



Development of a performance measurement system to choose the most efficient programs, the case of the Mashhad transportation system



Ali Gholami*, Maysam Ziaee

Mashhad Traffic and Transportation Organization, Mashhad, Iran

ARTICLE INFO

Keywords:

Performance measurement system
Public transportation
Private transportation
Efficient programs

ABSTRACT

Transportation system can be improved in any city by performing numerous different measures ranging from relatively inexpensive signal re-timing to very expensive freeway development. Determining the set of measures that are the most cost effective and efficient for a particular city has always been very challenging. In this study, the development of a performance measurement system (PMS) is used as a base for choosing the best programs for the city of Mashhad, Iran. Six programs are selected for analysis; four programs from major public transportation programs and two from major private transportation programs. The following steps are performed to conclude the proposed most efficient programs: (1) defining a wide range of performance measures (PM), (2) selecting a set of PMs based on the city's goals, (3) calculating the improvements of each program and (4) comparing the results with “do nothing” scenario. The analysis shows that modification of the current Taxi Khattee (equivalent to jitney) and introducing the bus rapid transit (BRT) system are the most efficient programs for Mashhad. The very expensive interchange or light rail transit (LRT) system are not as efficient as a modification of the current bus system.

1. Introduction

Performance measurement is the periodic measurement of progress toward explicit short-term and long-term objectives and the reporting of the results to decision makers in an attempt to improve program performance (Neely et al., 1995).

Transportation system is a very complex system that cannot be appropriately analyzed without a performance measurement system (PMS). One important part of any PMS is a set of performance measures (PMs). PMs are indicators of the results of programs or projects, and are intended to measure their effectiveness. The set of PMs can form the responsibilities and strategies of responsible traffic and transportation organizations. The success of organizations can be seen through their performance measures. However, one very common mistake can happen through comparing two cities by the same PMs. Every city has different situations and encounters different problems. As a result, the ideals, goals, and objectives can differ significantly from one city to another. PMs must be defined in such a way that make it possible to check periodically how much an organization is responding to an individual city's goals. Therefore, a city's PMS should be defined based on that city's goals.

Extensive research has been done to address different aspects of a successful general PMS. Bititci (1994), Olve et al. (1999), and Robson (2004) discuss how PMs should be directly related to the organization's strategy and should be chosen from the organization's

* Corresponding author.

E-mail addresses: a.gholami@gu.ac.ir (A. Gholami), ziaee@mashadtraffic.ir (M. Ziaee).

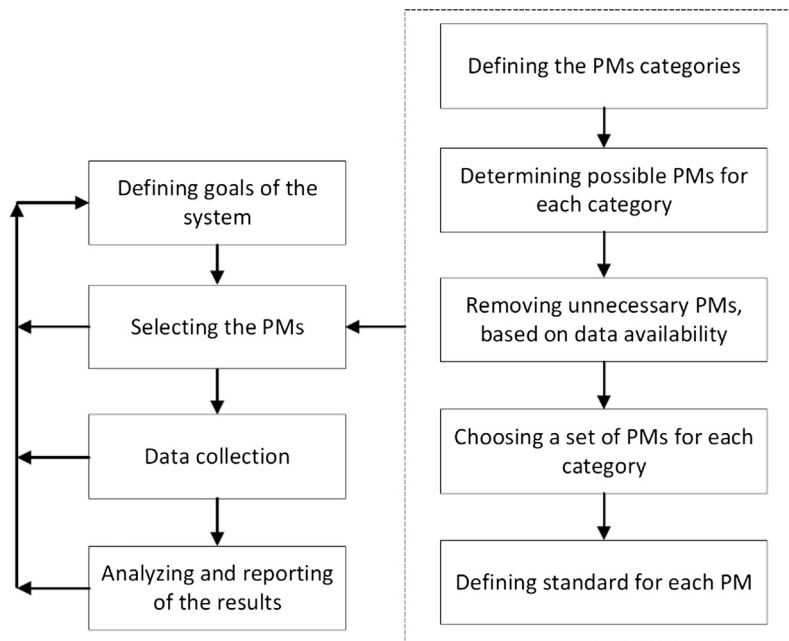


Fig. 1. PMS development for Mashhad transportation system.

strategic objectives. Performance measurement frameworks have been proposed by various authors to support this idea. Thaklar (2007) has summarized various performance measurement frameworks. Santos et al. (2002) have addressed the needs of an organization in the development of performance measurement system using a multi-criteria decision analysis. Neely et al. (2000) presented a process-based approach to the performance measurement system. Additional research can be found in the literature regarding the PMS, e.g. Keegan et al. (1989), Kaplan and Norton (1992), Neely et al. (2002), Bititci et al. (1997), Drucker (1990), and Neely (1998).

For the transportation system, the research regarding a successful PMS and its application for decision-making is not well developed and many aspects remain controversial. Weisbrod et al. (2009) examine the recent progress at assigning monetary values to what are normally considered “hard to quantify” benefits of transportation projects. They focus on three types of impacts – environmental quality, health and wider economic impacts – to examine how transportation project evaluation methods have evolved in recent years and how they compare the methods used for evaluation of non-transportation programs. Hanley and Spash (1993), James (1994), and Forkenbrock and Weisbrod (2001) have addressed the same issue. NCHRP Report 446 surveyed how PMS are applied in state DOTs (Cambridge Systematics, 2000). FHWA (2004) also did a similar review for uses of PMS in Australia, Canada, Japan, and New Zealand. TCRP Report 88 (2003), Chu et al. (1992), and Badami and Haider (2007) have studied performance measures for public transportation.

This research aims to develop a PMS and apply it in choosing the best major programs for the city of Mashhad, Iran. The results can prove that the best programs are not necessarily the ones that are widely considered the most efficient.

2. Performance measures selection process

Fig. 1 shows the summary of PMS’ development in this study. The first step is to define system goals. The goals of the Mashhad transportation system were obtained from the Balanced Score Card study (Mashhad Traffic and Transportation Organization, 2011). This study states that the Mashhad transportation system should be (1) safe, (2) economical, (3) fast, (4) intelligent, and (5) sustainable. Based on these goals, 13 categories were defined for PMS including: accessibility, mobility, economy of system, quality of life, environment, safety, system utilization, traffic culture, fuel consumption, justice, system maintenance, users’ satisfaction, and demand. Some of these categories are mentioned in literature (e.g. Reiff and Gregor, 2005), however the availability of data and specific situation of Mashhad caused other category types to be added, such as demand. Gholami and Tian (2016) cited that around 20 million pilgrims visit the Holy Shrine of Imam Reza in the center of Mashhad each year. Most of these pilgrims come to Mashhad during summer (July to end of September) and two weeks at the beginning of spring (March 21 to April 4). Therefore, the majority of pilgrims visit a small zone in the city (Holy Shrine of Imam Reza) in a short period of time. Also, the daily travel demand is higher at noon and sunset since most prayers are at the Holy Shrine during these times of the day. Summer and spring holidays are based on the solar calendar so they happen on the same dates each year. However, some religious dates that attract pilgrims to Mashhad are based on the lunar calendar and therefore, travel each year happens on different dates. Both these solar and lunar holidays are called special days. Of course in some years, lunar occasions fall on solar-based holidays, so the city experiences an extreme peak period. To monitor crowded traffic on these special days, the Mashhad Traffic and Transportation Organization (MTTO) decided to have one

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات