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Evaluation of Pedestrian Bridges and Pedestrian Safety in Jordan

Mohammad Abojaradeh*, Ph.D., P.E.
Faculty of Engineering, Department of Civil Engineering, Zarqa University,
P.O. Box 2000, Zarqa 13110, Jordan Tel: 00962-5-3821100
*E-mail: abojaradeh@yahoo.com

Abstract
Car accidents represent a major problem in Jordan. It is the second major cause of death. More than 30% of all car accidents in Jordan involve pedestrians, a percentage considered very high compared to other countries such as the UK and USA.
The main objectives of this study are to collect data, analyze, and evaluate the pedestrian bridges and pedestrian safety in the greater Amman area. In addition, to develop regression prediction models that relate the percentage use of pedestrian bridges with possible factors that affecting the use of pedestrian bridges.
A sample of pedestrian bridges and tunnels were chosen for this study. Detailed data were collected from the location of each pedestrian bridge. The collected data was analyzed and used in forming the regression models. Several regression prediction models were formed and the best models were chosen. Also, a questionnaire survey was prepared and distributed to a random sample of pedestrians at the selected locations. Also, personal one-to-one interviews were conducted to collect more data from a random sample of pedestrian on the selected sites in order to study the pedestrian behavior and attitude in the area of a pedestrian bridge. It was concluded that pedestrian bridges have a positive impact and have great potential of reducing number of pedestrian fatalities. The main factors that affecting the use of pedestrian bridges are: the posted speed limit, the overall width of the cross walkway, and the existence of median barrier.

Key Words: Pedestrian Safety, Pedestrian Bridges, Traffic Accidents, Traffic Safety, Regression Models, Amman, Jordan.

1. Introduction

It is known, worldwide, that the importance of the traffic safety is not less than other issues in our life, since it comes in third place of peoples' death after cancer and the cardiac disease. The world faces today the big challenge of traffic accidents that harvest annually millions of human lives. The consequences of these traffic accidents do not only affect the victims or their families, but extend to the impact the community and its progress.

Highway safety is a worldwide problem. With over 500 million cars and trucks in use, the World Health Organization WHO reported that the world loses over 1.2 million people annually and 50 million are injured because of motor vehicle crashes. The estimated economical loss of more than US$ 500 billions (WHO 2010). In the United States, motor vehicle crashes are the leading cause of death for people between the ages of 1 to 34 years and rank third as the most significant cause of potential life lost, after cardiac disease and cancer (NHTSA 2010).

The four main components of the highway mode of transportation are the driver, the pedestrian, the vehicle, and the road. To provide efficient and safe highway transportation, knowledge of the characteristics and the limitations of each of these components are essential (Garber 2008).

1.1 Traffic Safety in Jordan

Car accidents represent a major problem in Jordan. It is the second major cause of death. More than 33% of all car accidents fatality in Jordan involves pedestrians, a percentage considered very high compared to other countries such as the UK and USA. Jordanian Public Safety officials state that on average two people are killed and fifty more are injured in 380 road accidents each day. There are no signs that these numbers will decrease; on average, fatalities of

car accidents increase 7% every year (JTI 2010). Jordan, as one of the developing countries, has high level of traffic accidents. In Jordan, traffic accidents have caused more than 11000 fatalities and more than 200 thousands injured or disabled between the years 1989-2010 (PSD and JTI 2010). The economical and industrial rise that spread rapidly all over the country in the past recent years directly contributed in this problem. The number of cars rapidly increased, that led to directly increasing accident frequency and severity. Every year especially in the summer many tourists and Jordanians come to the country causing an overload on the traffic services offered on inner and outer city roads. That itself causes a rapid increase in fatal accidents and serious economical and social and health related issues.

Jordan is considered one of the leading countries in their yearly accidents rates. The average world fatality rate per 10000 vehicles is equal to19. The modern country fatality rate is equal to 2. The fatality rate in Jordan was above 13 fatalities/ 10000 vehicles in the past 10 years from 1999-2008. Annual accident cost in Jordan is more than 300 million JD, which represents more than 3.0 % of the Grand Domestic Product (GDP) as shown in Table 1.

