



Localization, needs assessment and optimization of the construction of petrol stations in Kerman province

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Abstract: Due to the costs of setting up the construction of fueling station as well as costs associated with indiscriminate use of gasoline which suffer gross domestic product (GDP) and the country's capital, the necessity for need assessment of the construction of gasoline stations and correct localization of them is evident and obvious in order to reduce subsequent costs. Therefore, the aim of this study is the need assessment of the construction and localization of gasoline stations in the province of Kerman. The objectives of this study include: (1) Need assessment of new gas station in Kerman; (2) Evaluating the economic feasibility of gas station with respect to existing fees and related costs; and (3) Analyzing the status of gas stations in Kerman province from the customer perspective. This research is practical study in terms of the objective and it is descriptive in terms of nature. The population of this research includes all the fueling stations of Kerman province, which the number of it was around 214 stations, and all customers referred to gas stations and fueling stations in Kerman province that accurate statistics are not available. Due to the limited number of fueling stations, all of them were designated as sample and were studied through census methods. As well as, the judgment (deliberate) method was used to evaluate the status of the stations from customer's perspective to determine the sample size; the sample size was 511 people who were randomly selected. The data collection methods in this thesis were the library and field methods. "Payback period" was used to analyze the economic feasibility of gas supply stations in the study and t-test with one sample was used to analyze the status of the station from customers' perspective. Payback period was approximately estimated 22 years, which due to inflation and the time value of money can be stated that the construction of gas stations with current trends in Kerman province has no economic justification. The analysis results indicate that there is no need to build new station in Kerman province based on existing indices and the gas stations in Kerman province are in good condition.

Keywords: Need assessment, localization, payback period

INTRODUCTION

Access to the service centers can be evaluated from two aspects of the lack of use and lack of its proper position; the lack of an activity is a need to establish a user in one area, but lack of a proper position is a category that an activity does not have proper localization and so it leads to a waste of time and energy, travel costs, reduced access, forced to make greater use of car, etc. [Khakpour et al., 2011].

Usually the establishment of many urban elements and predominantly profit is more a function of economic mechanisms of free competition, but non-profit public urban elements cannot be entirely conceded to economic mechanisms of market; it is necessary to get help of decisions and policies based on interests in order to compensate for inefficiencies in the market that the main task of planners and public health services are among them [Yekanifard, 2001].

Optimal localization of urban service centers has high importance, and urban planners with their appropriate site selection have effective help in ensuring the welfare of citizens and thus in addition to contributing to the realization of social justice, they take a big step towards a sustainable urban [Pourmoalem et al., 2011].

So, we can say that planners are trying to optimize the distribution of service centers in urban environments and the distribution is according to the distribution of the population and demand at different locations. Supplied petroleum products sites and especially gas stations are among required service centers for society. According to the importance of gas position in everyday life of people and also to better access to the product and to respond better in the field, this study aimed to evaluate the need assessment, localization and optimization of the position of a gas station.

This study consists of five chapters. Research outlines are presented in the first chapter as follows: problem statement, importance and necessity, questions, objectives, and research hypotheses. The second chapter includes research literature such as definition of the requirements and need assessment, need assessment strategies as well as results, localization, characteristics affecting localization and its models, the economic evaluation of projects and literature. In the third chapter, the methodology, the population, the sample and sampling methods, tools and methods of measurement and data analysis methods are discussed.

In chapter four, statistical analysis included both descriptive and inferential analysis of the data and the research hypotheses are discussed; finally, in the fifth chapter, the research results, limitations and research suggestions are presented.

The importance and necessity of the research

Due to regional and even global developments, the country needs are changed day to day and meeting all the changing and varied needs is not possible due to limited resources; so identification of the potential needs and priorities among them is important. Since establishing new service centers requires a lot of costs, so setting the task of its building (needs assessment) as well as choosing the best location of the center (localization) is very important, so that a greater number of citizens benefit from its services.

