FORECASTING DEMAND FOR CO-MODAL TRANSPORT AND TOURISTIC SERVICE INTEGRATED PACKAGES

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ABSTRACT

The paper aims at developing an appropriate model for assessing the potential demand and market share of a new integrated co-modal service in case additional touristic services are also integrated in the service package. The model allows assessing the impact that touristic services might have on users' decisions regarding the modal configuration of their trip and defining user profiles accordingly. Furthermore, the identification of user segments allows defining differentiated service packages, in order to develop new innovative Business Models for passenger transport.

Keywords: co-modal transport, multinomial logit model, user segments, business model

1. INTRODUCTION

During the last three decades, one of the priorities in the agenda of the European Transport Policy has been related to the rationalization of modal split and the promotion of intermodality. In the beginning, the main emphasis was put on policy actions for the promotion of freight intermodality. Intense research activities and rich results supported and continue to support relevant policy objectives. In a second step and nowadays, increased importance is also paid to passengers' intermodality issues. Recently, the concept was more specified under the term of co-modality; the supply of modal alternatives and the increased possibility of users for combining modes and networks where they organize their own trip, is at the heart of the concept. Co-modality aims at a better exploitation of resources, a better connectivity and accessibility of the regional and local transport systems and, mainly, the reduction of negative external transport effects on safety environment and quality of life.

To promote passengers' co-modality, the coordination of transport services and timetables, as well as the quality of service at terminal interfaces, play a crucial role. In case of long trips with touristic purpose, the quality of co-modal services can even affect the final destination choice of a trip. In many cases, a key parameter of co-modal success relates with the supply of an integrated package of transport services, based on a single ticket and a good coordination between the actors involved. Moreover, in the case of trips with touristic purpose, additional touristic services during the journey to the final destination can further affect the choice between transport alternatives.

In many cases, a key parameter of success relates with the development of new alternative transport services -and routes-, to be integrated in the existing transport network. This refers to the activation of a "missing link", either in terms of infrastructure or in terms of lack of service supply even if the relevant infrastructure exists.

This paper aims at developing an appropriate mixed multinomial logit model for assessing the potential demand and market share of a new integrated co-modal service in case additional touristic services are also integrated in the service package. The model allows assessing the impact that touristic services might have on users' decisions in composing the intermodal pattern of their journey and defining user profiles accordingly. The paper is based on an actual Case Study dealing with the development of an alternative –optimised- network service solution for connecting the Adriatic corridor from Italian ports to the port of Patras and then to the island of Crete. The research work was realized in the frame of the FP7 project "HERMES-High Efficient and Reliable Arrangements for Crossmodal Transport" (2010-2011), which aims at developing and analyzing new mobility schemes and associated business models.

2. THE FRAMEWORK FOR THE MODEL DEVELOPMENT AND APPLICATION: ASSUMPTIONS AND FEATURES OF THE CASE STUDY

In the current situation, the maritime transport (ferry) services linking continental Greece -including Peloponnese- to Crete are mainly based on the Piraeus hub port; passenger flows coming from the Adriatic corridor and having Crete as final destination, are oriented from the port of Patras to the port of Piraeus through the road transport network (private cars or bus services) and then, they use ferry services to Crete. These flow patterns involve important trip deviations.

The proposed case study examines the conditions for the development of a fully integrated co-modal transport service for passengers between Western/Central Europe through Italy and the Adriatic–Ionian corridor and Crete, avoiding deviation through Piraeus. The study examines the entire network configuration of such an integrated service, including: a) the long distance ferry transport between Italy and the port of Patras; b) the inland leg connecting the port of Patras to the west-southern Peloponnese, more particularly to the port of Kalamata and c) the medium distance ferry transport from Kalamata to Crete. However the main focus of the study is on the currently "missing link" i.e. the inland leg between Patras and West-Southern Peloponnese (Kalamata) which needs to be integrated into the network.

The current situation and the proposed network alternative are illustrated in Map 1. It is noticed that this "link" misses in terms of service; the relevant connections in terms of road and railway infrastructure exist and are available for operations.

