

Determination of Effective Travel Variables on Air Transport Demand with Using Structural Equation

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Abstract

Air transport system has always been involved in all aspects of life because of its high potential in transporting passengers and goods. In this research we surveys the effects of travel variables on demand of domestic air transport, and for gathering required information from passengers, a questionnaire was designed including 20 effective parameters on air transport demand with questions. These parameters were investigated based on their importance using "Factor Analysis" and finally proved that the factors "price paid by passengers", "services offered by air transport system" and "time" has had the greatest impact on air transport demand with more than 20 % influence. "Structural Equation Modeling" has been used for checking the "Factor Analysis" results. The results of the model proved the correctness of factor analysis. Furthermore, the result of factor analysis has showed that the most important parameter has been "low cost travel" with the factor load of 0.9-1 in all case studies. Results show that both groups with factor load of more than 0.5 in the obtained factors have identified the factor "services" as the important and effective factor with the influence value of more than 20%.

Keywords: Air transport, transport demand, factor analysis, structural equation, travel variable

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1. Introduction

Increased development of technology in new era has made human society needy for equipment through time and costs saving. Meanwhile requirement of fast vehicles which delivers passengers to their destination at shortest time is felt more day by day. Among all transport systems including road transport, rail transport, and marine transport etc. air transport system performs a special place in transport of a country due to high speed of movement, decreasing journey time because of coping with lows and heights and moving high volume of passengers on one journey. One of the contemporary concerns of politicians is to increase rate of income and consequently increasing rate of car ownership and consequently increasing journeys with private transport [Bass, Donoso, Munizaga, 2011].

An air transport system may offer services to many environs cities. Enabling high number of flight and delivering passengers helps air transport system to exhibit its high level of communication to all. Enough volume of passenger demand plays the role of heart and spinal column of a network. Thus, knowing this point that an origin-destination travel network has got how much demand is essential because of preventing high operation costs [Safarzadeh and Naseralavi, 2009 & Goedecking, 2010]. Among significant factors in increasing or decreasing these demands, the factors like level of services, economic costs and delays in travel can be mentioned. Disruptions in travel time cause disturbing stuff duties and users of this system; in a way that with increasing disruptions, we can see a decrease in passenger demand rate [Sherry, 2015].

This article intends to recognize effective factors in attraction or repulse of different social classes of air transport system passengers with investigating effective factors on travel variations including: “number of journeys with air transport system”, “type of journey” (business, recreational, emigration etc.), “required distance from origin to destination to use air transport system” and finally “payment method of air transport system.

2. Literature Review

A need to anticipate number of passengers is very important to help short-term and long-term management decision making. Long-term anticipation of demand is helpful for planning infrastructures of airport industry and air navigation services and also designing and ordering new fleet.

Furthermore, being able to anticipate short-term fluctuations in demand process allows development of strategies to deal with demand instability in air transport and also the occurrence of flight delays [Scarpel, 2014]. Economic theories show that the economic growth of a transport system is related to different factors such as rate of demand in order to carry out job affairs, recreation and tourism affected by family and style of living [Bieger et al. 2007].

Xiao et al. carried out some researches about approaches of increasing demands which showed in order to maximize airport capacities and suitable construction of infrastructures, improvement of accommodations and passengers' demand are very important [Xiao et al. 2013].

Barnhart et al. has carried out a research about management of air transport demand and improving the capacity. He has proceeded to describe a number of functions to improve effective factors in order to increase demand capacity [Barnhart and Fearing, 2012]. Yang and Fu carried out a research about comparison of big airlines and small airlines in the field of demand reduction. Yang stated in his research that smaller airlines due to easier supervision and better welfare and transport services have more demands in comparison with big airlines [Yang and Fu, 2015].

Lieshout et al. carried out a research about liberalization of the intra market by government based on intensity of competition among airline companies. It can be attributed to low-cost business model (a model that we can make the maximum profit out of minimum cost) [Lieshout, Malighetti, Redondi, Burghouwt, 2015]. Kopsech carried out a research about analyzing demands for air travels in Sweden. The results showed that recreational air

passengers show more sensitivity than business travel passengers [Kopsch, 2012].

Rolim carried out a research in Sao Paulo international airport and through a linear regression; they surveyed effects of transferring airports from public sector to private sector on air passenger demands. The results have proven that privatization results in making the air journeys expenses reasonable and consequently increases demands up to a maximum value [Rolim, Bettini, Oliveira ,2016].

Scotti and Dresner carried out a research about assessment of increasing baggage fee on air passenger demands. Results proved that increasing baggage fee as much as 1 \$ results in losing 0.7% of passengers and a one-dollar-increase in fares results in more reduction of profit up to about 8x [Scotti and Dresner, 2015]. Lupo carried out a research for assessing of service quality of air transport system in one of the international airports of Cecil. Results proved that several effective parameters of service factor play the main role in increasing demands [Lupo, 2014].

Liu carried out a research about increasing efficiency of air transport systems in Pekan and Shanghai Airports and proved that increasing quality of airport services has a positive effect on increasing the amount of demand attraction that leads to improve by economic efficiency of airports [Liu, 2016]. Beria and Laurino, carried out some researches in Milan, Italia about the effect of holidays and important events on variations of air transport. The results showed that some events has had a significant impact on increasing amount of passengers; in a way that in some cases has caused a 20-percent increase in this amount[Beria and Laurino, 2016].

In 2015, Jani carried out a research about effects of delays or cancellation of flights. The results proved that cancellation or delays of flights leads to extra expenses for passengers and as a result reduction of air transport

passenger demands [Janic, 2015]. Most of the studies in the field of transportation emphasize on specific technical items. In studies about ground transportation safety problems are more concerned, or in air transportation the focus is mostly on planning and management problems [Saffarzaedeh and Naseralavi, 2009]. As it was shown in this part, passenger’s features and comments and the trip’s specifications are less noticed. Thus, in this study the effects of passenger’s features and their trip on the transportation demand are studied. This topic has been important in developing countries in recent years because of the slow growth rate of number of domestic flight passengers.