Also gas consumption trend is in such a way that the country has serious problems about and wrong fuel consumption and non-compliance saving with minimum have imposed environmental, economic, cultural, social, traffic, etc. consequences on the country. Therefore, considering the enormous costs of setting up fueling stations as well as costs that excessive consumption of gasoline has imposed on GDP and the country's capital, the necessity of need assessment of establishing supply gas stations as well as its correct localization to reduce next costs is quite obvious. Therefore, this study given the importance of need assessment of supplied gas stations and the extent of Kerman province (increasing the costs due to this extension) is discussed the needs assessment, localization and optimization of the gas supply station in the province of Kerman.

Research questions

Question 1: Does the number of available stations meet the needs of applicants?

Question 2: Due to the current fee status and related costs, is constructing new station economically justified?

Question 3: Is the situation of the stations favorable for customer service?

Research objectives

Objective 1: Need assessment of the construction of new gas supply station in Kerman province;

Objective 2: Investigating the economic justification of the construction of gas supply station with respect to existing fees and related costs; and

Objective 3: Evaluating the status of the supply gas stations in Kerman province from the customer perspective.

Research hypotheses

Hypothesis 1: The number of available stations is responsive to the needs of applicants.

Hypothesis 2: Due to the existing fees and related costs, establishing new station is not economically justified.

Hypothesis 3: The situation of the gas stations is favorable for customer services.

Research Methodology

Several methods are used for research and researchers are not usually conclusive on the definition of the types of research methods, and accordingly it has been classified differently.

In terms of objective, the research methods can be divided to below approaches: fundamental, practical, and functional. Also, the study is divided in terms of the nature and method into five categories: historical, descriptive, correlational, experimental and causal [Hafeznia, 2008: 50-53].

Practical researches are applied to meet human needs and improve and optimize the tools, methods, objects and models in order to develop welfare and improve the lives of human beings using the cognitive context and knowledge provided through fundamental research [ibid: 51].

The researcher seeks how the issue is in descriptive researches and wants to know how phenomenon, variable, object or subject is. In other words, such research investigates the status quo and describes the current situation regularly and systematically and studies its features; and if necessary it will analyze the relationship between variables. Correlation or consistent studies are conducted to achieve information on the relationship between variables, but it does not necessarily have to uncover the cause and effect relationship [ibid: 59-67].

This research is applicable in terms of objective because its results are used in an organization (the National Iranian Oil Products Distribution Company). The study is descriptive in nature because it investigates the status quo.

Population

The population is related to the entire group of people, events and things that the researcher wants them to investigate [Sekaran, 2007: 294].

The population consists of a set of people, objects, etc. (units) that have at least one common trait [Khaki, 2003: 250].

The study population consisted of all fuel supply stations in Kerman province that their number was approximately 204 stations in 2014 [National Iranian Oil Products Distribution Company, 2014].

To assess the status of all stations from customer perspective, the statistical population consisted of customers referred to gas stations and fueling supply stations in Kerman province that the exact figures are not known and its calculation is difficult.

Methods and tools for data collection

The data collection methods in this thesis were library and field methods. In the library level, figures on the number of stations, the number of nozzles and the gasoline consumption (m³) and so on were extracted from a consumption of petroleum products [National Iranian Oil Products Distribution Company, 2014], and were used in the survey to assess the costs of the inventory from costs per station as well as questions and answers from people working at each station. Finally, researcher-made questionnaire with 12 questions in the range of 5-point Likert was used to evaluate the status of station from customers' perspective (see Appendix).

Data analysis method

Economic analysis method

“Payback period” is used to analyze the economic feasibility of gas supply station in this study. This method is an approximate method to compare projects economically. Analyzer by using this method searches period and time that the initial investment can be offset by annual income; in simple words, total annual revenues are equal to the investment costs in the period.

Among the reasons for using this method, it can be noted that it is simple and generalized, because this approach does not depend on issues such as the minimum absorbing rate of any investor, variable rate of inflation, the costs of depreciation (Due to the variable quality of devices used in stations) and so on.

Statistical data analysis method

A variety of statistical indicators were used in this study to describe the collected data. Overall, in this study, all statistical analyses were conducted by computer software of SPSS-21 and graphs were drawn by Excel software.