Some statistics data of population, number of vehicles, accident frequency, and severity growth between the years 2001-2010 are presented in Table 1.

1.2 Definition of Pedestrian Bridge

Pedestrian bridges are structures made for allowing pedestrians to cross a street/road/highway without being exposed to the risks of car accidents. A pedestrian bridge is any structure that removes pedestrians from vehicle roadway. This creates a road junction where vehicles and pedestrians do not interact. These structures can be located either above the roadway (overpass such as pedestrian bridge) or below the roadway (underpass such as tunnel) (Wikipedia 2012).

1.3 Pedestrian Underpasses and Overpasses

These special pedestrian facilities are generally warranted only at locations where exceedingly heavy volumes of pedestrian traffic must cross a heavy vehicular flow. Factories, large sports arenas, and school are places where such forced conditions usually exist.
An underpass or overpass should be constructed when the problem cannot be solved in simpler and more economical manner (TEH USA 2008).
Assuming the needs exists, decision as to whether to use an overpass or underpass is generally determined by the physical layout of the area. Overpasses have certain advantages over underpasses in that they can usually be constructed for considerably less money. Sewers, water mains, utility conduits, often complicate excavating work for underpasses. Often underpasses require lighting, forced ventilation, and drainage (TEH USA 2008).

1.4 Pedestrian Safety in Jordan

Pedestrians are the largest group of road-users, they represent a high-risk group in road traffic, and their proportion of road casualties is too high. Therefore, pedestrian safety is seen as a major area of concern in all countries. Every 24 hours, 11 pedestrian accidents occur in Jordan. Pedestrians are most susceptible, representing 70% of traffic fatalities in most developing countries. Over 30% of car accident fatalities in Jordan are pedestrians, especially children under the age of 15 . Pedestrians represent a high-risk group in road traffic and their risk of walking in terms of deaths per kilometers traveled is about 10 times risk greater than travel by car. Although pedestrian accidents recorded (2.9%) from the total number of accidents resulted in (32.5%) from the total number of fatalities and (23.8%) from the total number of injuries (JTI 2010). Pedestrians are more at risk in the day, between (12 pm- 4 pm), occurring more abundantly on Thursday than any other day. Amman has the highest number of pedestrian accident , 4028 out of the 4091 pedestrian accidents that occurred in 2010 happened in clear weather, while only 12 happened in foggy weather.We also found that the majority of pedestrian accidents happen on dry roads, (3292 from 4091) and in the daylight (3702 out of 4091) (JTI 2010). Pedestrian accidents normally involve passenger cars. However,

considerable numbers of accidents involved heavy goods vehicles. Pedestrians walking on the road make up the majority of casualties in pedestrian Accidents followed by pedestrians walking on the sidewalk. Main cause of pedestrian accidents is error of the driver. That includes not respecting pedestrian priority, lack of attention, intoxication, speed, and disregarding crosswalks. More than 50% of pedestrian accidents are caused by cars driving at 40 mph. Pedestrian accidents can also be caused by error of the pedestrians, such as lack of attention, ignoring traffic controls, ignoring crosswalks and pedestrian bridges, lack of awareness or caution. Children in Jordan are at a high risk of being injured in car accidents. Fatality rate of this group is 3-4 times higher than in the industrialized countries. The highest rate of pedestrian deaths are within the age group (3-5) years, and formed (18.8%) of the total pedestrian deaths overall .Children are the most effected by pedestrian car accidents because of many things, such as having more difficulty in judging speed and distances than adults, are less likely to be spotted by a driver because of their height, they have poor understanding of the use of the roadway and the installed traffic control devices, and their conception and perception of traffic situations is not always well developed (JTI 2010). Approximately 50% of children in Jordan walk to school. Forty percent of children walking time are on the road and not on the pavement . On average, they need to cross two junctions. Children walking to school in lower income areas are more likely to be involved in a crash than higher income areas. They tend to walk in-groups and are at a high risk of being involved in traffic conflicts. The role of pedestrian bridges is not being fully implemented, because over 60% of pedestrians choose not to use pedestrian bridges for varied reason. Females use it more than males and children more than adults do. Reasons for not using the bridge include the discomfort and waste of time of extra walking distance, the high stairs, health reasons, or fear of safety (JTI 2010).