3. Research Methodology

Factor Analysis is a very useful technique of linear algebra used for Dimensional reduction of calculations. Furthermore, it is used for compacting data and limiting data set with high dimensions. This method tries to convert main variables to smaller groups of derivatives which have a strong linear relationship. Using several methods of analyzing data such as main variable analysis and factor analysis not only can identify some viewpoints about existing patterns in data, but also may present different results in comparison with previous imagery [Anand, 2014], to prove the correctness of extracted results from Factor Analysis, the final model has been designed with structural equation modeling. In the research ahead, at first step, important factors on the amount of air transport demands have been specified with the aid of questionnaire method. For determining the important factors by surveying different references, more than 20 factors were determined that fifteen of them were briefly introduced in table 1.

Table.1 the fifteen factors obtained from Literature Review

Row	Factors	Reference
1	Safety during the flight	[Bieger, Wittmer, Laesser. 2006]
2	Additional costs	[Rolim, Bettini, Oliveira ,2016]

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3	Harmonizing departure time and reaching to destination	[Lieshout, Malighetti, Redondi, 2015]
4	Having better flying services	[Lupo, 2014]
5	Departure time of airlines	[Lupo, 2014]
6	Time of flight or distance from origin to destination	[Yang, Fu, 2015]
7	Cancellation of flight	[Barnhar, Fearing,2012]
8	Low travel costs	[Beria, Laurino, 2016].
9	Having better ground services	[Yang and Fu, 2015]
10	Importance of using air transport system	[Barnhart, Fearing, 2012]
11	Using charter tickets	[Rolim, Bettini, Oliveira ,2016]
12	Personnel good greeting	[Kopsch, 2012].
13	Having no delay	[Janic, 2015]
14	Low ticket cost	[Beria,Laurino, 2016]
15	Suitability of cargo transport and commute	[Liu, 2015]

Twenty parameters have been identified as effective parameters on air transport demands with investigating literature and interviewing with professors and experts. Based on the identified factors, a questionnaire was designed and was distributed in limited number among the target statistical societies. Stability of questionnaire is calculated based on Cronbach's alpha coefficient with SPSS. To investigate the content validity of questionnaire, it was referred to experts' opinions. Structural validity of questionnaire was also proved with Factor Analysis Method with SPSS. In next step, the number of needed questionnaires was determined based on the size of statistical societies by using Cochran Formula and the questionnaire were distributed among statistical societies. Then, data were studied with Exploratory Factor Analysis method to find out effective factors on air transport demand based on different travel variables. Extracted factors are presented in following tables completely. In this research, Exploratory Factor Analysis method has been accomplished by SPSS. In the following, the final model has been designed with structural equation modeling (SEM) and using AMOS software.

At first, a questionnaire which had been already designed was distributed among 25 people and after filling questionnaires, data was analyzed by SPSS. In this software, the asked factors were introduced with qn ($n=9,10,11,\dots,28$)

and the importance of factors with ln ($n=1,2,3,4,5$). Finally, Cronbach alpha coefficient was obtained 0.844 for 20 effective parameters on air transport demand which falls within the acceptable range.

In this research, considering Cochran Formula [Israel, 2013], required number of cases to survey in four cities is 344 people that are divided between four cities in proportion of daily air transport of each city. Reason of choosing airports of these cities for sampling is to cover the cities with different conditions properties in the country. We can consider Gachsaran as an economic zone of oil and refinery due to being oil field, Shiraz as a case of metropolis, Yazd as a historical case and Yasuj as a developing city. Demographic statistics and the quota of each city from all distributed questionnaires are presented in figure.1.

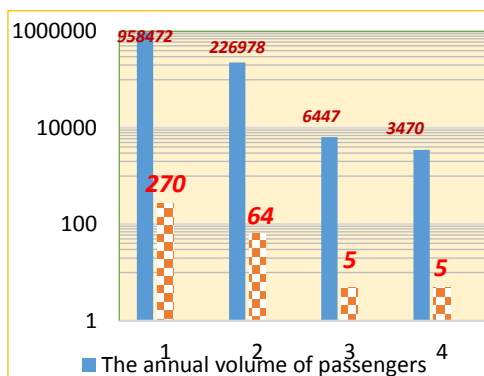


Figure.1 demographic of passengers and statistical society of study

In order to investigating validity of questionnaire in this research, SPSS software has been used to perform Factor Analysis method. At first, to check whether the number of selected case volume is enough for Factor Analysis, Kaiser-Meyer-Olkin Test (KMO) has been carried out. Also, to determine this point that correlation of proposed questions in statistical society is not zero, Bartlett Test has been used. The results of KMO and Bartlett tests are 0.744 for 20 questions of questionnaire about effective factors on air transport demand which is a very suitable value and shows that Factor Analysis method can be used for these

components. In the section “results of Bartlett test”, a significant amount less than 0.05 has been obtained which represents suitable fitting of extracted Likert scale items from effective factors on air transport demand for considered questions [Anand, 2014].

4. Analysis and discussion

4.1 Factor Analysis

After ensuring that Factor Analysis method can be used to extract Likert scale items of effective factors on air transport demand, Factor Analysis method has been used with the aid of SPSS to recognize effective factors on air transport demand.

For this purpose, 20 effective parameters on air transport demand have been considered as obvious variable and air transport demand is considered as hidden variable. In order to recognize the most important effective parameters on air transport demand, located parameters in the first identified factor obtained by Factor Analysis has been brought in the section “Results

Table 2. The most important obtained parameters from Factor Analysis (Effective factors on air transport demand based on number of trips)

components	Number of components	Identified parameters of first effective factor on air transport demand based on number of trips					
		2 times or 3 times a month	Once a month	Every 4 months	Every 6 months	Once a year or do not travel at all	It's the first time
Importance of using air transport system	q9						
Safety during the flight	q10						
Harmonizing departure time and reaching to destination	q11						
Having no delay	q12						
components	Number of components	Identified parameters of first effective factor on air transport demand based on number of trips					
		2 times or 3 times a month	Once a month	Every 4 months	Every 6 months	Once a year or do not travel at all	It's the first time

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Departure time of airlines	q13						
Time of flight or distance from origin to destination	q14						
Cancellation of flight	q15						
Low travel costs	q16	0.927	0.949	0.831		0.836	
Low ticket cost	q17	0.905	0.905	0.854		0.898	
Additional costs	q18	0.843	0.750	0.733		0.671	
Releasing rate of flight tickets	q19	0.866	0.819	0.872		0.803	
Using charter tickets	q20	0.799	0.700	0.783		0.594	
Personnel good greeting	q21						
Having better flying services	q22				0.831	0.807	
Having better ground services	q23				0.909	0.716	
Existing VIP and CIP services in airport area	q24						
Suitability of cargo transport and commute	q25				0.768	0.774	
Existing services and appropriate accommodation in airport area	q26				0.853	0.848	
Possibility of ticket online shopping	q27						
Satisfaction of choosing this system	q28						
Influence (percentage)		31.520	20.955	24.911	21.290	18.957	26.798

As it is clear in table.2, the most important effective parameters on air transport demand based on the number of trips are services of air transport system and paid expenses by passengers of air transport. These results correlates with the Liu's researches about the

effect of services on attracting passengers and Scotti's researches about the effect of cost for passengers on attracting them to air transport system [Scotti and Dresner, 2015&Liu, 2016].

