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Intelligent policy recommendations on ports administration: Introducing a business model approach for the evaluation of ports' services

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Abstract

The paper focuses on enhancing Passenger Intermodality aiming at developing new business models for interconnectivity purposes. The current work initiates with the description of the results derived from two questionnaire surveys conducted in Patras port (a customer survey and a more 'targeted' survey to the authority of the port) which aimed at measuring the customer satisfaction of the port offered services. Using these findings, a methodology is developed for identifying the optimal measures for Patras Port, by applying a combination of marketing and economic evaluation techniques.

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1. Introduction

The aim of this work is to support the effective port management of passenger traffic, by promoting the fluidity and quality of passenger mobility chains. Interconnectivity and transfer from one service to another within the same mode or between modes was assessed considering all relevant dimensions (perspectives), such as :

- Physical (“time and space as well as interfaces”) interconnectivity;
- Logical (“Information”) Interconnectivity;
- Economical (“ticketing”) Interconnectivity;
- Contractual Interconnectivity (“company agreements”);

For this reason a specific node of the chain between Italy and Greece- the port of Patras- was examined aiming to propose a suitable business model that will strengthen the role of the port as an intermodal terminal. In order to succeed this, all different domains of interconnectivity (logical, physical, economical and contractual) examined and specific interventions proposed. These interventions resulted from passenger opinions about the important services that must be offered in an interchange in combination with the existing offered quality of services in the specific terminal.

The above interventions affected some of the blocks in the existing business plan of the Port creating also new interactions between the involved stakeholders. At the end of this procedure a new business model was created in order to cover the demand of the passengers and to promote the intermodal character of the terminal. This model can be used as a “prototype” to other similar terminals-ports for the identification and practical implementation of those measures that can enhance the port’s intermodality and thus its competitiveness through the increase of passenger traffic.

2. The notion of passenger intermodality

In the past, intermodality has mainly been understood as related to the transfer of passengers between vehicles. Efforts have been undertaken in order to develop an intermodal infrastructure like railway stations at airports and transfer points with optimized transfer ways. Nevertheless fully integrated infrastructure has been an exception so far.

On the demand side it is still unclear which level of intermodality is currently achieved. No proper measurement of intermodal behavior and no integrated statistical demand database exist, which could identify intermodal trips on a European level. This is mainly the outcome of the usually applied “modal view”: transport statistics or surveys focus mainly on single modes and do not consider the underlying journeys that are often a combination of an access mode, one or more long-distance modes and an egress mode. Thus, it must be stated that up till today the users’ requirements in terms of intermodality are not fully identified. Even the integrated concept of level of service is not fully matured and its implementation is hardly found. Recent research activities like the project “Towards Passenger Intermodality in the EU” (2004) created a work plan for the field of passenger intermodality and shed a first light on the users’ requirements and their intermodal travel behavior.

The concept under focus lies on the rational that it is possible to obtain better market share in long distance passenger transport modes (e.g. rail, coach or air transport) if only the “long-distance” part of the trip was considered by travelers for their modal choice. However, if the final destination is not easy to reach any of these advantages would be easily cancelled. Time spent on board the “long-distance” mode can be used to provide passengers with information about the best path from the arrival station to their final destination, and possibly also sell them valid tickets for that local transport, and to identify groups of

passengers going to destinations close-by to one-another and organize, for example, a taxi or mini-van transport for them, selling the corresponding voucher aboard the “long-distance” mode.

These are conceptually simple operations, often requiring only some real-time telecommunication but there are organizational and contractual difficulties in its service provision that are invisible to the final customer. However, these services despite representing a small portion of the mobility chain offer an upgraded fluidity in the whole door to door trip and, as such, have a considerable influence on the public perception of transport attention to their needs and of the expected costs and difficulties of the local component of long distance transport. They represent the missing link of transport networks. The current work shows how these “missing links” for a specific terminal can be found and replaced and the way that these actions can affect the business model creating a new prototype.

In this paper, the ‘passenger intermodality’ concept of the port of Patras is examined, since it is considered (the port of Patras) to be an important passenger transport node, and thus useful conclusions can emerge for the ways and methods to promote intermodality in other cases as well.

3. Case study and survey results description

3.1. The Study Site

The Patras Port is placed in the city of Patras in Peloponnesus. It is broadly accepted that the Port of Patras plays an important role in the economic development of the City of Patras, as well as of the broader region and national mainly due to the ferry boats which connect Greece with Italy. It consists of a Passengers Port which handles an important part of the total passengers’ sea traffic between Greece and other countries and also of a Commercial Port. It has four main piers and wharfs of approximately 3.000m total length and 8.5-10.5m depth. The Port capacity can afford mercantile ships up to 25.000 register tons and passenger ferry ships up to 16.000 register tons and up to 220 meters length.