2. Study Objectives

The main objectives of this study in order to improve pedestrian safety in Jordan are:
1- To collect data, analyze, and evaluate the pedestrian bridges and pedestrian safety in the greater Amman area.
2- To develop regression prediction models that relate the percentage use of pedestrian bridges, as a dependent variable, with possible factors that affecting the use of pedestrian bridges, as independent variables.
3- To propose effective countermeasures to reduce the frequency and severity of pedestrian accidents in Jordan.

3. Study Area

This study focuses on major streets in western Greater Amman Municipality. The study area includes the following major streets: Prince Rania Al-Abdullah Street (Al-Jam'a Street), Al-Madina Almonawara Street, Airport road, Al-Zarqa Autostrad Street and Abdullah Ghosheh Street. The data from ten pedestrian bridges were collected and analyzed in the study area.

4. Study Methodology

A sample of pedestrian bridges and tunnels were chosen for this study to determine their advantages, and their impact on the number of pedestrian-related car accidents. Also, the most dangerous crosswalk locations were selected to do the study. A questionnaire survey was prepared and distributed to a sample of pedestrians at the selected and most dangerous locations in larger Amman area. In addition, personal one-to-one interviews were conducted to collect more data from a sample of pedestrian on the selected sites in order to study the pedestrian behavior and attitude in the area of a pedestrian bridge. Statistical data about pedestrian accidents were collected from the Department of General Statistics in Jordan DGS, Jordan Traffic Institute JTI, Greater Amman Municipality GAM, and from the Public Security Directorate PSD.

Field data from the sample pedestrian bridges were analyzed and used in forming the regression prediction models. These regression models relate the percentage use of pedestrian bridges, as a dependent variable, with possible factors that affecting the use of pedestrian bridges, as independent variables. Several regression prediction models were formed and the best models were chosen.

5. Results and Analysis

The collected data were analyzed and used in the predicted regression models. Several regression prediction models were formed and the best models were chosen.

5.1 Statistical Model Formation

SPSS (Statistical Package for Social Sciences) software was used in forming the regression models in this study. SPSS is considered one of the most frequently used program for researchers in many fields such as engineering, science, art, education, and psychology.
The method of least squares that leads to the best fitting line of a postulated form to a set of data is used to form regression models between the dependent variable Yi, and independent variables Xi. In this study, the dependent variable Yi = the percentage use of the pedestrian bridges. On the other hand, the independent variable Xi includes the possible factors that affect the percentage use of the pedestrian bridge. The detailed factors are shown in Table 2. The detailed collected data in the study area are shown in Table 3.
A relationship between the dependent and the independent variables usually take the following form:

$$Y_i = ß_0 + ß_1X_1 + ß_2X_2 + \ldots + ß_n X_n \quad (1)$$

This relationship is known as a multiple linear regression model.

5.2 Interpretation and Selection of the Best Regression Model

Stepwise calibration procedure was used to form the Multiple Linear Regression Model. The selections of explanatory variables follow the following four guidelines to decide which explanatory (independent) variables to include in the linear regression model. The selected independent variable has to follow the following four rules:

1. Must be linearly related to the dependent variable.
2. Must be highly correlated with the dependent variable.
3. Must not be highly correlated between themselves.
4. Must lend themselves to relatively easy projection

The selected regression model has to have maximum 3 to 4 variables in order to have an easy projection and application, and in order to have a lower cost. Also, the selected regression model should have strong coefficient of determination R^2 value.
The coefficient of determination R^2, quantifies the fact that the goodness of fit of a regression line increases with the proportion of the total variation that is explained by the regression line. R^2 ranges from zero when none of the total variation is explained by the regression line to unity when all of the variation is explained by the line. It is denoted as a squared quantity to capture the fact that it is always non negative. The square root of R^2 the Coefficient of determination is called the coefficient of correlation (r or R). Its value can range from -1 to 1. In the case of linear regression the sign of R is the same as the sign of the slope of the regression line. When R is near 1, there is a high positive correlation between x and y. when R is near -1, there is a high negative correlation. If R is around zero, then there is no correlation between x and y.

