

# Field Training of Pedestrian, Influence on Accident Cost in Mid-Size Cities

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## Abstract

Iran is a developing country whereby traffic accidents are one of the main causes of death, following the primary health-related cause of disease [1]. Highly vulnerable individuals that are most prone to traffic accidents are cyclists and pedestrians; they suffer the highest rate of disability and death in Iran. Researchers usually suggest that traffic incidents are the cause of careless and unsafe pedestrian or driver behavior. Most common among these behaviours are running, slow walking while crossing, crossing at unmarked zones, using cell phones or otherwise being distracted while crossing, crossing diagonally, crossing when the pedestrian light indicates it would be unsafe to do so, not looking left or right before crossing, disregarding traffic signals, and so on [2]. Apart from these, several other factors influence pedestrians and are evident in the behavior and attitude of the individuals. Previous studies have successfully influenced the role of pedestrian behavior and attitude in the traffic environment [3]. The reference to the attitude in traffic safety literature has a particular meaning that Jalilian defined in a specific way. Attitude is considered a prediction factor of human behavior and plays a major role in determining individual behavior that will cause and/or affect traffic accidents [1].

This paper highlights the innovative way of pedestrian education which held by the author and support of Qazvin municipality in Iran. The results prove the significant importance of Field Training of Pedestrian (FTP) in cities like Qazvin through the cost-benefit method.

**Keywords:** Pedestrian, Accident, Cost-benefit, Behavior, Traffic Safety, Mid-size City

## 1. Introduction

According to Crowe, it is believed that when responsible authorities try to make rational decisions regarding the development of societies, the first concept or requirement is associated with individuals' security and safety [4]. This understanding of safety can be social, physical, and/or cultural, but in any form, it is a key influential factor in a developing society. I propose that such influence and therefore, effectiveness, can be measured by the satisfaction of the inhabitants of any given urban area. Satisfaction and behavioral change are essential for safety on roads to reduce the accidents [5]. The safety on roads, highways, and transportation systems is one of the most significant indicators used to measure the level of overall safety in different regions or societies. Other common public safety indicators include but are not limited to,

crime rates, educational level, household income, infrastructure development, and access to healthcare among others. The mobility, accessibility, and performance of the users of a transportation system is highly associated with traffic safety and the growth and development of a city [2]

According to Banister, traffic safety is one of the development factors underpinning the quality of life or standard of living for inhabitants through improved transportation systems [6]. Among transportation system problems, traffic safety is the leading primary cause of inefficiencies and dissatisfaction. Previously, transportation was an inexpensive factor because safety was not a significant consideration. Now, however, transportation has become safer and more functional, but also more expensive. Nevertheless, it is crucial that different regions develop new policies that encourage and promote traffic safety. In recent decades, urban regions have become crowded, causing numerous other problems for city management that include heavy traffic congestion and an increased number and type of accidents [7]. Past traffic safety literature has observed that these problems are prolonging travel time and increasing costs. In some cases, such problems have also caused a disincentive to individuals to use the public transportation facilities; this is especially true in Iran [8].

Over the past few decades, many municipalities in Iran tried to construct more routes, bridges, intersections, and highways in order to solve the problem of traffic congestion [9]. These municipalities also applied intelligent transportation systems (ITS) to manage the infrastructure of cities effectively. Azarmi et al recognized in their study that the development of infrastructure alone provided short-term solutions for reducing traffic congestion. Their effectiveness in the long run could not be achieved without appropriate planning to reduce road accidents, pedestrian injuries and fatalities. Even though ITS was applied post-construction, attention to transportation system users, all of which are pedestrians at some point during their commute, was mostly neglected during the planning procedure.

According to different studies and United Nations reports, there continue to be high numbers of pedestrian injuries and fatalities in Iran [3]. There are several high population areas, like Tehran, which have congestion and accident problems [8]. These challenges are not limited to Tehran but also are found in smaller, mid-size cities like Qazvin. This congestion and the resulting high frequency of accidents cause more delays, increases in costs, and a decreased desire to use public transportation [10].