The port’s capacity can afford passenger ferry ships up to 220 meters length. The Port has a (2.932 m²) 2-floor Passengers Terminal where there are the passenger lounges, the agencies of shipping companies, Customs office, duty-free stores and other services. It serves more almost the 50% of the international passenger flows in Greece (879314, 2010 data). The national flows of the port are almost the half of the international. During 2010 almost 450 thousands passengers traveled from/to Ionian Islands using the port.

The Port is very close to the railway station, the interurban bus terminal as well as the urban bus station and the city center. This fact makes the achievement of good level of intermodality and interconnectivity of the port a quite easy target. But is this also the opinion of the passengers?

3.2. Customers survey results

The main scope of the customer survey in Patras was to analyze the passengers’ opinion for the offered quality of the Port services in relation to the enhancement of intermodality. Through this analysis, the important factors and parameters of the port’s services will emerge from the passenger perspective.

The customers’ survey was executed during a period of five days (22-27/9/2010). The customer survey has been based on a well structured questionnaire. The interviewees – passengers answered to specific questions in order to evaluate the accessibility and the services of the port related to interconnectivity. In addition a ranking of the services’ importance according to the passenger’s opinion took place. At the end of the survey, 560 passengers replied to the questionnaire.

Based on the customer questionnaire, as it is presented in the following figures, 35% of the transfer originates from Attica and Central Greece (Sterea Ellada). Attica appears to be the basic feeder of the passenger traffic. 21% is the percentage of the passengers that declares as origin the port of Patras. The most common destination is Italy (36%), while the corridor Italy - Austria Germany assembles 48%. It is marked that an important share of the transfers corresponds also to the Ionian Islands. The transfer time at the terminal/interchange is in high level as the 52% of the passengers participated in the survey have been transferred in the area of the port in at maximum 5 minutes, a percentage that grows to 76% for transfer in 10 min. This fact implies the satisfactory level of exploitation of the port infrastructure, the cooperating transport modes and the organization of the port operation.

The waiting time until the next departure imply undeniably that the frequencies of the itineraries are satisfactory. 46% of the participants believe that the acceptable time to spend at the terminal/interchange is up to 30 min. The passengers are satisfied with their stay at the port of Patras since the waiting time until their next departure is in the acceptable limit and only a small percentage of 16% is probably disappointed. The above results were also validated by the fact that only the 20% of the passengers gave a negative evaluation to the waiting time factor and the timetable coordination between modes.

In addition, another factor that was evaluated by the customers was the luggage handling service of the port. The evaluation was quiet negative as the 44% rated the service from 1 to 3, the 26% from -1 to -3 and 30% gave a zero score

The offered quality of signposting is one of the main problems in the offered services of the port of Patras. This is the main result of the data analysis that is presented below. Almost the half of the repliers gave a negative score. Their opinion it was better for the information displays but still they were not quiet satisfied. The ticketing and booking system evaluation was much better.

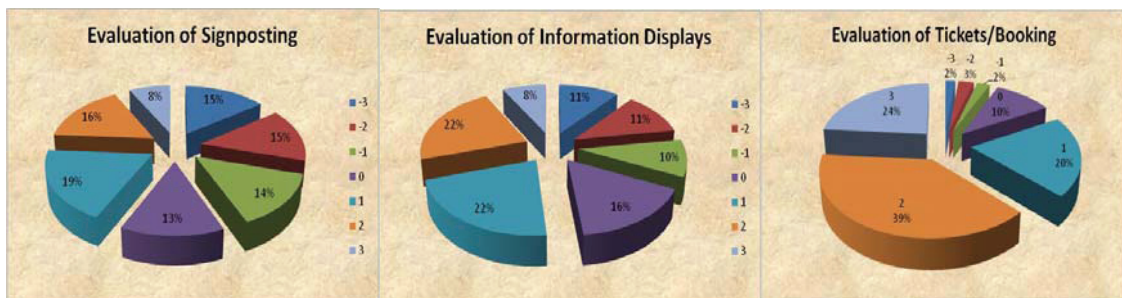


Fig. 1. Evaluation of information and ticketing services

The identification of the critical parameters is based on the rate that the passengers gave to the importance of every service and to their level of satisfaction with them. According to that, for the most important factors and the respondents' satisfaction of them is presented in the following quadrant diagram.