5.3 Prediction Regression Models for All Pedestrian Bridges in the Study Area

The dependent variables Yi = the percentage use of the pedestrian bridges
The independent variables Xi include the possible factors that affect the percentage use of the pedestrian bridge. All these variables are shown in Tables 2 and 3.
A sample of the SPSS software output are shown in Tables 4 and 5. Table 4 shows the analysis of variance statistics ANOVA for the best model. On the other hand, Table 5 shows the correlation matrix between all the variables. The Y variable is highly correlated with X5 then X3 then X2 then X1 then X6 and lastly X4. Table 6 shows all the best regression models with the coefficient of determination R^2 and the adjusted R^2 and the F test value. Model number 3 is the best model with the highest value of adjusted R^2, and F value. Model 3 relates the percentage use of the pedestrian bridges with the existence of median barrier. The second best model is model number 2, which relates

the percentage use of the pedestrian bridges with the width of the cross walkway. The third best model is model number 1, which relates the percentage use of the pedestrian bridges with the speed on the street. The fourth best model is model number 6, which relates percentage use of the pedestrian bridges with the existence of median barrier and the speed on the street. Other models are good models. The best regression model by using the stepwise method is model number 3 of the following form:

$$Y = 74.25 + 24.417X_5 \quad (2)$$

6. Results of the Questionnaire and Personal Interview

A questionnaire survey was prepared and distributed to a sample of pedestrians at the selected and most dangerous locations in western Amman area. In addition, personal one-to-one interviews were conducted to collect more data from a sample of pedestrian on the selected sites in order to study the pedestrian behavior and attitude in the area of a pedestrian bridge. Table 7 shoes the summary of the questionnaire results as an average from all the pedestrian bridges sites. The Arabic version of the questionnaire was distributed to the sample population in the study area. A translation to English language of the questionnaire is presented here as shown in Table7.

The following results were drawn from the questionnaire and from the one-to-one interview of the random sample of pedestrian:

1- tunnels (underpass) are preferred over the overpass bridge
2- pedestrian bridges increase the pedestrian safety
3- pedestrian education and awareness of the benefits of using the pedestrian bridges plays a vital role in pedestrian safety
4- Jordan traffic institute JTE plays an important role in the education and the awareness of the public
5- The parents can help in educating their children and helping in increasing pedestrian safety
6- Enforcement should be applied on violated pedestrians in order to force them to comply with the pedestrian laws and rules
7- there should be effective laws and rules for the people who do not use pedestrian bridges\tunnels specially in dangerous locations
8- Driver awareness can help in increasing pedestrian safety
9- Using the pedestrian bridge is preferable on using the regular cross walks
10- The most important factors that encourage pedestrians to use the pedestrian bridges are:
    a- the existence of median barrier
    b- the type of the pedestrian bridge
    c- the existing vehicle speed on the roadway
    d- the crossing width of the roadway
    e- the traffic and vehicles volume on the street
    f- the type of pedestrian bridge overpass or underpass
    g- the pedestrian bridge is covered or not
    h- the enforcement on using the pedestrian bridge

7. Conclusions

The following conclusions are withdrawn from this study:

1- The pedestrian bridges have a positive impact and have great potential of reducing number of pedestrian fatalities.
2- The main factors that affecting the use of pedestrian bridges are: the posted speed limit, the overall width of the cross walkway, and the existence of median barrier.
3- Results of the analysis revealed that the main causes of pedestrian accidents are: factors related to the pedestrian, such as ignoring traffic controls and crossing at inappropriate locations, and disregard of caution. On the other hand, factors related to the driver are more common, such as speeding, disregarding

crosswalks and violation of traffic control devices. Effective countermeasures were proposed to reduce the frequency and severity of pedestrian accidents in Jordan.