In such circumstances, the use of public transportation is not considered an effective way to reduce congestion and accidents, due to the lack of training and awareness of traffic rules that currently exist in Iran [8]. At this stage, it is essential to develop the field training and education in order to improve traffic safety within

the region. This can be done by introducing new training methods, which remain the major consideration in the current paper. The purpose of reducing the number of accidents involving pedestrians will only be achieved if the city and regional management takes proactive measures to provide specific and targeted traffic safety education.

In the 1980s, the development of telecommunication and electronic systems in different regions was considered the best method of controlling the traffic conditions [8]. Cultural methods that depend on the beliefs of individuals, in contrast, remained complicated methods to resolve traffic safety problems, even though high technology features like ITS were applied. As an example, during the 1990's, the method of "field education for people" was introduced to pedestrians to explain how traffic safety is important for them and society. For instance, this important method was tested in Northern Kosovo and resulted in fewer traffic accidents [11]. Additionally, common ethical principles in teaching other methods of safety training for drivers and individuals were used, which when applied, improved traffic safety and decreased the number and intensity of accidents [9].

Therefore, the advantages of field training for pedestrians (FTP) is considered unique despite the associated budgetary challenges that require the consent of local and regional decision makers in order to proceed with implementation of FTP. Even though FTP provided short-term advantages and gains in the field, it was unknown to what extent this method could be effective in improving traffic safety levels. Thus, the major questions of this paper are associated with the effectiveness of FTP in changing behavior to result in a reduction of the number of accidents while also increasing the satisfaction and confidence of residents in the city's transportation system. This paper analyses and assesses these questions based on the implementation of FTP in Qazvin, Iran. This assessment includes a focus on the implementation costs relative to the advantages of traffic safety education and training, with specific attention on FTP.

The purpose of the paper is to assess the effectiveness of FTP on the behavior and satisfaction of inhabitants by increasing their awareness of traffic safety under specific guidance and education, with special attention given to the development of a model for cost and benefit analysis for mid-size cities in Iran. The study aims to assist in determining whether FTP is economically feasible and relevant as a best practice among traffic safety strategies for the purposes of the Ministry of Transportation and National Organization of Municipalities in Iran. This assessment also aims to transcend the inherent cultural conflicts found within mid-size cities in Iran, specifically that of Qazvin, in proposing the objective benefits and merits possible through the implementation of FTP.

This study was purely conducted in the city of Qazvin, which is a city of Iran with a population of approximately 382,000 residents. Qazvin is known as a medium sized city of Iran located 150 kilometers to the Northwest of Tehran. Within this city, citizens belong to different ethnic groups, including Turkish, Gilaki, Kurd, Tat, and Fars. As it is both an industrial and agricultural city, Qazvin has an immense working population with a relatively low unemployment rate. Due to a growing population and most importantly increasing the budget for transportation system in Qazvin, however, the rate of car and pedestrian accidents within the city is on the rise as well. Figure 1 presents the increase rate in transportation system budget in Qazvin from 2004 to 2012. The budget was basically used to prepare better transportation infrastructures such as new streets, ITS, bridges and improving geometric design of the existing network. Qazvin transportation system is using 44.4 Km of highways, 62.8 Km of arterial, and 120.2 Km of collector roads.

In order to improve traffic safety in cities, and to promote guidance

for pedestrian and bicyclist safety, several social organizations have recently been established. In these organizations – such as the National Cooperative Highway Research Program (NCHRP), Centers for Disease Control and Prevention (CDC), American Association of State Highway and Transportation Officials (AASHTO), National Highway Traffic Safety Administration (NHTSA), and Transportation Research Board (TRB) – standing committees on pedestrian and bicyclist safety are included [8]. Similarly, in Qazvin (a city with more than 20 kilometers of designated bicycle roads), a shared bicycle program was started to deal with traffic accidents and health issues. In this, the Transportation Organization of Qazvin Municipality is responsible for advertising and programming bicyclist safety, which is costly. At the same time, implementing pedestrian safety programs in the city for the purpose of changing its culture was an initiative that cost more for the organizations if there is no government intervention. By contrast, if the government intervenes it will save money, despite employment costs for traffic safety teachers and advertisement costs, such as developing brochures and using social media platforms. This implies that the financial responsibility of such traffic safety projects rests with the government rather than with residents of the regions.