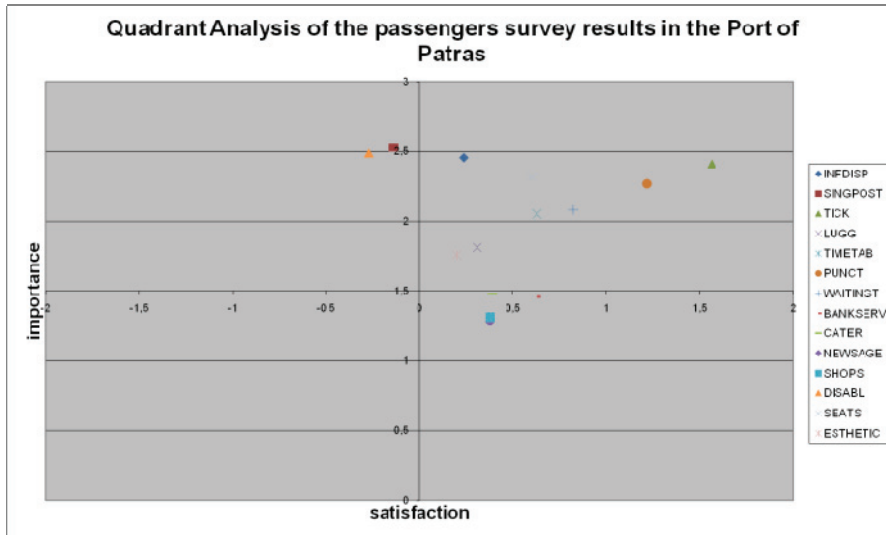


Fig.2. Results of the overall quadrant analysis

From the above figure it becomes clear that the most important services of the port are the Information displays, the Signposting & directions, the tickets/booking and the facilities for disabled people. For three of these factors their satisfaction is too low and special attention must be given on those issues from the administrative authority of the port.

4. Business Model of Patras Port: Current situation

4.1. Problems and opportunities for the port of Patras

The main problems and opportunities for the port of Patras in the current situation were identified from the passengers and the stakeholders' survey and concerned the physical dimension of interconnectivity, the logical (information display) and economical (integrating ticketing) as well as the different organization of some existing services (luggage handling). These issues are considered important from the passenger perspective (as it was pointed out in the previous paragraph).

Specifically a main (connectivity) problem of the port constitutes the long distance between the main port area (passengers' waiting area) and the platforms, for which the passengers are compelled to traverse carrying their luggage. This issue becomes even more critical as far as people with disabilities and elderly people are concerned. The port authority could overcome this interconnectivity barrier by putting small buses for transferring the passengers from the main port area to the platforms.

Another major issue the passengers' survey has emerged concerns the information displays and the signposting of the port. All passengers identified this issue as highly important and at the same time not sufficiently covered by the port. Low cost investments in signs and info displays could resolve this issue and constitute an opportunity for attracting additional passenger demand in the port.

Finally, a main (institutional) problem that was identified by the passengers' as well as the stakeholders' surveys is the lack of cooperation among the transport (and the other) stakeholders of the port. This fact affects the quality of service of the port since it leads to the lack of timetables' coordination as well as integrated ticketing. The particularity of the last interconnectivity problems is that

the cooperation of all involved stakeholders is a prerequisite in order to resolve them. On the contrary the previous barriers could be arranged by the terminal operator (port authority) alone.

From the passengers survey it became clear that the main barriers and the respective improvements that must be realized in the port in order to enhance its passenger interconnectivity are related to the following measures:

- The adequate signposting and info displays
- The transfer to the platforms of the passengers and the luggage
- Integrated ticketing via the port’s webpage (one shop stop)
- Coordinated timetables of alternative modes (ship and bus)

The first two measures (signposting and free transfer of passengers and luggage) are strictly related to the port authority while the last two measures (integrated ticketing and coordinated timetables) presuppose the close collaboration between all different agents involved. The first group of measures addresses the problem (barrier) of increased waiting times and low passenger comfort while the second group promotes interconnectivity as a whole, resulting in the enhancement of the quality of services. In the following paragraphs, the modeling of customer satisfaction would lead to certain conclusions in regard to the impacts (improvements) in the port’s intermodality by the aforementioned measures.

5. Customer Satisfaction Model development for the port services

5.1. Customer satisfaction index calculation

The overall objective of creating the customer satisfaction index is to classify all the parameters that influence the customer satisfaction (and thus the port competitiveness) and assess the impacts of certain improvements of the port services in order to come up with a (validated) priority list of potential measures and strategies for promoting passenger intermodality.