4- The focus in this study was to resolve the serious problem that is threatening our people lives, and causing major economical and social concerns in this country.
5- The role of pedestrian bridges is not being fully implemented, because over 60% of pedestrians choose not to use pedestrian bridges for varied reason. Females use it more than males and children more than adults do.
6- Reasons for not using the bridge include the discomfort and waste of time of extra walking distance, the high stairs, health reasons, or fear of safety.
7- The addition of cross walks/pedestrian bridges next to schools decreases injuries to children by car accidents drastically.
8- The number of pedestrian car accidents will not decrease unless we take drastic action. The government should make schools safer and dangerous roads and highways easier to get across.
9- Pedestrian bridges overpasses are appropriate when there is high speed and/or high traffic flow, where there is considerable pedestrian delay or a high pedestrian accident problem. Proper evaluation of these parameters can help in identifying the most appropriate locations for installing pedestrian bridges. An economic analysis is proposed for the purpose of reasonable evaluation of the required parameters that justify the installation of such costly structures.

8. Recommendations

The following recommendations are needed to improve pedestrian and traffic safety in Jordan:

1. It is recommended to improve the driver and pedestrian behavior through the following:
   a. Increase enforcement
   b. Education and awareness for drivers and pedestrians
   c. Increase the role of the Police Friends and the Secret Police
   d. Use high technology surveillance of driver behavior such as using stationary and moving radars and cameras.
   e. To have a daily news report through the T.V. and Radio stations about the daily traffic accidents, and to show the human losses and the injuries caused by these accidents, also to talk about the social and financial losses that can result.
   f. To force drivers and pedestrians who repeat traffic violations to attend training courses concerning traffic laws and regulations.
   g. To increase the penalties for violation of traffic laws and rules
   h. To start educating our children in schools about traffic safety rules and regulations. Also, encourage the students at university level to take traffic safety course.
   i. To encourage drivers to drive defensively and to obey traffic rules and regulations in all circumstances.
   j. To increase the number of traffic police patrols on the most hazardous and dangerous streets and intersections.
2. Widen the study area to include most areas inside Greater Amman Municipality, and to include more variables in the regression models. A comprehensive study is needed.
3. To have more collaboration and coordination between all traffic and transportation agencies to improve traffic safety and achieve the goal of reducing traffic accidents frequency and severity.
4. The urgent need to adopt and implement a practical traffic safety strategy that has clear targets, objectives, action plans, time frame, and legislations.
5. The time has come to establish the Jordan National Traffic Safety Council to take its role in handling all the traffic safety issues in Jordan.
6. The most dangerous locations (black spots) must be determined and the most effective countermeasures must be proposed to enhance the pedestrian safety in Jordan

10. Traffic safety education in Jordan is in urgent need of proper attention. The role of the school should be over emphasized. Parents are currently the main source of information for their children. These Parents should be educated in traffic safety issues to relay the right message to their children.
11. Planners should be aware of pedestrian needs and behavior in traffic. This knowledge will guide them to provide safe pedestrian facilities.
12. Importance of using pedestrian bridges should be addressed. It should be an obligation to use them.

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Mohammad Abojaradeh Ph.D., P.E., a Ph.D. graduate of Arizona State University USA in 2003, who got his Master degree from Jordan University in 1997, and his bachelor degree from Kuwait University in 1985. He is specialized in Transportation, Traffic, and Highways. His major research interests are in the performance and improvement of Pavement materials, Traffic studies and Traffic and Pedestrian safety, Highway Engineering Studies, and in Transportation Engineering Studies.