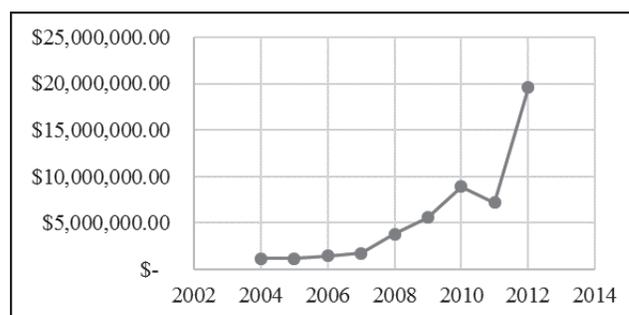


Figure 1. Transportation system budget in Qazvin, 2004-2012

Although individuals believe that traffic safety is a need that must be highly prioritized by the government, many authorities disagree with this perspective on traffic safety programs due to the currently increasing financial loss incurred.

However, the implementation of FTP will serve as a strong reminder to citizens that traffic safety is not only a governmental issue; it affects the city financially, as following the specific guidance has the potential to reduce the costs of accidents paid by individuals themselves. In this regard, traffic safety projects favor persuading the population's attitude to be more active concerning traffic safety [12].

As explained by Steg & Gifford, this not only reduces the financial cost imposed on a city's population, but such engagement also compensates government since individuals are able to perform to their highest potential and contribute to the growth of a county's GDP. Considering this fact, several researchers have stated that traffic safety projects have had a positive financial impact on both governments and populations in the long-term. For instance, a project called "Immediate Actions" was implemented in the United States and costed \$70,000, the funding of which was raised through various cost centers in 2013 for the transportation services operating budget.

Peak hours of accidents in Qazvin occur in two times during 24 hours. The first peak time is 12:00-14:00 during the day, and the second time is at night 21:00-22:00. First peak time happens during the closing time for schools and government and public service jobs. Second peak time happens when families finishing their family time in the city. Figure 4 shows the area with high risk of accidents in Qazvin for the year of 2010. Intensity of the accidents

and number of accidents in area shown are more than other parts of the city.

Due to the high injury and fatality rates in pedestrian accidents in Qazvin, this paper intends to look at the possible causes of this problem and propose a viable solution. In addition, this paper intends to make a cost-benefit analysis model to analyze the effectiveness of FTP on the overall development of pedestrian culture, behavior, and knowledge pertaining to traffic rules in Qazvin. The identified research aims to create public awareness about the dangers or risks of disobeying traffic rules and guidelines. Educational systems and methods like FTP are essential in order to support, transform, and improve the city's transportation network. This paper intends to promote improved traffic safety by providing the best field training programs for passing pedestrians (FTP), which is designed by the author to yield improvements in the city's crossroads and junctions. This research intends to develop an appropriate and comprehensive model in order to assess the educational influence on traffic culture that is essential to improve safety.

Subsequently, before and after the implementation of FTP, the evaluation of its effectiveness will complete through this research study. In the final step, a comparison between costs and benefits will present in order to ensure that FTP is demonstrated to be financially feasible for any given city in Iran, specifically Qazvin.

In general, the questions that we are going to address in this paper are:

1. Can FTP reduce the number of accidents and increase safety?
2. Can the cost-benefit model economically justify the use of FTP?
3. Can FTP reduce the number of accidents and increase safety?

Considered the aims and objectives of this paper, the following key hypotheses are made:

HA1: Implementation of FTP is increasing the public's awareness, attitude, and willingness to follow traffic rules in Iran, specifically in Qazvin.

H01: Implementation of FTP is not increasing the public's awareness, attitude, and willingness to follow traffic rules in Iran, specifically in Qazvin.