Map 1. Current situation and proposed network configuration

Therefore, the proposed alternative service solution is related to new "business models". In order to promote the proposed solution, the study investigates a business model on the basis of a service offering with two packages: a) the "direct transport to

Crete" (for Non-Stop Travelers) and b) the "Transport and Tourism" package, that combines transport with touristic services during the journey in western Peloponnese.

The package for the Non-Stop Travelers offers the direct access from an Italian Adriatic port to Crete through the ports of Patras and Kalamata. This service is assumed to cover the missing link that exists today, the connection of the Peloponnese with Crete; it will offer a direct transfer avoiding the port of Piraeus and minimizing the trip deviations. It gives the opportunity to the tourist to realize the whole trip with one ticket and to have the less possible attending time at the interchanges due to integrated schedules that the new service will provide. This service consists of the following parts: a) Transfer from Italy (Ancona, Brindisi or Venice) to Greece (port of Patras), b) Transfer with a shuttle inland transport service (bus or rail) to the port of Kalamata in southern Peloponnese and c) Transfer to Crete (Chania) by ship. The suggested services of the package assembled in following: Transportation, luggage handling, e-ticketing,

The "Transport and Tourism" package combines the transfer from an Italian port to Crete with a two days sightseeing tour in the Peloponnese. This package includes transportation, accommodation and sightseeing tour. With one ticket for the whole chain the tourist receives: a) Transfer from Italy (Ancona, Brindisi or Venice) to Greece (port of Patras), b) Two days' stay (one night) in Peloponnese and visit of the most important archaeological sites and c) Transfer to Crete (Chania) through the port of Kalamata.

Considering the infrastructure network of the region and the transport market characteristics as well, added value of the proposed service alternatives for the users is expected from:

- Service improvement (travel time reduction, transport cost reduction)
- Service enlargement and additional benefits for users (integrated package including transport and touristic services)

In addition, beyond the users' benefits, the proposed model is expected to create numerous socio-economic benefits, such as the reduction of the total vehicle-km produced, the alleviation of congested road corridors and terminals and the promotion of new Short Sea services.

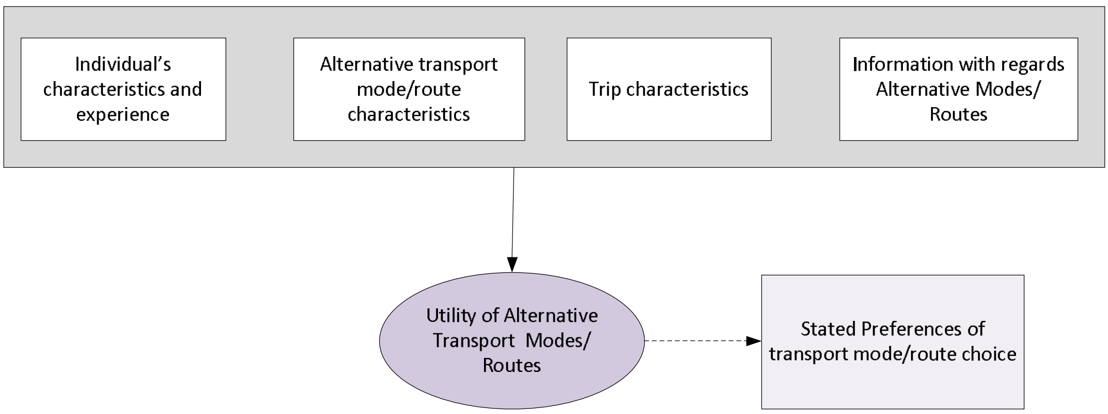
3. CUSTOMER SEGMENTATION AND MODELING FRAMEWORK

This section presents the customer segmentation with regard to potential users of the proposed new integrated chain from the Adriatic corridor to Crete through an inland connection between the ports of Patras and Kalamata with the use of discrete choice modeling. More specifically, customer segments are identified based on a combination of criteria and characteristics that were used as explanatory variables in a route and mode choice model.