Table 1. Statistics Data for Population, Vehicles, and Accident in Jordan between the Years 2001-2010 (Source: Jordan Traffic Institute 2010)

Description	Year									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Accidents	52622	52913	62115	70266	83129	98055	110630	101066	122793	140014
Fatalities	783	758	832	818	790	899	992	740	676	670
Injuries	18832	17381	18368	16727	17579	18019	17969	13913	15662	17403
Registered vehicles	509832	542812	571498	612330	679731	755477	841933	905592	994753	1075453
*Inhabitants (million)	5.182	5.329	5.480	5.350	5.473	5.600	5.723	5.850	5.980	6.113
Accident per day	144.3	145	170	192.5	227.8	268.6	303.1	276.89	336.4	383.6
Fatality per day	2.1	2.1	2.3	2.2	2.2	2.5	2.7	2.03	1.9	1.8
Injury per day	51.6	47.2	50.3	45.8	48.2	49.4	49.2	38.12	42.9	47.7
Accident per 10,000 vehicles	1032.9	974.8	1086.9	1147.5	1223	1297.9	1314	1116.2	1234.4	1301.9
Fatality per 10,000 vehicles	15.4	14	14.6	13.4	11.6	11.9	11.8	8.17	6.8	6.2
Injury per 100,000 vehicle	369.4	320.2	321.4	273.2	258.6	238.5	213.4	153.63	157.4	161.8
Fatality per 100,000 population	15.1	14.2	15.2	15.3	14.4	16.1	17.3	12.65	11.3	11.0
Injury per 100,000 population	363.4	326.2	335.2	312.6	321.2	321.8	314	237.83	261.9	284.7
**Severity rate	0.37	0.34	0.31	0.25	0.22	0.19	0.17	0.14	0.13	0.13
***Financial costs (million JD)	160	170	190	202	220	258	281	245	258	311

*The Hashemite Kingdom of Jordan Department of Statistics
** Number of injuries and fatalities divided by number of accidents
***Financial cost according to study of traffic accident cost in Jordan

Table 2. Independent variables: Factors affecting the percentage use of pedestrian bridges

Variables	Independent Variables
X1	Traffic Hourly Volume (Vehicle/Hour)
X2	Posted Speed Limit (Kilometer/Hour)
X3	The overall width of the cross walkway (Meter)
X4	Type of Pedestrian Bridge/ Tunnel, X4=1 for tunnel, X4=0 for regular overpass pedestrian bridge
X5	The existence of Median Barrier, X5=1 for median barrier, X5=0 for no median barrier
X6	The Pedestrian Bridge is covered or not, X6=1 for covered, X6=0 for uncovered

Table 3. Collected Data for Dependent and Independent Variables

Bridge name	Y	X1	X2	X3	X4	X5	X6
Sweelih	97	6186	60	30	0	1	1
Al-Mahkamah	65	6171	50	20	0	0	0
Majdi mall	78	4802	50	20	0	0	0
University tunnel	100	8092	70	30	1	1	1
Agriculture college	100	9866	70	30	0	1	0
University hospital tunnel	100	6640	70	30	1	1	1
Al-dostor	69	6984	50	20	0	0	0
Al-Ra'ae	85	6965	50	25	0	0	0
Ministry of Agriculture	100	10024	70	35	0	1	0
Mukhtar Mall	95	10445	70	35	0	1	0

Table 4. ANOVA Statistics for the Best Regression Model

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1430.817	1	1430.817	43.019	.000[a]
	Residual	266.083	8	33.260		
	Total	1696.900	9			