HA2: The cost-benefit model can justify the use of FTP with regards to financial considerations.

H02: The cost-benefit model cannot justify the use of FTP with regards to financial considerations.

HA3: FTP can reduce the number of accidents and as a result, increase safety.

H03: FTP cannot reduce the number of accidents and as a result, increase safety.

HA4: FTP can satisfy inhabitants regarding to increasing their knowledge and awareness about traffic safety.

H04: FTP cannot satisfy inhabitants regarding to increasing their knowledge and awareness about traffic safety.

HA5: FTP can increase the traffic safety knowledge of pedestrians.

H05: FTP cannot increase the traffic safety knowledge of pedestrians.

### *1.1. Innovation in research*

Based on some past studies presented by Abbaszadegan & Babapoor, Azemati, Bagheri, Hosseini, & Maleki, and Kaparias, et al. [13, 9, 14], and the needs of current research, it is identified that lack of research which can help to decrease pedestrian accidents may continue into the future, if additional and appropriate research

is not conducted. Therefore, this study is conducted by considering cultural, behavioral, and financial aspects that might be effective and/or ineffective during the application of FTP. In this context, the following research was carried out 2012 and 2013 in Qazvin, Iran, where the rate of pedestrian accidents and fatalities was relatively high prior to FTP. This research took a total of six months to complete, in two separate phases, and entailed the participation and education of hundreds of pedestrians in nine congested intersections of Qazvin. Transportation is known as one of the major driving forces for economic development, as it creates prosperity for individuals around the world and is essential for modern development. For a city such as Qazvin, the transportation principles of FTP further help the city to flourish and prosper by reducing the costs and financial burdens associated with pedestrian and car accidents.

The present paper investigates the effects of FTP in improving traffic safety in Qazvin. The influence of education pertaining to traffic safety on pedestrians has been evaluated through questionnaires and statistical analysis of data. In order to estimate the financial influence of FTP, a cost-benefit assessment of the implementation of FTP will take place.

Traffic safety is one of the highest costs associated with transportation systems, surpassing, for example, the costs of road maintenance and urban furniture in Iran including Qazvin [15]. Therefore, this research focuses on innovating a new method for Qazvin and other mid-size cities in Iran, in order to optimize the congestion and turbulence present in intersections, while also decreasing pedestrian accidents that diminish the level of service in Qazvin's transportation system.

The improvement in standards of living in different regions of the world, including Iran, is partially dependent on managing the costs of transportation systems [16]. The key innovative idea introduced in this paper is that many of these costs can be reduced through the implementation of FTP, as it improves pedestrian movement at intersections and decreases the number of pedestrian fatalities. The reduction of pedestrian fatalities is the most important concept asserted in this paper, and due to the high benefits of FTP in comparison with the costs of implementation, FTP is introduced as an innovative solution to address the problems referred to by the study conducted in Qazvin.

In fact, FTP has two different sides which this paper covers both of them. First side is its' influence on traffic safety by reducing the number of accidents. Second side is increasing the knowledge, awareness and satisfaction of pedestrians and inhabitants.

## **2. Methodology**

In many ways, it is incredible to be talking about traffic safety at all. A human being has been using roads and other transport modes for thousands of years; however, safety was always an issue. The quality of vehicles, roads, and driving, as well as traffic safety culture, are the most important aspects in the differences between developed countries and developing countries. For over a decade, the United Nations tried to point out traffic safety as an important issue for most. Traffic safety remained in UN agendas, aspirations and discussions, while over time traffic engineers, city managers, urban planners and health departments found themselves increasingly isolated on this issue, especially in their respective hemisphere. Even as they reestablished relations and regulations with management systems, their lack of cooperation in the implementation of traffic safety persisted. Furthermore, the inertia and defiance of people who did not pay enough attention to traffic safety was another factor in the unsuccessful changes.