**Table.3 the most important obtained parameters from Factor Analysis
(Effective factors on air transport demand based on type of trip)**

components	Number of components	Identified parameters of the first effective factor on air transport demand based on type of trip				
		business	Recreation and pilgrimage	Education and training	Emigration and inhabitancy	other

Importance of using air transport system	q9					0.811
Safety during the flight	q10					
Harmonizing departure time and reaching to destination	q11					
Having no delay	q12					
Departure time of airlines	q13					
Time of flight or distance from origin to destination	q14					
Cancellation of flight	q15				0.703	
Low travel costs	q16	0.908				
Low ticket cost	q17	0.916				
Additional costs	q18	0.878				0.747
Releasing rate of flight tickets	q19	0.808				0.511
Using charter tickets	q20	0.702				0.793
Personnel good greeting	q21					0.634
Having better flying services	q22		0.868	0.698	0.794	
Having better ground services	q23		0.816	0.835	0.816	
Existing VIP and CIP services in airport area	q24					0.709
Suitability of cargo transport and commute	q25		0.790	0.838	0.783	
Existing services and appropriate accommodation in airport area	q26		0.827	0.828	0.800	
Possibility of ticket online shopping	q27					0.647
Satisfaction of choosing this system	q28					
Influence (percentage)		22.835	21.972	20.423	24.628	27.527

According to the results of table.3, parameters of the first effective factor on air transport demand based on type of trip are service delivery and also imposed costs on passengers. However, for the passengers who have the intention of emigration and inhabitancy, “flight cancellation” parameter which is a time-related parameter has been selected as the effective parameter. Furthermore, the option “other

purposes of trip” is also a combination of parameters “services”, “welfare” and “cost”. These results correlates with Lupo's researches about the effect of services on attracting passengers and Rolim's researches about the effect of cost on attracting passengers to air transport and also Janic's researches about the effect of time on demand changings [Rolim et al.2016 & Lupo, 2014 & Janic, 2015].

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**Table 4. The most important parameters from Factor Analysis
(Effective factors on air transport demand based on travel distance)**

Components	Number of components	Identified parameters of the first effective factor on air transport demand based on travel distance			
		Less than 300 KM	Between 300 KM and 500 KM	Between 500 KM and 1000 KM	More than 1000 KM
Importance of using air transport system	q9				
Safety during the flight	q10				
Harmonizing departure time and reaching to destination	q11				
Having no delay	q12				
Departure time of airlines	q13				
Time of flight or distance from origin to destination	q14				
Cancellation of flight	q15				
Low travel costs	q16			0.887	0.888
Low ticket cost	q17			0.872	0.839
Additional costs	q18			0.768	0.882
Releasing rate of flight tickets	q19			0.819	0.713
Using charter tickets	q20			0.712	0.907
Personnel good greeting	q21				0.562
Having better flying services	q22		0.826		0.794
Having better ground services	q23		0.805		
Existing VIP and CIP services in airport area	q24				
Suitability of cargo transport and commute	q25		0.820		
Existing services and appropriate accommodation in airport area	q26		0.872		
Possibility of ticket online shopping	q27				0.658
Satisfaction of choosing this system	q28				
Influence (percentage)		0.00	19.923	20.898	36.898

According to results of table.4, parameters of the first effective factor on air transport demand based on required distance to use transport system are two options of imposed costs on

passengers and offered airport services. These results correlates with Scotti's

researches about the effect of cost on attracting passengers to air transport and Liu's researches about the effect of services on attracting

Table.5 the most important factors obtained from Factor Analysis (Effective factors on air transport demand based on the style of financing for travel)

components	Number of components	Identified parameters of the first effective factor on air transport demand based on the style of financing for travel			
		Personal payment	Payment by a governmental company	Payment by a private company	other
Importance of using air transport system	q9				
Safety during the flight	q10				
Harmonizing departure time and reaching to destination	q11				0.904
Having no delay	q12				0.548
Departure time of airlines	q13				
Time of flight or distance from origin to destination	q14				
Cancellation of flight	q15				
Low travel costs	q16		0.959		0.943
Low ticket cost	q17		0.956		0.939
Additional costs	q18		0.847		0.881
Releasing rate of flight tickets	q19		0.952		
Using charter tickets	q20		0.729		
Personnel good greeting	q21			0.525	
Having better flying services	q22	0.850		0.729	0.903
Having better ground services	q23	0.847		0.754	
Existing VIP and CIP services in airport area	q24				
Suitability of cargo transport and commute	q25	0.822		0.906	
Existing services and appropriate accommodation in airport area	q26	0.843		0.898	
Possibility of ticket online shopping	q27				
Satisfaction of choosing this system	q28				
Influence (percentage)		21.528	28.442	27.290	41.361

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passengers [Scotti and Dresner, 2015&Liu, 2016].

Presented results of table.5 represents this point that the parameters of the first effective factor on air transport demand based on the quality of supplying travel expenses are mainly in two parts of expenses and services of air transport system. These results correlate with Yang's researches about the effect of services on attracting passengers and Rolim's researches about the effect of cost on attracting passengers to air transport and also Janic's researches about the effect of time on demand changings [Rolim et al.2016 &Yang and Fu, 2015 & Janic, 2015].