Figure 1 presents the modeling framework for the mode/route choice of travelers for the proposed extended Adriatic-Ionian Corridor from Peloponnesus to Crete with an ultimate goal to identify different market segments. The attributes that is expected to influence travelers' decision-making process for a journey to Crete through the Adriatic-Ionian corridor can be broadly categorized into the following four groups:

- Individual's characteristics and experience, such as age, gender, income, profession, etc. Users' experience influences behavior since it constitutes the major database that is registered in their memory. Experience is measured by the frequency of use of the alternative transport modes/ routes in the past.
- Alternative transport mode and route characteristics, such as travel time, number of transfers, travel cost, etc.
- Trip characteristics, such as trip purpose including work, vacation, etc., number of individuals that travel together, etc.
- Information with regards alternative transport modes and routes. It involves information that users receive by sources such as friends, family, or co-workers. This information has a great impact, especially in the case of passengers that have never travelled to the particular destination. It is based on the opinions acquaintances have for certain alternative modes/routes and their corresponding characteristics.

Figure 1: Modeling Framework – Customer Segmentation Process



4. DATA COLLECTION METHODOLOGY

The data collection methodology involved personal interviews addressed to travelers of the Adriatic Corridor. Considering the case study, the port of Patras is the most crucial node of the examined passenger flows, as it is the hub offering access to both alternatives: the current operating service through Piraeus and the proposed one through Kalamata. Therefore, the site selected for the field survey and interviews was the port of Patras. The choice of the interviewees was random. The questionnaires included two parts. A revealed preferences part that indicated the actual individuals' preferences and choices, and a stated preference part in which information about the trade-offs between the alternative modes and routes characteristics were provided in hypothetical scenarios.

For the modeling effort presented below, a total of 169 complete questionnaires collected in September 2010 were used, where the trip purpose of the respondents was vacation. These questionnaires provided a total of 623 stated preferences data that were used for the estimations of discrete choice models.

The questionnaire developed was supported by the passengers' modeling framework presented in the previous section. The questionnaire collected the following information:

- Revealed preferences data, which included: (a) general travel information (origin-destination, travel in group or not, trip purpose, whole trip duration etc); (b) information concerning modal choice of customers, decomposing the whole trip of passengers into legs; (c) information at the Interchange level, such as services offered at the interchange, customers evaluation of the performance of the services offered and rating of the importance of each type of service; (d) Alternative Routes, not selected by the customers for reaching their destination and focuses on the criteria of their choice (cost, travel time, comfort, quality of service at the means, quality performance of the interchange used etc).
- Socio-economic characteristics, such as age, income, gender, nationality, etc.
- Stated preferences data, representing passengers' responses to various hypothetical scenarios in which travel time and travel cost varied. The Stated Preference experiments will contribute to the assessment of the attractiveness of the proposed business model.

The results of the Descriptive Analysis of the data that were used in the model development process are summarised as follows:

- Approximately 10% of the respondents are less than 20 years old, while 7% gain more than 2.000€/month.
- 11% of travellers have their children travelling with them.
- 36% of travellers made more than 4 stops (transfers) during their trip to/from Patras.
- More than half of the respondents (52.2%) travel by car and approximately 11% travel by bus during the inland part of their trip.
- One third of the respondents (29,8%) planned their trip from 3 to 18 months ago, while 20% planned it only within a few days (1 to 20 days).

5. CUSTOMER SEGMENTATION – MODEL SPECIFICATION AND ESTIMATION RESULTS

5.1. Segmentation criteria

Based on a priori assumptions, as well as on the descriptive analysis of the data, it was decided to segment the sample based on the number of stops variable. Thus two market segments were created as follows:

- Non-Stop Travellers: all the individuals that conducted less than/equal to three stops during their reported journey; and
- Travellers with Stops: all the individuals that conducted more than 3 stops during their reported journey. This segment will conduct to identify the potential users of the “Transport and Tourism” package.

In order to verify that systematic variation of the coefficients in the above subgroups of the sample exists, a model comparison took place. To do so, a model with the full data set was first estimated and then the same model was estimated for each segment separately. The values of the market segmentation test and the likelihood ratio test (Appendix A) revealed that indeed taste variations exists among the market segments and thus two models – one for each segment should be estimated and applied for market share forecasts.