Recognizing this reality, FTP determined to re-examine our approach to educate people at an equal level, with the same quality,



Photo 1. Pedestrian Misbehaviour in Qazvin, Iran, before application of FTP



Photo 2. Pedestrian Misbehaviour in Qazvin, Iran, before application of FTP



Photo 3. Pedestrian Misbehaviour in Qazvin, Iran, before application of FTP

## 2.2. Data Collection

In this paper, the collected data is broken down into three categories. The first kind is referred to as accident data. Accident data was collected from the Office of Traffic Police in Qazvin city, Iran and the validity was approved by them. The second category of data is costs associated with accident, which is collected from the Ministry of Transportation and the National Statistical Organization. For the questionnaire, the data was collected through a field survey data collection method, which entailed sharing the survey documents at the pilot intersections.

## 2.3. Economic model of FTP

For the concerned region in this study, the research identifies the economic model of FTP. The reason for defining an economic model is to indicate a theoretical platform that would depict different economic processes through the identification of a particular set of variables and representing their relationships

amongst them. The model is determined by a simplified and structured design that contributes in defining complex situations and highlights the educational aspects with an economic perspective. Economic models typically utilize mathematical approaches; however, it is dependent on the topic and is not always necessary to use the mathematical technique for addressing the issue. For example, in transportation system management, the mathematical method is not preferred as leadership styles are found more effective to deal with management issues [6].

As this study is focused on utilizing FTP as a method for improving traffic safety in Qazvin through its influence on pedestrian behavior, analyzing the economic factors in this context refers to the evaluation of financial aspects of traffic safety within the city scale. Enhancing traffic safety education and field training to passing pedestrians is a crucial matter, and underscores the importance of assessing the economic aspects of such education, and specifically FTP, for individual residents and for the society at-large.

## 2.4. Cost-benefit Analysis of the Economic Model of FTP

Based on the definition of the economic model of FTP as defined above, it is necessary to identify the cost-benefit analysis (CBA). CBA contributes a systematic technique for properly defining strengths and weaknesses that are associated with traffic safety and the transportation system. This includes the defining of a specific set of activities for assessing FTP, which could include any activities that may have an economic impact in Qazvin and are operational business costs associated with FTP.

Utilizing CBA identifies the economic feasibility of FTP. This refers to identifying the initial costs for the factors that are involved in this context, such as those associated with studying and those anticipated for the planning process. Further, this study defines the implementation costs, which includes personnel, overhead, and advertisement costs. Advertisement costs are comprised of the installation of signs, utilization of social media platforms, distribution of flyers, the placing of banners, and using other such means. Benefits in this context refer to the reduction in financial damages.

By employing such techniques, FTP yields a decrease in the number of accidents while also decreasing the financial damages that are associated with pedestrian accidents during the year. This also translates to a decrease in fatalities as a result of fewer number of accidents. It means that the major benefit is a decrease in the number of fatalities and a reduced number of individuals that are either injured or killed on-site or in the hospital. By having fewer accidents, it is also understood that there would be a decrease in the number of injuries as well. Therefore, this research concludes that the application of FTP in a proper manner is likely beneficial, per the above-mentioned characteristics. To prove this conclusion, this research selected the CBA for analyzing the financial influence of FTP. Considering the general goals, specific steps are selected as the key steps for application of FTP in Qazvin city, Iran. Figure 5 shows the steps and the flowchart of FTP based on CBA.

The flowchart of the economic model of FTP in Qazvin based on CBA is presented below Figure 5. The initial step, according to this flowchart after the implementation of FTP, is to identify the benefits that would occur. The second step is based on the comparison of the cost of FTP. This would allow foreseeing the influence of FTP in future years through the use of software such as Microsoft Excel.

FTP to reduce total number of accidents, intensity of the accidents improving pedestrian behavior.

Step 1: Six major goals in traffic safety are:

- Safety Improvement
- Mobility Improvement
- Workability Improvement
- Efficiency Incensement
- Energy Consumption Improvement
- Satisfaction Factor Improvement

Step 2: Step two is based on determining the target year defines the number of years whereby FTP would be applied.

Step 3: Step three is divided into two steps whereby cost-benefit analysis would be taken by separately evaluating the cost and benefit.