The 14 quality measures that were ranked by the passengers can be grouped-according to the factor analysis results that is presented in the table 1- in four independent factors that are time (including ticketing/booking, timetable coordination, punctuality of modes and waiting time), information (including information displays and signposting), comfort (including facilities for disabled, esthetics and seats) and facilities (including bank services, catering, newsagents and shops).

Table1. Rotated component Matrix of the factor analysis

	Component			
	1	2	3	4
INFDISP	,202	,094	,148	,878
SINGPOST	,099	,187	,134	,882
TICK	,579	,027	,067	,173
LUGG	,584	,183	-,013	,196
TIMETAB	,745	,154	-,050	,010
PUNCT	,762	,085	,163	,026
WAITINGT	,716	,130	,108	,009
BANKSERV	,276	,512	,216	,128
CATER	,235	,770	,106	,089

	Component			
	1	2	3	4
NEWSAGE	,119	,821	,039	,092
SHOPS	,015	,791	,260	,077
DISABL	-,110	,267	,718	,152
SEATS	,164	,180	,777	,042
ESTHETIC	,129	,044	,687	,098

The Customer Satisfaction Index for the passengers of the port of Patras can be calculated by using a linear model which correlates the CSI with the four independent factors. This model is presented below:

$$CSI=0,262+0,386*TIME+0,361*FACILITIES+0,301*COMFORT+ 0,276*INFORMATION$$

According to the above model if the satisfaction of the passengers from the time factors is increased by one grade then the CSI will be increased up to 24%. The responding percentages for the facilities, comfort and information are 23%, 19%, 17%. It is very clear that all the factors are playing a very important role in the overall satisfaction of the passenger.

5.2. Further discussion on the model results

The benefits of the proposed improvements listed above, were calculated by using the results of the questionnaire survey analysis and the observations that were realized in order to estimate the time that a passenger must spend in order to be transferred from the port to specific interurban bus lines including the waiting time, the time for buying the ticket and the time to find his way for the next mode terminal.

Regarding the analysis of the passenger survey results the main findings that were used were:

- The proposed improvement are influence the factors with low ranking of satisfaction. According to the passengers' ratings, the satisfaction of the offered information quality is 1,5 so it can be improved another 1,5 grades in order to reach the excellent performance. The corresponding proposed upgrading for the other important quality measures are 2,5 for the signposting, 1.5 for the luggage handling and 1,0 for the punctuality of the alternative modes.
- Using the CSI model and the above mentioned quality improvements, the CSI upgrade was recalculated.
- For estimating the transfer time reduction due to the ticketing integration, specific observations took place calculating the mean time that a passenger spends in order to be transferred from the port to the interurban bus station and travel from Patras to Athens and other popular destinations. Separate observations were realized in order to split the calculated transfer time to waiting time and booking time.
- For estimating the transfer time reduction due to the coordination of timetables, all the relative collected data was analyzed, calculating the time between the arrival and departure of the alternative modes for specific o-d pairs.

Following the upper mentioned methodology the estimation of the indicators’ values took place as it is presented in the following table.

Table 2. Improvement from the implementation of the proposed business model

Proposed Improvements	Indicators to show enhancement	Evidence of Improvement
Coordinated timetables of alternative modes (ship, bus, KTEL etc.)	Transfer Time reduction Waiting time reduction CSI upgrade	Calculated to 2 hours Calculated to 2 hours Calculated to 20%
Transfer to the platforms of the passengers and the luggage	CSI upgrade	Calculated to 45%
Integrated ticketing via the port’s webpage (one shop stop)	Transfer Time reduction Waiting time reduction	Calculated to more than 1 hour Calculated to more than 1 hour
Adequate signposting and info displays	CSI upgrade Transfer Time reduction	Calculated to 30% Calculated to more than 20 minutes

As it is presented above specific changes in a business model can result to improvements in the operation of a terminal that can be counted as time, cost or satisfaction upgrade.

The upper mentioned example of the port of Patras constitutes a prototype methodology that can be used in any node of an intermodal chain in order to enhance intermodality and interconnectivity by combining the improving measures as resulted by the evaluation of the passengers with the corresponding changes that bring to the blocks of the current business model and the interaction between the involved actors.

6. Towards an improved Business model for the Patras Port

6.1. Categorization of measures-proposals

The new (proposed) Business Model of the Port is associated with the following two groups of measures-suggestions:

1. Achievement of ‘Seamless transfer’ within the port area through:

- Adequate signposting and info displays
- Transfer to the platforms of the passengers and the luggage

This first group of measures is associated with the desired quality of service of the port authority. The present study has pointed out the main attributes of the port that customers would like to be improved. This improvement is directly connected to the increase of passenger demand (as shown in 7.4). Moreover,

these specific improvements concern the terminal area and thus the only responsible for the implementation of these measures is the port authority itself.