5.2. Model Specification

The model specification for both models (Non-Stop Travellers and Travellers with Stops) is the same. The dependent variable of the Mixed Multinomial Logit Model consists of four alternative choices: (1) Car and Ferry through Patras-Piraeus-Crete Corridor, (2) Car and Ferry through Patras-Kalamata-Crete Corridor, (3) Bus and Ferry through Patras-Kalamata-Crete Corridor , and (4) Rail and Ferry through Patras-Kalamata-Crete Corridor as it is shown in the following diagram. It should be noted that in the stated preference scenarios the alternatives of Bus and Ferry and Rail and Ferry through the Patras-Piraeus-Crete Corridor were also available but both had limited number of observations and thus they weren’t included in the modelling process.

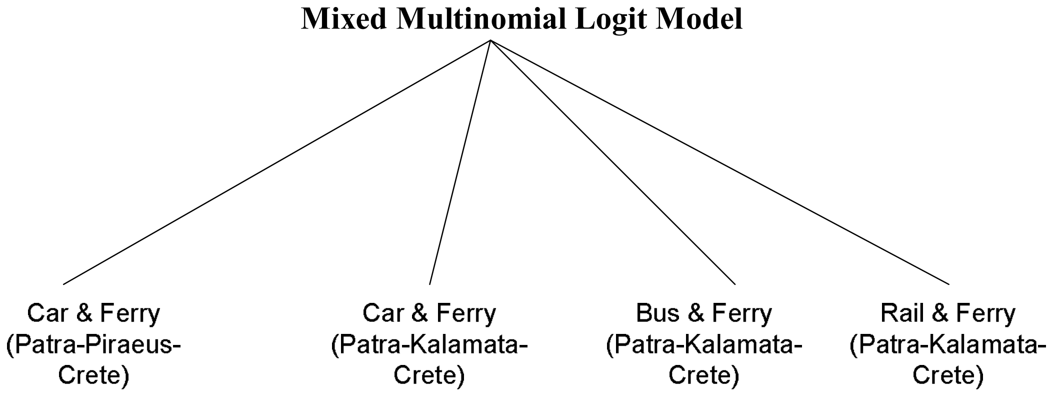


Figure 2: Dependent Variable

Table 1 presents a specification table for the understanding the parameters estimated and the way the utility of each alternative choice is specified. In this model the Car and Ferry through Patras-Piraeus-Crete Corridor is the base case for comparison. Therefore, three constants are defined, one for the Bus and Ferry through Patras-Kalamata-Crete Corridor(β_{01}), one for Car and Ferry through Patras-Kalamata-Crete Corridor (β_{02}) and one for Rail and Ferry through Patras-Kalamata-Crete Corridor (β_{03}).

The parameter (β_1) for travel time is generic among the two car alternatives, while the parameters (β_2) and (β_3) for the travel times of bus and rail respectively are alternative specific. The travel cost parameter (β_4) for the cars, as well as the parameter (β_5) of travel cost for the bus and rail alternatives are also generic. Also, the travel cost for the ferry passengers is generic (β_6), as well as the ferry cost for car (β_7) is generic for the car alternatives.

The socio-economic characteristics are specified as dummy variables. The first dummy variable with (β_8) parameter takes the value of 1 if the traveller's income is more than 2.000 € and 0 otherwise; the second dummy variable with parameter (β_9) takes the value of 1 if the users' age is less than 20 years and 0 otherwise; and the third dummy variable with parameter (β_{10}) takes the value of 1 if the passengers have their children with them and 0 otherwise.

The dummy variable with parameter (β_{11}) takes the value of 1 if the passengers are travelling with their car in the inland part of their journey and 0 otherwise, while the dummy variable with parameter (β_{12}) taking the value of 1 if the passengers are travelling by bus in the inland part of their journey and 0 otherwise, and represents a constraint that individuals may have when conducting their trip. The variable, with parameter (β_{13}) is continuous and refers to the duration that travellers planned their trip.

Table 1: Model Specification Table

	β_{01}	β_{02}	β_{03}	β_1	β_2	β_3	B_4
Car and Ferry through Patras-Piraeus-Crete	0	0	0	Travel time of Car through Patras-Piraeus-Crete	0	0	Travel cost of Car through Patras-Piraeus-Crete
Bus and Ferry through Patras – Kalamata-Crete	1	0	0	0	Travel time of Bus	0	0
Car and Ferry through Patras – Kalamata-Crete	0	1	0	Travel time of Car through Patras-Kalamata-Crete	0	0	Travel cost of Car through Patras-Piraeus-Crete
Rail and Ferry through Patras – Kalamata-Crete	0	0	1	0	0	Travel time of Rail	0