Step 4: Step four is based on the analyses of when the Breakeven Point would be obtained

Steps 5 and 6: The effect will be determined after the introduction of FTP, on the basis of appropriate criterions related to each goal presented.

To calculate the benefits and the costs, it is necessary to define what are the costs and benefits. Costs for FTP are the financial aspects to run the FTP in the city. Benefits are the type of financial costs must be paid by that if the FTP was not applied to the city. Section below calculates the benefits, however because it will be more understandable as a kind of cost nature benefit it called B-Cost.

Table 1 shows the goals and influences that FTP potentially carries itself. The implementation method may cause various results in different cities and cultures. However, in this paper we are studying a multi-cultural city like Qazvin.

The B-Cost considered in this research are divided into two parts, direct B-Cost and indirect B-Cost. The list of direct and indirect costs is presented in Table 2 and Table 3.

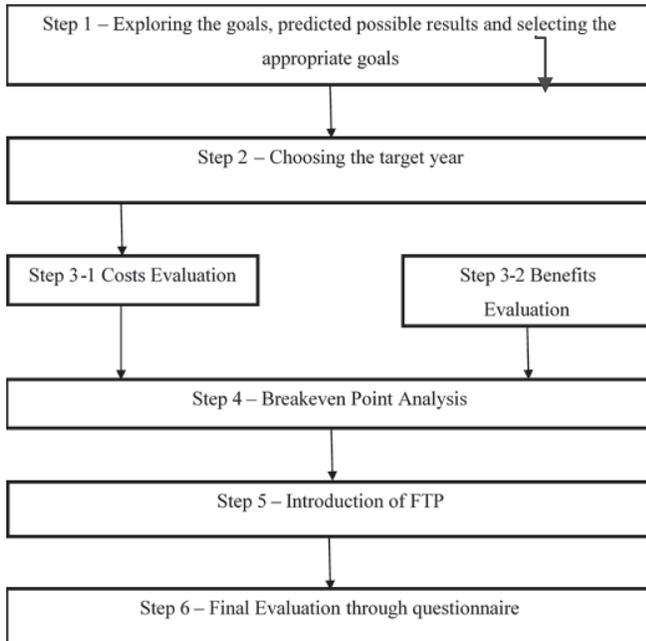


Figure 5. Flowchart of FTP based on CBA

Considering the general goals, specific goals within these categories are selected as the key goals for application of FTP in Qazvin city, Iran. FTP goals are:

- *Safety Improvement*: The indexes selected for SI are the decrease of accidents and reduction of reaction time for relief.
- *Efficiency Incensement*: EI strategies entail the Cost Decrease for transportation system and Improvement of Transportation Management

- *Satisfaction Factor Improvement*: The questionnaire will use the field survey method to know about the people willingness before and after the application of FTP.

Table 1. how FTP can be effective

Criteria	Specific FTP Goals
Reduction in total number of the accidents	- Supervisory Incensement in public transportation - Decrease in number of disabled drivers - Incensement in drivers' workability level - Incensement in control on the vehicle for the drivers - Traffic rules improvement helping the traffic safety - Traffic flow calming
Reduction in intensity of the accidents (death, injury, and liability)	- Incensement in drivers' workability level - Incensement in control on the vehicle for the drivers - Urgent services quality increase - Incensement in supporting the passengers
Reduction in total number of the accidents	- Improvement of the personal and public transportation safety

Table 2. Direct B-Cost

Direct B-Costs	
1	Machinery and damaged tools
2	Injuries costs – permanent disabilities are not included
3	Wasted time in accidents and wasted work hours of injured
4	Official costs (Courts, Police, Insurance)

Table 3. In-Direct B-Cost

Indirect B-Costs	
1	Death Cost
2	Permanent Disability
3	Sadness, mental injuries, indirect cultural and social costs for families

### 3. Results

According to the section 2 , it is needed to have the traffic and accident information as the input for the analysis. Pedestrian fatalities, injuries, compensation are the three types of accidents considered in this research. The data received from Traffic Police in Qazvin city for a year before and the year after application of FTP, Table 4 and Table 5.