a. Predictors: (Constant), X5

b. Dependent Variable: Y

Table 5. Correlation Matrix for all Variables

Correlations

		Y	X1	X2	X3	X4	X5	X6
Y	Pearson Correlation	1	.559	.888**	.896**	.426	.918**	.508
	Sig. (2-tailed)		.093	.001	.000	.220	.000	.134
	N	10	10	10	10	10	10	10
X1	Pearson Correlation	.559	1	.732*	.773**	-.069-	.624	-.233-
	Sig. (2-tailed)	.093		.016	.009	.849	.054	.518
	N	10	10	10	10	10	10	10
X2	Pearson Correlation	.888**	.732*	1	.901**	.477	.952**	.393
	Sig. (2-tailed)	.001	.016		.000	.163	.000	.261
	N	10	10	10	10	10	10	10
X3	Pearson Correlation	.896**	.773**	.901**	1	.224	.913**	.293
	Sig. (2-tailed)	.000	.009	.000		.535	.000	.412
	N	10	10	10	10	10	10	10
X4	Pearson Correlation	.426	-.069-	.477	.224	1	.408	.764*
	Sig. (2-tailed)	.220	.849	.163	.535		.242	.010
	N	10	10	10	10	10	10	10
X5	Pearson Correlation	.918**	.624	.952**	.913**	.408	1	.535
	Sig. (2-tailed)	.000	.054	.000	.000	.242		.111
	N	10	10	10	10	10	10	10
X6	Pearson Correlation	.508	-.233-	.393	.293	.764*	.535	1
	Sig. (2-tailed)	.134	.518	.261	.412	.010	.111	
	N	10	10	10	10	10	10	10

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6. The best Predicted Regression Models

Model Number	Regression Model	R^2	Adjusted R^2	F Test
1	$Y=14.12+1.23X_2$	0.788	0.762	29.8
2	$Y=31.48+2.09X_3$	0.803	0.778	32.6
3	$Y=74.25+24.42X_5$	0.843	0.824	43.0
4	$Y=20.14+0.59X_2+1.19X_3$	0.837	0.791	18.0
5	$Y=64.25+0.2X_2+20.75X_5$	0.845	0.801	19.1
6	$Y=57.1+0.81X_3+16.0X_5$	0.863	0.824	22.1
7	$Y=55.3+0.01X_2+0.8X_3+15.4X_5$	0.863	0.795	12.6

Table 7. The overall Result Summary for the Study Questionnaire

Question	strongly agree	agree	some times	disagree
1-do you usually use pedestrian bridges\tunnels?	34.4	34.9	23.1	7.6
2-do you think that the location of the pedestrian bridge is in a suitable place?	37.2	38.1	19.3	5.4
3-do you use pedestrian bridges\tunnels in peak hours?	37.6	38.5	16.8	7.1
4-do you find a difficulty from using pedestrian bridges\tunnels?	22.6	21.7	18.3	37.4
5-is there any other alternative to cross the street besides the pedestrian bridges\tunnels?	37	34.4	20	8.6
6-do you think that people of all ages use pedestrian bridges\tunnels?	24.8	28	26.5	20.7
7-does the median barrier force people to use pedestrian bridges\tunnels?	38.5	36.2	19	6.3
8-does the crossing width of the street play a part in using pedestrian bridges\tunnels?	33.8	39.6	20.1	6.5
9-do you think there is enough traffic awareness?	31.7	32.3	20.3	15.7
10-do you prefer using the cross walkway over pedestrian bridges\tunnels.	27.9	25.9	19.5	26.7
11-do you think pedestrian bridges\tunnels reduced pedestrian accidents.	39.5	33.2	19.6	7.7
12-do you think education has a part in reducing pedestrian accidents.	32.3	35.8	21.9	10
13-do you think the classes given by the Jordan Traffic Institute help reduce pedestrian accident?	31.5	36.3	21.7	10.5
14-do you think parents have a part in reducing pedestrian accidents?	33.8	35.8	24.2	6.2
15-do you think there should be a punishment for anyone who doesn't use pedestrian bridges\tunnels in order to reduce pedestrian accidents?	25	30.4	29.8	14.8
16-do you think driver awareness may help reduce pedestrian accidents.	32	35.1	22.2	10.7
17-have you ever attended a class about pedestrian accidents awareness?	24.9	24.7	13.2	37.2
18-do you think there are enough pedestrian bridges and tunnels in Jordan?	31.6	31.9	17.9	18.6
19-do you think traffic volume increases pedestrian accidents?	37.1	32.9	21.5	8.5
20-do you think there should be effective laws and rules for the people who do not use pedestrian bridges\tunnels in dangerous areas?	30.1	32.1	18.3	19.5

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