2. Achievement of ‘Integration of transport modes’ through

- Integrated ticketing via the port’s webpage (one shop stop)
- Coordinated timetables of alternative modes (ship and bus)

This group of measures corresponds to the proposals which presuppose the cooperation of all involved stakeholders. The first step towards the implementation of these suggestions is the close cooperation between the port authority, the shipping lines and the other transport operators.

6.2. Policy implications and recommendations for the proposed Business model

These proposals of the new business model affect also the future interactions between the involved agents. Specifically, potential areas of cooperation is the integrated ticketing, for which the involvement and the collaboration between the Municipality of Patras, the port authority, the shipping agencies as well as the bus operators and the taxi drivers is necessary in order to define a viable scheme for fares’ setting and revenues sharing. Moreover, an additional opportunity for interaction between the agents is the coordination of the timetables of the different modes.

Again in this case, the collaboration between the port authority, the shipping companies and the bus operator is required, in order to determine in detail the intermediary transfer times and modify their timetables accordingly. The cooperation scheme between the involved parties in the new business model of the port is presented in the following figure.

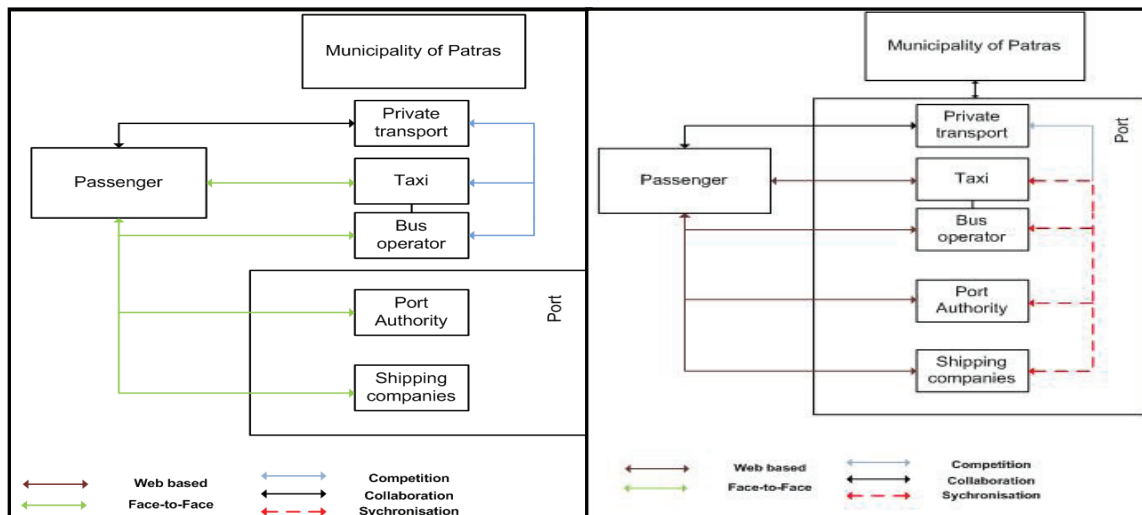


Fig.3. New cooperation scheme between the relevant actors

The figure above illustrates the current and the proposed Business Model framework from an organisational viewpoint. It highlights the fact that the current competitive relationship between the land

transport operators should transform in cooperation relationships in order to achieve coordination of the provided services with the shipping companies. For the implementation of this business model approach the Port Authority has to play a leading role as it constitutes the key player of the Port (together with the Municipality from a political perspective).

7. Conclusions

The overall objectives as well as the primary goals of all involved agents (stakeholders) in the new business model of the port of Patras remain the same. Since most of the agents involved concern private entities, the maximization of their profits should be considered as their overall objective. However, another important dimension that has emerged is that all involved agents should realize their service as part of a system (intermodal way of thinking). Once they realize that, an additional objective would be the promotion of the system as a whole, by the enhancement of the passenger intermodality in the port. This can be achieved only through the development of a new business model with different types of cooperation schemes between the agents, which would consequently alter (to a certain degree) the objectives and the goals of all involved parties. The common objective should be the settlement of all rising cooperation and collaboration issues for achieving a well organized intermodal environment up to the customers' needs. This would also lead to the strengthening of the port competitive advantage and increase of profits for all involved parties in the long term.

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