Table Error! No text of specified style in document.. Pedestrian accidents in Qazvin, 2012 - source traffic police headquarter

Type of Accidents	Number of Accidents	Percentage
Fatality	18	0.159%
Injuries	512	57%
Compensation	607	43%

Based on the traffic police data set, total number of pedestrian fatalities in car accidents for 2012 was 18 that 3 of them killed in bicycle accident, the remain was between pedestrian and cars. The number of 15 fatalities will be used in this chapter as the number of fatalities for the year 2012.

Table 5. Pedestrian accidents in Qazvin, 2013 - source traffic police headquarter

Type of Accidents	Number of Accidents	Percentage
Fatality	2	0.237%
Injuries	483	56.65%
Compensation	363	43.11%

One of the biggest problems in developing countries, such as Iran, is lack of a centralized information management system. Because of this reason, in some cases, there is a difference between the accident reports provided by the traffic police and the health department. For Qazvin, the fact check has been done between health department and the traffic police statistical department and this problem solved.

### 3.1. FTP implementation cost

Implementation cost has great influence on cost-benefit analysis, because in most projects the main cost of the project is implementation cost. Table 6 presents the costs of implementation, installation and running the FTP in Qazvin. Teachers and executive costs are based on the contract value that traffic organization of Qazvin municipality signed with the contractor to handle the FTP. The total amount for two contracts is 2000 million Rials which is equal to \$57000.00. Furthermore, advertisement cost is also presented in Table 6.

Table 6. FTP implementation costs

Item	Cost of installation (USD)	Period
Advertisement	\$10,230.00	1
Teachers	\$46,365.00	1
Study and research	\$9,900.00	1
Total	\$66,495.00	

### 3.2. Cost-Benefit Analysis on FTP

To calculate the benefits and the costs, it is necessary to define what are the costs and benefits. Costs for FTP are the financial aspects to run the FTP in the city. Benefits are the type of financial costs must be paid by that if the FTP was not applied to the city. Section below calculates the benefits, however because it will be more understandable as a kind of cost nature benefit it called B-Cost.

The B-Cost considered in this research are divided into two parts, direct B-Cost and indirect B-Cost. The list of direct and indirect costs are presented in Table 7 and Table 8.

#### 3.2.1. Injuries B-cost

There are two major parts in this section that they are needed to explore more. The intensity of the injuries is the first part that needs more attention. Distribution of the intensity and its' costs need to be considered in different categories. The second part of this section is treatment costs for each category of the first part.

Rajai hospital is the only hospital that all the injured and fatalities of accidents are receiving treatment and services in

Qazvin city. In patient records of Rajai Hospital in Qazvin city, the minimum amount of payment for each patient is \$15.84 and the maximum is \$871.365 in 2013.

The total B-Cost of injuries is \$116,000.40. According to the researches have been done by Ayati the average death costs in accidents is 19 times more than the injuries cost [18]. This ratio includes the death on accident location, hospital and during the transfer to hospital. Also, injuries cost is 111 times more than the compensation costs.

Table 7. Direct B-Cost

Direct B-Costs	
1	Machinery and damaged tools
2	Injuries costs – permanent disabilities are not included
3	Wasted time in accidents and wasted work hours of injured
4	Official costs (Courts, Police, Insurance)

Table 8. Indirect B-Cost

Indirect B-Costs	
1	Death Cost
2	Permanent Disability
3	Sadness, mental injuries, indirect cultural and social costs for families

#### 3.2.2. Value of one hour wasted time

To assess the value of one hour wasted time, direct and indirect income of a family has to be considered as a reference. These two types of income are named monetary and non-monetary income. In Table 9, the monetary and non-monetary income of the families in Qazvin city are presented. The financial year of 2012-2013 is the reference of the numbers below.

Calculation of other types of costs is presented in Shabaniverki et al paper [17], so here the paper presents the total B-Cost. In the Table 10 each cost and the total B-cost of accidents in Qazvin are presented. Based on calculations and the total direct B-Cost the total deducted cost of accidents in Qazvin city in the study year is \$11,997,337.96. To address these questions, it is necessary to apply the method of benefit over cost ratio to see the influence of FTP on economy of Qazvin.