	β_5	β_6	β_7	β_8	β_9	β_{10}	β_{11}
Car and Ferry through Patras-Piraeus-Crete	0	Passengers Ferry cost for Piraeus-Crete	Car Ferry cost for Piraeus-Crete	1 income is more than 2.000€/month, 0 otherwise	0	1 if passengers have their children with them 0 if otherwise	1 if the respondents travel by car in the inland part of their trip, 0 otherwise
Bus and Ferry through Patras – Kalamata-Crete	Travel cost of Bus	Passengers Ferry Cost for Kalamata-Crete	0	0	0	0	0
Car and Ferry through Patras – Kalamata-Crete	0	Passengers Ferry Cost for Kalamata-Crete	Car Ferry cost for Kalamata-Crete	1 income is more than 2.000€/month, 0 otherwise	0	1 if passengers have their children with them, 0 if otherwise	1 if the respondents travel by car in the inland part of their trip, 0 otherwise
Rail and Ferry through Patras – Kalamata-Crete	Travel cost of Rail	Passengers Ferry Cost for Kalamata-Crete	0	0	1 if age is less than 20 years, 0 otherwise	0	0
	β_{12}	β_{13}					

Car and Ferry through Patras-Piraeus-Crete	0	How long travellers planned their trip (in months)	
Bus and Ferry through Patras – Kalamata-Crete	1 if the respondents travel by car in the inland part of their trip, 0 otherwise	0	
Car and Ferry through Patras – Kalamata-Crete	0	How long travellers planned their trip (in months)	
Rail and Ferry through Patras – Kalamata-Crete	0	0	

5.3. Mode/Route Choice Model Development and Estimation

This section presents two discrete choice models representing the route and mode choice of the two customer segments. Both models were estimated using the corresponding number of the stated preference observations collected in the sample. Biogeme was used for the model estimations. Table 2 presents the route and mode choices, individuals made at the stated preferences scenarios for each market segment.

Table 2: Mode/Route Choice based on Stated Preferences Scenarios

	Non-Stop Travelers		**Travelers with Stops**	
Travel Mode/Route	**Number of Observations**	**Percentage (%)**	**Number of Observations**	**Percentage (%)**
Car Patras - Pireaus	36	9.0	16	7.1
Bus Patras - Kalamata	22	5.5	16	7.1
Car Patras - Kalamata	197	49.4	74	33.0
Rail Patras - Kalamata	144	36.1	118	52.7
Total number of observations	**399**	**100**	**224**	**100**

Table 3 presents the model estimation results for the two customer segments.

Table 3: Model Estimation Results

	Non-Stop Travelers		**Travelers with Stops**	
Variables	**Coefficient**	**t – Stat**	**Coefficient**	**t – Stat**
Constant of Bus (Patras-Kalamta-Crete) (β_{01})	0.693	0.26	0.437	0.10
Constant of Car(Patras-Kalamta-Crete) (β_{02})	-0.564	-1.10	-0.453	-0.63
Constant of Rail (Patras-Kalamta-Crete) (β_{03})	0.929	0.61	1.44	0.64
Travel time of Car (min) (β_1)	-0.483	-5.06	-0.157	-1.74
Travel time of Bus (min) (β_2)	-0.702	-2.37	-0.331	-0.79
Travel time of Rail (min) (β_3)	-0.797	-4.77	-0.153	-0.90
Travel cost of Car (Euros) (β_4)	-0.0279	-2.46	-0.0288	-1.50
Travel cost of Bus and Rail (Euros) (β_5)	-0.0956	-1.86	-0.0703	-1.11
Passengers Ferry Cost (β_6)	-0.00965	-0.34	-0.0412	-1.83