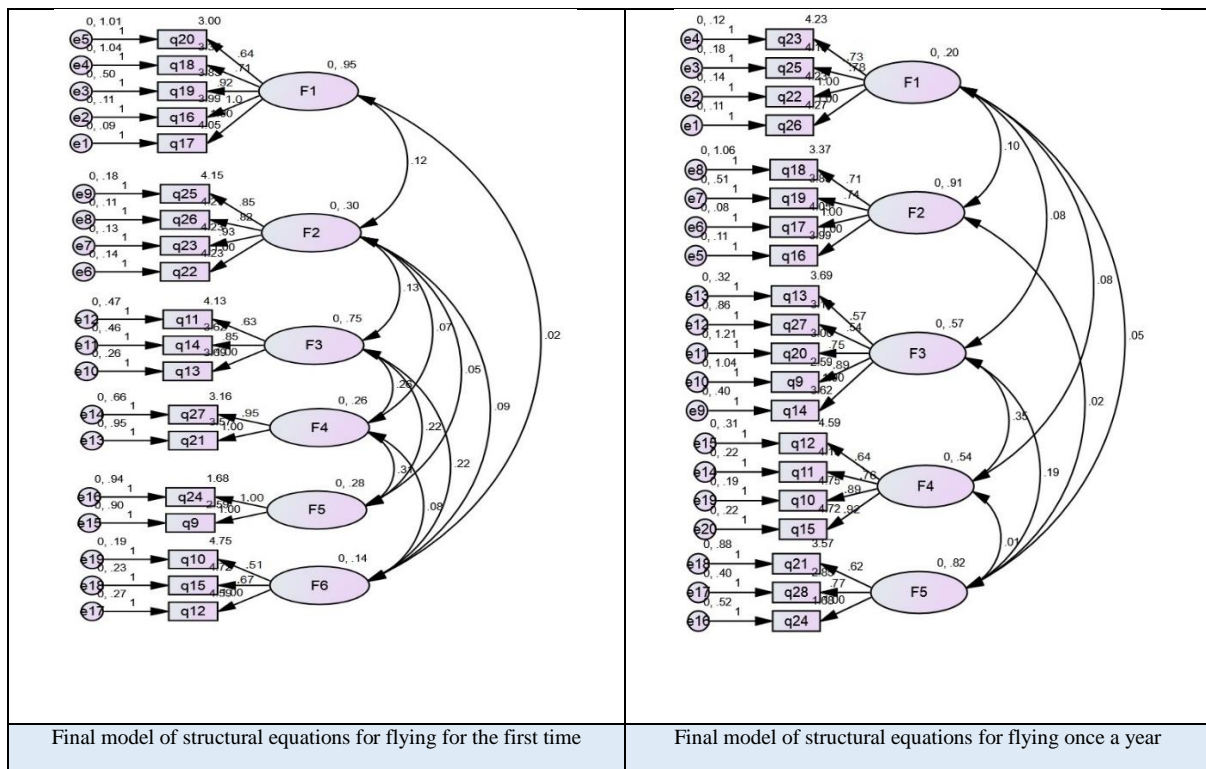
4.2 Investigating the Modeling of Structural Equation

The factor Analysis method is not a thorough method to determine effective factors on air transport demand due to being unable to assess the correctness of analysis. So,

there's a need to investigate the results of Factor Analysis method with using structural equation modeling.

In order to conduct structural equation modeling, all the identified components are considered as independent variables and component "air transport demand" is considered as the hidden dependent variable.

In the presented model, coefficients which have been presented for each route are the amount of influences that each of the components has with another component. Originally, structural equation modeling is a combination of Factor Analysis and route analysis. In the presented figure, components F1, F2, F3, F4, F5, F6 is ordered obtained factors from Factor Analysis. Also, parameters q9, q10, q11... q28 are the attributed parameters assigned to each of these six factors. Final results of structural equation are presented in figures.2, 3, 4, 5 and table.8.