According to table 10 the total deducted cost in Qazvin because of the application of FTP is \$642,806.48 and cost of implementation is \$66,495.00. As a result, the benefit-cost ratio for Qazvin city is 9.67 which is more than one. The ratio of 9.67 describes the benefits of FTP are significantly more than the costs. As a matter of the fact, research questions 1, 3 and 4 are proved by this ration. Moreover, cost over benefit ratio of 10.3 shows, if accidents at least drop by 10.3 percent at the year of application, the FTP is feasible economically and the costs and benefits are equal.

In order to address research question regarding the influence of FTP on accident numbers, number of fatalities deducted by 16, injuries number deducted by 29, and number of compensation dropped by 244.

Table Error! No text of specified style in document.9. Monetary and Non-Monetary income of families in Qazvin

Income reference	Monetary Income	Non-Monetary Income
Salary base jobs	\$1,085.44	\$181.94
Self-Employment	\$662.01	\$5.86
Non categorized	\$976.50	\$1,453.59
TOTAL	\$2,723.95	\$1,641.39

Table 10. Total indirect B-Cost

Type	Cost	Percentage
Injuries Treatment	\$116,000.40	18.05%
Wasted Time of Injuries	\$927.56	0.14%
Temporary Disabilities	\$18,345.85	2.85%
Wasted time value for those were not involved directly	\$14,795.64	2.30
Deaths, permanent disability, sadness, mental illness	\$321,428.25	50.00%
Equipment and destroyed tools	\$159,357.00	24.79%
Official costs	\$11,951.78	1.86%
Total	\$642,806.48	100%

#### 4. Conclusion

To provide for the possibility that FTP could be perceived and measured as a significant component of traffic safety in mid-size cities in Iran, it was important to develop a model with the ability to apply in most of the similar cities with the same characteristics encompassing the costs and benefits of such new method for them.

FTP was suggested by the author to city council and after budget approval, transportation deputy of Qazvin municipality run the project. FTP teachers, Aber Yar, participated in educational classes in order to have the same level of knowledge regarding the traffic safety issues in Qazvin, specially about pedestrians. The total FTP duration per year was two months, which held into two peak months of traffic.

The relative degree of importance of field training of pedestrian, FTP, as rated by Qazvin inhabitants determined in response to research problems. One of the main problems that FTP could overcome was the number of pedestrian accidents in Qazvin.

Cost-benefit analysis on FTP application in Qazvin included different aspects of accident costs. Calculation of fatalities cost, injuries cost, compensation cost and indirect cost are some of them. According to the results the total deducted cost in Qazvin because of the application of FTP is \$642,806.48 and cost of implementation is \$66,495.00. As a result, the benefit-cost ratio for Qazvin city is 9.67 which is greatly more than one.

#### 5. Recommendations

The following recommendations are offered for related research for developing FTP in similar cities in Iran or other developing countries.

1. Given the changing standards of road design, urban planning and technology, a chain of studies, based on this paper, would document a series of cities changing their pedestrians' behavior. Thereby the potential that decisions regarding the changes in traffic rules, laws in cities would be relatively current and less exposed to personal or local bias.
2. While the current method, FTP, changes the pedestrian's behavior and reduce the pedestrians' accidents costs, another research can also study about influence of FTP on drivers. During the application of FTP it was observed that drivers feel less stress at intersections and they are more satisfied of new experience as a driver. Measuring the stress factor at intersections before and after FTP for drivers can be a topic of research.
3. Cultural and behavioral change happens gradually during the time, hereby the author recommends the researchers to research about different criteria of cultural and behavioral changes that can influence on traffic safety in developing countries. Given that this study provides a basis for concluding that FTP is a pedestrian organizer which can help the city managers to manage their city in a safe manner. For sure, there is cost of implementation for most of the studies and pilots, meanwhile the benefits in long time are remarkable as results of this paper prove.

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