Car Ferry Cost (β_7)	-0.0339	-1.85	-0.0188	-1.01
1 if income is more than 2.000€/month, 0 otherwise (β_8)	-0.597	-0.61	0.667	0.58
1 if age is less than 20 years, 0 otherwise (β_9)	5.64	3.00	0.815	0.56
1 if travelers have their children with them, 0 otherwise (β_{10})	0.327	0.52	4.44	1.92
1 if the respondents travel by car in the inland part of their trip, 0 otherwise (β_{11})	1.90	2.82	7.18	7.83
1 if the respondents travel by bus in the inland part of their trip, 0 otherwise (β_{12})	-0.550	-0.64	1.88	1.53
How long travellers planned their trip (in months)	0.0131	2.24	-0.00892	-1.96
σ	3.37	4.67	-2.59	-3.72
Summary Statistics				
Number of Observations	399		224	
Initial log-likelihood	-553.131		-310.530	
Final log-likelihood	-291.330		-126.742	
Rho-square	0.473		0.592	
Adjusted Rho-square	0.443		0.537	

A Mixed Multinomial Logit Model that accounts for repeated observations from the same individuals in the data set has been estimated for each customer segment. Other alternative model structures were also estimated and tested (such as nested logit, random error coefficients, etc.) to ensure that the alternative choices are independent.

From the model estimation results it can be seen that the Mixed MNL model in both segments, allows for capturing intrinsic correlations among the observations of the same individual. The dependent variable of the models consists of four alternative choices: (1) the Car through Patras-Piraeus road network, (2) Bus through Patras-Kalamata road network, (3)Car through Patras-Kalamatas road network; and (4) Rail through Patras-Kalamatas road network.

Non-Stop Travelers' Model Estimation Results

In this model the Car through Patras-Piraeus road network is the base case for comparison. The parameter for travel time is generic among the two car alternatives, while the parameter for the travel times are alternative specific for the bus and rail alternatives. Also, the travel cost parameter for the car cost is generic, as well as the parameter of travel cost for Bus and Rail.

This means that if all the other variables remain the same, individuals prefer Rail, then Bus, then the Car via Patras-Kalamatas road network and least the Car via Patras-Piraeus road network.

The parameter of travel time by car is negative and statistically significant, as it was expected, which means that if there is an increase in the duration of one minute then the passenger utility of this mode will be decreased by 0.483. The parameter of travel time by bus is also negative and statistically significant and it is higher in an absolute value than the parameters of both rail and car.

The parameter of travel cost of cars is also negative and statistically significant as expected. An increase of car's travel cost of one Euro will result in a utility reduction of 0.028, while an increase in rail and bus travel cost of one Euro, will result in a utility reduction of 0.096.

The socio-economic variable that was found significant for this segment is the age of individuals. More specifically, it appears that young traveler's are more likely to use rail for their trip compared to other modes.

In addition, as the duration of trip planning increases the probability of choosing car alternatives increases as well.

Travelers' with Stops Model Estimation Results

In this model the Car through Patras-Piraeus road network is the base case for comparison. The parameter for travel time is generic among the two car alternatives, while the parameter for the travel times are alternative specific for the bus and rail alternatives. Also, the travel cost parameter for the car cost is generic, as well as the parameter of travel cost for Bus and Rail.

Similarly to the Non-Stop travelers' segment, if all the other variables remain the same, individuals prefer Rail, then Bus, then the Car via Patras-Kalamatas road network and least the Car via Patras-Piraeus road network.

The parameter of travel time by car is negative and statistically significant, as it was expected, which means that if there is an increase in the duration of one minute then the passenger utility of this mode will be decreased by 0.483. The parameter of travel time by bus is also negative and statistically significant and it is higher in an absolute value than the parameters of both rail and car.

The parameter of travel cost of cars is also negative and statistically significant as expected. An increase of car's travel cost of one Euro will result in a utility reduction of 0.028, while an increase in rail and bus travel cost of one Euro, will result in a utility reduction of 0.07.

The socio-economic variable that was found significant is the number of children. More specifically, individuals with children are more likely to use car instead of other modes. In addition, those that are currently using bus or car for the inland part of their trip, they are more likely to use the same transport mode in the future.

In addition it appears that as the duration of trip planning increases the probability of choosing car alternatives decreases.

Customer Segments Additional Characteristics and Market Share

- Non-Stop Travelers: Travelers that are young (under 20 years old) and/or have high incomes and prefer to use mass modes either bus or rail ; Travelers that plan their trip well in advance and prefer to use their own car. These travelers are interested for a direct trip from Patras to Kalamata, with no intermediate stops and corresponds to 64% of the target population;
- Travelers with Stops: Travelers that are in favour of multiple stop trips but they want to use their car, such as those that travel with children and/or have high incomes; Travelers that like to plan their trip well ahead and use mass transit modes for their multiple stops journeys. These travelers are interested for a multiple-stop trip from Patras to Kalamata, and correspond to 36% of the target population.