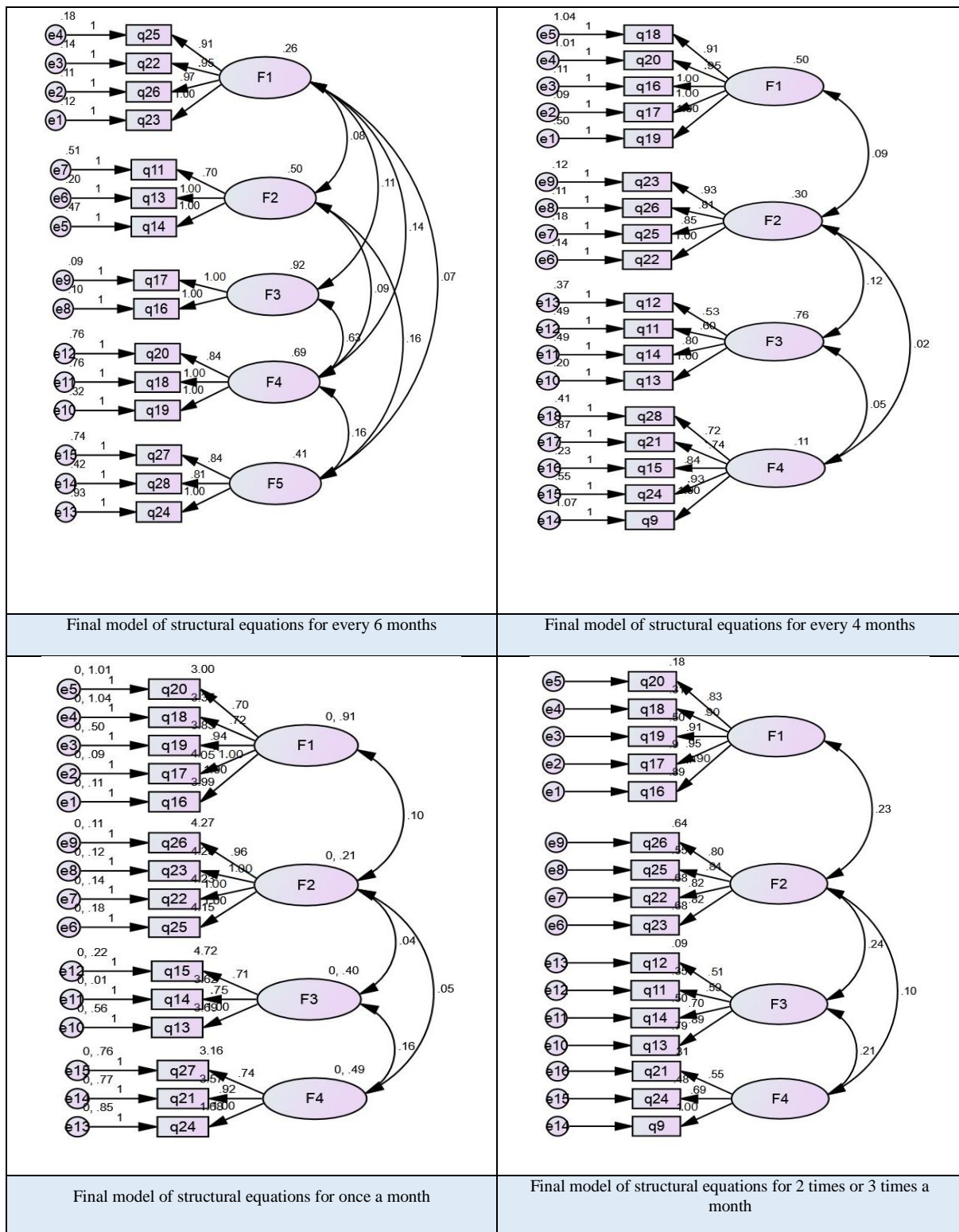


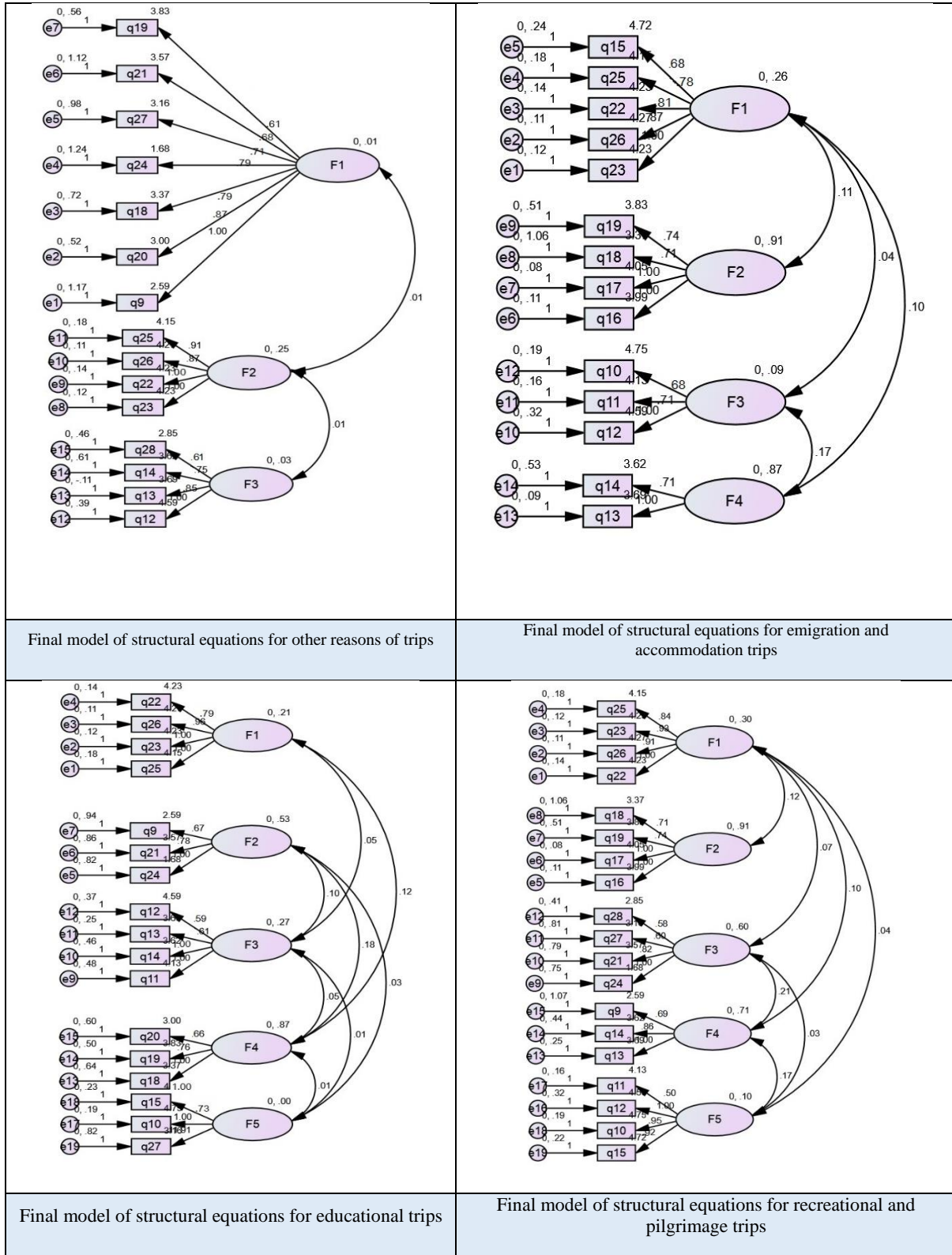
Figure.2 Final model of structural equations for number of journeys

As it is clear in fig.2, the most important parameters of air transport demand based on number of trips are service factors of air transport system and also paid the costs by

passengers of air transport system by the factor load of 0.6 to 1. The importance of these parameters has been proven in the study of

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Scarpel and Lupo [Scotti and Dresner , 2015&Liu, 2016].