Data analysis consists of two parts of descriptive and inferential, which in the descriptive level, the researcher summarizes and classifies the collected data using descriptive statistics indicators. In other words, in the descriptive analysis, the researcher first summarizes the collected data by preparing frequency distribution table and then he shows them with the help of diagrams. The most important descriptive statistics factors include frequency, frequency percentage, mean, standard deviation and so on.

As well as, one of the most important stages of research is statistical analysis; applying appropriate methods at this stage allows providing correct results. In order to analyze the information, Wilcoxon test is used to compare the two dependent groups (number of standard and nozzles in each area) and single-sample t-test is used to assess the suitability of the location of station from customers' perspective.

Table 1: Single-sample t-test to assess the status of stations from the customers' perspective

Variable	Compared with the average value of 36					
	t-statistic test (t)	df	Sig.	Mean difference (Mean-36)	P value of 95%	
					Lower limit	Upper limit
The status of station	2.251	499	0.125	1.63	0.2086	3.0674

The values of t-statistic test and significant level were calculated 2.251 and 0.125, respectively, according to the results of Table 1, that the significant level was higher than 0.05; therefore, the null hypothesis based

on optimal position of stations from customers' perspective will be accepted. So it can be stated that gas supply stations in Kerman province are in good condition with confidence of 95%.

Conclusion

In any scientific research, researcher has to find an answer for each question and makes an idea how the problem is in his mind. He should do this based on preliminary studies, researches, reasoning and thinking [Hafeznia: 2008: 253].

Any scientific research is accomplished based on certain objective; i.e., the researcher objective is the basis and foundation to expand the scope of knowledge and science, or being practical to solve the problem or improve the quality or quantity level. Therefore, the researcher should announce his theory considering each of these goals [ibid: 255].

In the last part, research hypotheses were statistically analyzed; however, since the statistical analysis alone is not enough to find answers to the research questions, in this part, the interpretation and description of results of any of the hypotheses are presented.

Hypothesis 1: The number of available stations is responsive to the needs of applicants.

To investigate this hypothesis after the standard estimation of the number of nozzles required for each area, it compares with the existing number of nozzles, then this hypothesis was accepted (even without statistical hypothesis testing), but Wilcoxon pairwise comparisons test was used in order to ensure further to investigate this hypothesis. Thus, the null hypothesis was "the need to build new station" and the opposite hypothesis was "no need to build new station"; the values of test statistic and significant level were calculated to be -2.666 and 0.004, respectively; that the significant level was less than 0.05, therefore, the null hypothesis "the need to build new station" was rejected and the opposite hypothesis "no need to build new station" was accepted. So it can be stated that there is no need to build new station with 95% confidence based on available indices in Kerman.

The above result can be known as a result of past policies of the National Iranian Oil Products Distribution Company in expanding the number of fueling stations in the past few years instead of their qualification. So that licenses were solely issued for a region on the basis of individuals and the need of the region (distances, covered population, etc.) did not be considered; as a result, high concentration of fuel supply stations is considered in some cities of the province more than other cities.

Hypothesis 2: Due to the existing fees and related costs, establishing new station is not economically justified.

Engineering economics method "payback period" was used to investigate this hypothesis per nozzle. Payback period was estimated almost 29 years. According to the rate of inflation and the time value of money, it can be stated that establishing gas supply station with current trend in the Kerman province has no economic justification.

This may be due to high cost of the items of initial investment, particularly in land prices and primary constructions. As well as, another factor for raising the payback period and not economic justification of establishing gas supply station is rising the number of stations in the past; so that the increase in the number of stations decreases division and distribution of clients between stations and reduces economic efficiency of the stations.

Hypothesis 3: The situation of the gas stations is favorable for customer services.

Researcher-made questionnaire designed with 12 questions, was used to assess the status of gas stations in the 5-point Likert scale. Single-sample t-test was used to investigate the above hypothesis; so that the null hypothesis was “the favorable status of stations from customers’ perspective” and the opposite hypothesis was “the unfavorable status of stations from customers’ perspective”. The test statistic and significant level were 2.251 and 0.125, respectively, that significant level was more than 0.05, so the null hypothesis based on “the favorable status of stations from customers’ perspective” was accepted. So it can be stated that gas supply stations in the Kerman province with 95% confidence are in good condition.