The above preliminary customer segmentation will form the base for offering better tailored services to the potential customers of the proposed extended corridor. The “Transport and Tourism” package is identified to the segment of the “Travelers with Stops”.

6. MODE/ROUTE MARKET SHARE FORECASTS PER CUSTOMER SEGMENT

Table 4 presents the market share forecasts based on the model estimation results for the two customer segments. As it can be seen for the non-stop traveller segment, the probability of car through Patras-Kalamata-Crete route is the highest (0,57), followed by rail alternative through the same route (0,25). On the other hand in the travelers with stops segment, the probability of choosing rail for the Patras-Kalamata-Crete route is the highest (0.55) followed by the car alternative (0.33).

Table 4: Market Share Forecasts

Modal Split		
	Non-Stop Travelers	**Travelers with Stops**
Car – Patras_Piraeus	10,00%	8,00%
Car	57,00%	33,00%
Bus	7,00%	4,00%
Rail	25,00%	55,00%

From the model estimated parameters one can calculate the values of time for the different alternative modes per customer segment (Table 5).

As it can be seen for the Non-Stop Travelers’ segment, the value of time of the car alternative is 17.31 €/hour, the value of time of the bus is 7.34 €/hour and the value of time of the rail is 8.34 €/hour. On the other hand for the Travelers with Stops segment the values of time are significantly lower, as expected in all modes. It should be also noted that the calculated values of time are comparable with the results of other research in Greece and abroad.

Table 5: Values of Time (€/hr):

Values of Time (VOT)		
	Non-Stop Travelers'	Travelers with Stops
Car	17.31	5.45
Bus	7.34	4.71
Rail	8.34	2.18

7. CONCLUSIONS

Based on a field survey at the port of Patras using Stated Preference/Revealed preference experiments, this paper developed a Multinomial Logit Model able to forecast the potential demand of a new co-modal transport service for passengers between Western/Central Europe and Crete, through Italy and the Adriatic–Ionian corridor. The model estimation results provide a significant insight for the identification of different market segments for the extended Adriatic-Ionian Corridor from Peloponnesus to Crete. Travel time is the crucial parameter of decision choices and the various clusters of estimated value of time significantly affect the users segments and respective choices.

Based on the model results, two main market segments were identified, while additional sub-segments based on their mode and route preferences was also revealed. They correspond to: a) travelers that are in favour of multiple stop journeys, and could also be interested for having a wide range of transport and touristic services offered to them along the Patras – Kalamata route and b) travelers that are mostly interested for a direct trip from Patras to Kalamata, with no intermediate stops.

The identification of these main user segments conducts to the definition of differentiated service packages for the various user groups respectively. The estimation of the share of travelers with multiple stops allows defining the characteristics of the "Transport and Tourism" service package, as mentioned in chapter 2. Similarly, the estimation of the share of "Non-Stop Travelers" allows defining the "Non-Stop Transport" service package. Both compose a twofold Business Model for the development of a new co-modal service.

The Business Model can be used as a strategy and operational tool for private partnerships and public authorities, in order to assess future innovative business models and regional development planning respectively. The methodology provided by the paper can be transferable to other "inter-sector" service concepts. Moreover, the methodology contributes to the scientific literature dealing with "missing – service- link" problems in transportation, considering the perspectives of further policy developments for the promotion of co-modality.

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APPENDIX A

Market Segmentation Test

Model	Log likelihood	Number of Coefficients
Non-Stop Travelers	-126.742	17
Travelers with Stops	-291.330	17
Restricted Model (All obs)	-451.646	17

Table A: Values for the Market Segmentation Test

The null hypothesis is of no taste variations across the market segments:

H_0: $\beta_{NS} = \beta_S$

The likelihood ratio test (with 34-17=17 degrees of freedom) yields:
LR=-2(-451.646+126.742+291.330)=67,148

Chi Square for 95% interval with 17 degrees of freedom = 27.59

And we can therefore reject the null hypothesis at 95%.