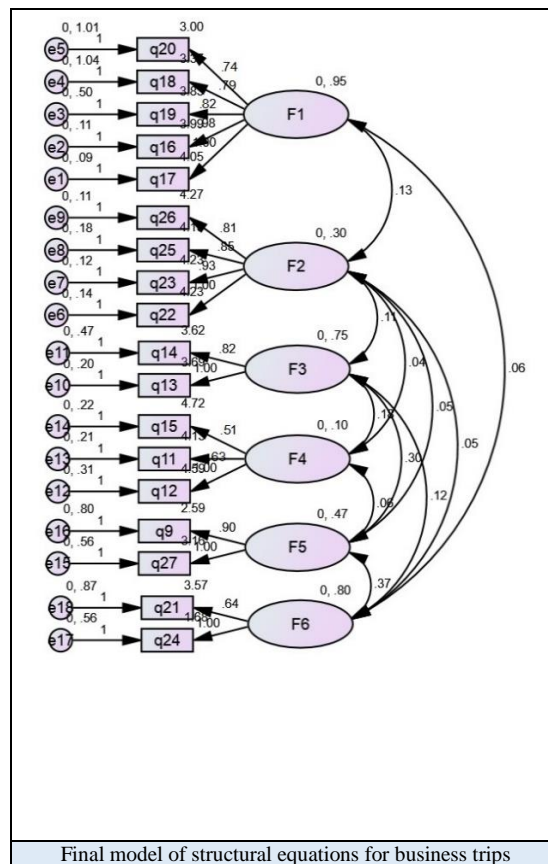


Figure 3. Final model of structural equations for type of trip

According to results of fig.3, parameters of the first effective factor on air transport demand based on the types of journey are in connection with the way service delivery and also imposed costs on costumers' and also factor "time" with the factor load from 0.6 to 1 in all considered conditions. The importance of these parameters

has been proved in the study of Lupo and Rolim and Janic [Rolim et al. 2016, Lupo, 2014 and Janic, 2015].

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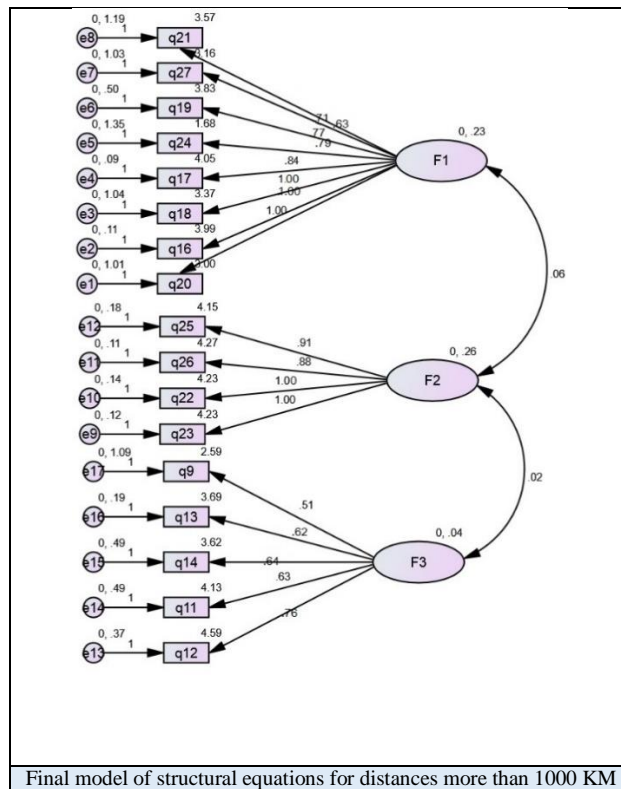
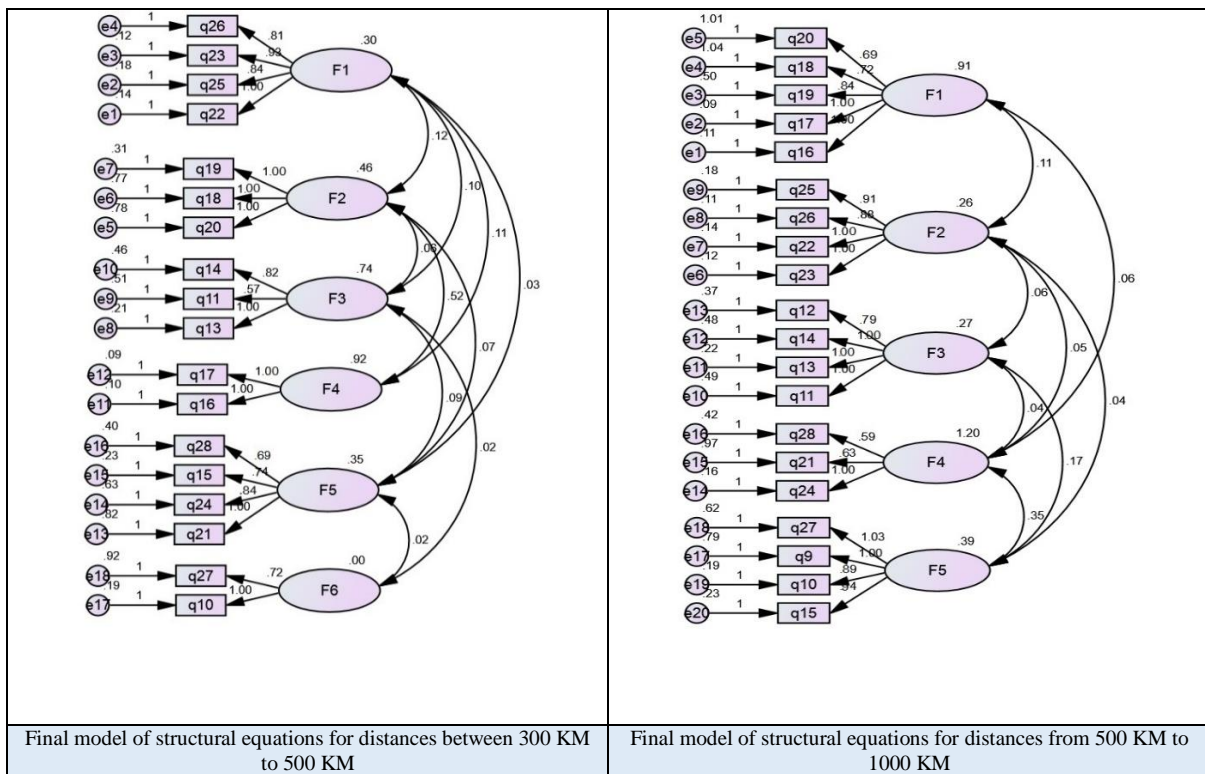


Figure 4. Final model of structural equation for distance of travel

According to results of fig.4, parameters of the first effective factor on air transport demand based on required distance to use transport system are summed up in parameters related to two options of imposing costs on passengers and airport presented services by factor load of

0.6 to 1. In this condition, personnel's good greeting has been mentioned as an effective parameter in the first recognized factor. These results have been proven in Scotti and Liu's results [Scotti and Dresner , 2015 and Liu, 2016].