References

- Oskonezhad, M.M., (2001). Engineering economics and economic evaluation of industrial projects, Tehran: Amir Kabir University Press.
- Esmaeili, B. (2001). Needs assessment. *Journal of Tadbir*, No. 117, p. 99.
- Emami, H.R. (2008). Evaluating and localizing the centers of official documents using AHP and GIS model. MSc. Thesis in Islamic Azad University of Semnan.
- Babaei, M. (1999). Need assessment of information. Tehran: Iran’s Scientific Information Center.
- Pourmohamadi, M.R. (2006). Urban land use planning. Tehran. Semat Press.
- Rafiapour, F., (2002). Explorations and thoughts, the introduction to the ways of understanding society and social studies. 14th Edition, Tehran, Sahami Enteshar Corporation publication.
- Ziyari, Y.A. and Hoseinmardi, M. (2009). Evaluation and analysis of urban land use and weighting criteria for CNGs using AHP model (Case study: Gas Region 4 in Tehran). *Research and Scientific Journal of Human Geography*. Vol. 2(1): 39-52.
- Sarmad, Z., Bazargan, A. and Hejazi, E. (2001). *Research Methods in Behavioral Sciences*, Tehran: Agah Press.
- Sekaran, O. (2012). *Research Methods in Management*, translated by Mohammad Saebi and Mahmoud Shirazi, Tehran: State Management Training Center, 10th Edition.
- Soltani, I. (2006). Interaction of needs assessment and effectiveness of training in learning organizations, Isfahan: Arkane Danesh.
- Shakeri, A. (2010). Estimating the structured model of demand for gasoline and gas oil in the transport sector of Iran. *Journal of Energy Economics Studies*, Vol. 7 (88): 1-31.
- National Iranian Oil Products Distribution Company, (2014). Statistics statement of energy-producer consumption of petroleum products.
- Abaszadegan, M. and Torkzadeh, J. (2000). Needs assessment in organizations. 1st Edition, Tehran, Enteshar Circuit Corporation.
- Asakereh, M. (2010). Evaluation of localizing and presenting the optimal model for applications in elementary schools (Shadegan). Master’s thesis. Shahid Chamran University in Ahwaz, Department of Geography and urban planning.
- Fathi Vagavgh, K. (2002). Educational needs statement (models and techniques), Tehran: Aiezh Press.
- Majidian, D. (2008). Evaluation of industrial designs, Tehran, Industrial Management Organization.

- Masoumi Kelati, A.R. (2013). Executive procedure of and training skills and need assessment. Engineering and Civil Organization in Tehran, Education and Human Resource Development.
- Meamari, M. (1998). Study of the distribution of petrol stations in Tehran and Tehran Optimal Positioning (reorganization of fuel distribution stations in Tehran). MSc. Thesis in Urban Planning Major, Islamic Azad University, Central Tehran Branch, Graduate Center of Mirdamad.
- Mehrmohamadi, M. (2002). Curriculum: views, approaches and perspectives. Mashhad, Behnashr Press.
- Nobakht, Sh. and Mostafavi Marian, A. (2010). Optimal Positioning fuel supply stations using mathematical programming and Geographic Information System (GIS); A Case Study of Mashhad. Journal of Transportation Engineering, Vol. 2 (2): 171-180.
- Ministry of Power, (2009). The energy balance of 2009. Office of Macro Planning of Electricity and Energy.
- Yekanifard, A.R. (2001). Localization principle of health centers. Municipalities Quarterly, Vol. 3 (23): 16-23.
- Connell, H. (2004). University research Management. Paris: OLCD publication, France.
- Cox, D., lawver, david e., baker, m., doerfert, d. (2003), Critical water curriculum needs as perceived by agricultural science teachers in programs located within the boundaries of the Ogallala aquifer. <http://www.agedweb.org/WRAEC/2004/WRAEC/Proceedings/Final2004Papers/2004Cox.pdf>.
- World health organization (2000). Priority setting methodologies in health research, Special programme for research & training in tropical disease sponsored by UNICEF/ UNDP/ World Bank/WHO, 1-40.