport systems in the 41 counties of the country, with emphasis on the Bucharest region.

As a result, the Romanian public transport system consists of four main categories of networks:

I. Underground public transport network, based on subway trains;
II. The public surface network, based on buses;
III. The surface public network, based on tram;
IV. The surface public network, based on trolleybuses.

Comparatively, the analyze measured the efficiency of the transport systems at country level compared to the networks in Bucharest.

In support of this analysis, the Data Envelopment Analysis model (DEA) was used, involving the use of a set of comparable indicators in order to establish pertinent conclusions between the input and the output elements: „These outputs and inputs will usually be multiple in character and may also assume a variety of forms which admit only ordinal measurements (Charnes, et al., 1978)".

On the other hand, regarding the difficulties encountered in the public transport system in Romania, it should be mentioned:

i. The technically outdated infrastructure;
ii. The failure to comply with the current pollution standards of vehicles in the circulating fleet;
iii. Stopping the local tram production, the plant realizing only repairs and maintenance operations;
iv. The lack of new trams and trolleybus acquisitions during the 2013-2015 period;
v. Limited number of dedicated bicycles paths;
vi. No routes dedicated exclusively to the public transport vehicles.

In conclusion, in this analysis were identified the counties with the highest levels of overall efficiency, as well as the counties with the most unsatisfactory results, thus achieving Bucharest's rating in a general ranking across the country.

Therefore, the Data Envelopment Analysis model uses the linear programming algorithm to evaluate the effectiveness of decision-making processes. Similarly, advanced mathematical details of the DEA algorithm can be found in the scientific work of Seiford and Thrall (1990), (1993), (1996) and Lovell (1994).

The DEA method is mainly used for activities that are difficult to quantify in terms of efficiency, being used internationally in social, economic or scientific research. The literature proposes the analysis of data collection in the form of decision making units: DMU's.

First of all, all the input and output data (inputs and outputs) are combined into one parameter to obtain an efficiency score within [0,1].

On the other hand, in addition to evaluating the efficiency scores, the DEA model provides a series of instructions in the form of quantitative targets that can be used to improve the overall efficiency levels.

In the current research, the counties of the country (in a total of 41) were used for the elements of the DMU decision making units and for the entry and exit data were considered the following variables:

A. Data input:
1. The number of inhabitants in the analyzed county;
2. The number of transport units in public transport park: the modes of transport within the circulating park (buses and minibuses, trams, trolleybuses).

B. Output data:
1. Number of users transported annually.

Specifically, in the current research, the DEA method obtained the results on the efficiency of the public transport networks analyzing each county individually and also in relation to the other statistical data.

The DEA algorithm involved the use of linear programming to investigate the relationships of direct influence between inputs (the population of the counties and the number of modes of transport in the circulating park) and the output used (the number of users of the transport system analyzed).

In essence, it was possible to achieve an efficiency ranking for the 41 counties, as well as to design a set of potential values for each region. If those regions would change the inputs variables, then the potential efficiency could be achieved.

To summarize, the main purpose of this chapter was the evaluation of Bucharest Municipality in relation to all the other counties of the country, in order to obtain an overview of the overall efficiency of the urban transport networks.

In conclusion, was carried out a comparative analysis of the public passenger transport system in Bucharest and the situation in the country.

Given these points, Bucharest is the only city in Romania to provide the citizens with an underground transport system and at the same time it has the status of European Capital, being the most developed city in terms of social, economical, as well as political.

The present thesis contributes to the scientific research in Romania by carrying out an extensive research on urban management in Bucharest, in detail on the public transport of passengers in the Capital. Also, in the thesis, was presented a detalied analysis on how to improve the general quality provided by the public transport systems.

Moreover, the premises of the functioning and implementation of a Total Quality Management system were provided. Under these circumstances, was investigated the importance of a TQM managerial system for an organization that has as main activity passenger transport services.