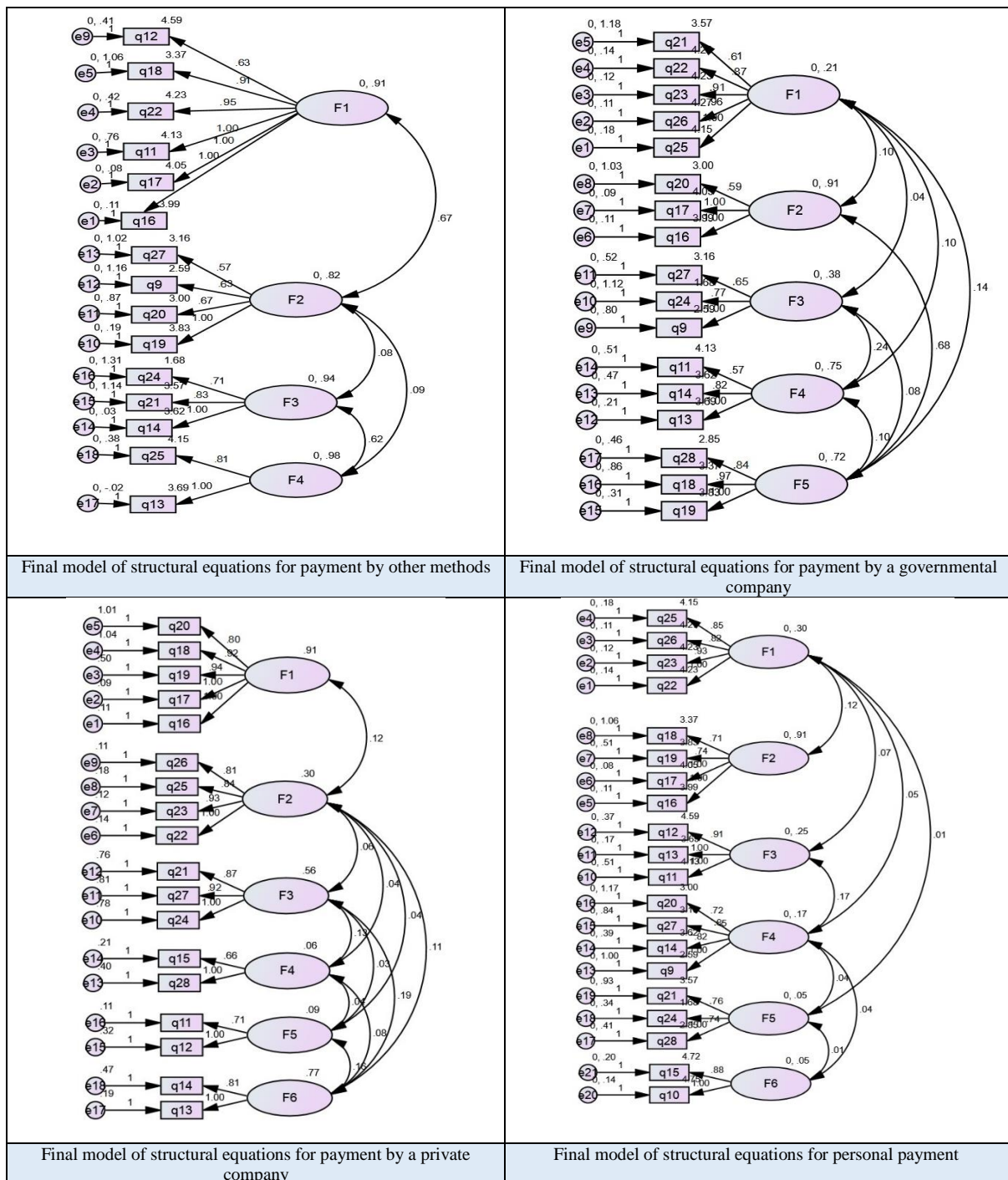


Figure.5 Final model of structural equation for quality of supplying travel expenses

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Table.6 final results of index “goodness of fit” effective factors on air transport demand

Different situations of air transport passengers	RFI	IFI	CFI	NFI	RMSEA	Significant amount	DF/ Chi-squared
Results of index “goodness of fit” for the first air travel	0.736	0.822	0.820	0.782	0.074	0.00	4.422
Results of index “goodness of fit” for once a year air travel	0.7	0.784	0.782	0.741	0.078	0.00	4.698
Results of index “goodness of fit” for every six months air travel	0.849	0.913	0.912	0.822	0.066	0.00	3.510
Results of index “goodness of fit” for every 4 months air travel	0.730	0.810	0.808	0.722	0.079	0.00	4.866
Results of index “goodness of fit” for once a month air travel	0.812	0.878	0.877	0.846	0.078	0.00	4.270
Results of index “goodness of fit” for 2 times or 3 times air travel	0.760	0.832	0.831	0.800	0.051	0.00	3.325
Results of index “goodness of fit” for other reasons of travel	0.700	0.733	0.730	0.700	0.071	0.00	4.034
Results of index “goodness of fit” for emigration and accommodation travel	0.842	0.902	0.901	0.873	0.063	0.00	3.952
Results of index “goodness of fit” for educational travel	0.700	0.800	0.797	0.755	0.079	0.00	4.360
Results of index “goodness of fit” for recreational and pilgrimage travel	0.763	0.844	0.842	0.799	0.061	0.00	3.767
Results of index “goodness of fit” for business travel	0.768	0.850	0.848	0.812	0.067	0.00	4.274
Results of index “goodness of fit” for distances between 300 and 500 KM	0.816	0.892	0.890	0.849	0.051	0.00	3.184
Results of index “goodness of fit” for distances between 500 and 1000 KM	0.725	0.810	0.808	0.765	0.078	0.00	4.255
Results of index “goodness of fit” for distances more than 1000 KM	0.700	0.773	0.772	0.740	0.076	0.00	4.079
Results of index “goodness of fit” for payment by other methods	0.796	0.834	0.830	0.807	0.059	0.00	3.467
Results of index “goodness of fit” for payment by a governmental organization	0.773	0.851	0.849	0.815	0.078	0.00	4.422
Results of index “goodness of fit” for payment by a private organization	0.756	0.840	0.838	0.802	0.077	0.00	4.390
Results of index “goodness of fit” for personal payment	0.707	0.794	0.791	0.750	0.079	0.00	4.534

In order to analyze “goodness of fit” indexes for the model and suitability of the proposed model, the indexes such as Chi-squared, Normed Fit index, Root mean square error of approximation, Comparative Fit index, Radiative forcing index, International friction

index are measured based on specific statistical methods (Table.6).

As it is clear in table.8, final results of index value for “goodness of fit” such as RFI, IFI, CFI, NFI are all higher than 0.7 and close to 1 for different influential conditions of effective

components on air transport demand which are suitable and acceptable. Also, the meaningful amount is 0.05 which is in the range of acceptable limit. Also, the proportion of Chi-squared to degrees of freedom is less than 5 which is within the acceptable ranges for this model. About index RMSEA, the more values that is closer to zero leads to the better "goodness of fit" and when it is between 0.05 to 0.08, then it shows very good goodness of fit. Index RMSEA in final models shows that the performance of residuals is suitable in the model. So the final obtained models are appropriate.

5. Discussion

According to results of table.4 and figure.2, it can be seen that for passengers having journeys of "once a month", "2 or 3 times of the month" and "every 4 months", with a factor load of higher than 0.7 in all, the presented parameters by the first identified factor and also the highest amount of influence with the amount of more than 20%, the factor "cost" is the most important factor. The reason of this issue is the high imposed cost to them due to high volumes of travel. For passenger who use this system every 6 months or once a year, identified "factor load" higher than 0.7 among these parameters, represents the important factor of "services of air transport system". The last group of these passengers is the one who have the intention of using this transportation system for the first time. Parameters related to the factor "cost" for these people has been the most important with the percentage of 26.8; such that with moderating costs of using an air transport system there is a possibility of attracting these passengers at the next times. These results correlate with Liu's researches about the effect of services on attracting passengers and Scotti's researches about the effect of cost for attracting passengers to air transport [Scotti and Dresner, 2015 & Liu, 2016].

According to results of table.5 and figure.3, it can be understood for passengers who have the intention of the business trip with air transport system, parameters related to the factor "cost" with the factor load of higher than 0.7 and an influence value of 22.8 % have had the most important effect on attracting passengers.

Reason of this issue is the connection of their profession and high volume of their air travel and high imposed costs to this group of people. Also, in three groups of "recreational and pilgrimage", "emigration and accommodation" and "educational", constitutive parameters of the factor "services" with a factor load more 0.7 and the highest amount of influence with the amount of more than 20%, is the most important identified factor among these 3 groups. The last group of passengers is the one who has some special reasons for their trip. Effective parameters on attracting these passengers are "services" and "imposed costs" with the influence value of 27.5%. These results correlate with Lupo's researches about the effect of services on attracting passengers and Rolim's researches about the effect of cost on attracting passengers to air transport and also Janic's researches about the effect of time on demand changings.

According to results of table.6 and figure.4, the first group which has been examined is the one who has used the air transport system for distances between 300 and 500 KM. In this group, the factor "services" with the factor load of higher than 0.8 parameters of this factor and with the influence value of 19.9% is the most important factor for this group. Also, people who used air transport system for distances between 500 and 1000 KM, with having factor load of 0.7 based on all the first parameters and with the influence value of 20.9%, the factor "cost" is selected as the most effective factor on demand. People who used air transport system for distances more than 1000 KM, parameters related to both factors of "cost" and "services" as the effective factor to the influence value higher than 36.9%. These results correlates with Scotti's researches about the effect of cost on attracting passengers to air transport and Liu's researches about the effect of services on attracting passengers [Scotti and Dresner, 2015 and Liu, 2016].

According to results of table.7 and figure.5, the first groups who were investigated were the ones who paid the cost of air transport system with two methods of "personal payment" and "payment by personal organization working there". Results show that both groups with

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factor load of more than 0.5 in the obtained factors have identified the factor “services” as the important and effective factor to the influence value of more than 20%. Furthermore, for people who pay the cost of air transport system by “governmental organization working there”, the most important identified factor is “cost” with factor load of more than 0.7 in those parameters and the influence value of 28.44%. Also, for groups whose flight cost have been paid by other ways, the parameters of 3 factors, including cost, services and time has been considered as the important factors for attracting this group of passengers with the influence amount of more than 41.4%. These results correlates with Yang's researches about the effect of services on attracting passengers and Yang's researches about the effect of cost on attracting passengers to air transport and also Janic's researches about the effect of time on demand changings [Yang and Fu, 2015 & Janic, 2015].

6. Conclusions

Air transportation system due to the high potential of moving passenger and goods, has always been attractive to all walks of society. As a result, recognition of effective factors on demands of air transport passengers, which is dependent on different conditions of passengers, is essential. In this research which investigated effective factors on air transport demands of domestic flights, the following results have been obtained:

- 1- By using Factor Analysis for different conditions of air transport passengers, 3 factors of “imposed cost by passengers”, “presented services to passengers” and factor “time” have always had a high importance to the influence amount of more than 20% in all conditions; which correlates with Yang, Rolim and Janic's researches, According to results of Factor Analysis, the most effective factor is the imposed cost by passengers which has been identified as the first factor in 50% of conditions; which correlates with Scorpell and Scotti's researches.

- 2- Structural equation modeling method has been used to explain the connections between identified factors. Regarding the results of structural equations, it can be concluded that the classification of effective factors on air transport demand in all studied conditions is correct.
- 3- In structural equation modeling, the most important recognized parameter is “low travel cost” with factor load between 0.9 and 1 in all the investigated conditions.
- 4- One of the other research topics is to identify effective factors on air transport demand, based on demographic variables of air transport demand (sex, marital status, level of education and income) that have an influence in classifying effective factors on air transport demand. Investigating these parameters leads to different results for researchers.

7. Endnotes

KMO: Kaiser-Meyer-Olkin Test
SEM: structural equation modeling
AMOS: a statistical software package for structural equation modeling
NFI: Normed Fit Index
IFI: Incremental fit index
CFI: Comparative fit index
RFI: Relative fit index
RMSEA: Root mean square error of approximation

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