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HOW SERVICE BUNDLING CAN INCREASE THE COMPETITIVENESS OF LOW MARKET SHARE TRANSPORT CONNECTIONS

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HOW SERVICE BUNDLING CAN INCREASE THE COMPETITIVENESS OF LOW MARKET SHARE TRANSPORT CONNECTIONS

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ABSTRACT

This paper investigates the conditions under which a low share transportation service, bundled together with a Value-Added-Service (VAS) such as tourism, can compete with a faster transport connection. First, a business model is suggested for the service-bundle. Then the viability of the model is assessed using breakeven analysis. The approach is validated using a service example including ferry, bus and archaeological tourism. The paper assesses the viability of the service-bundle by relating the cost of the proposed service to the quantified benefits resulting from its use. A realistic pricing scheme is determined on the basis of which the breakeven demand is calculated. The yielded demand is validated based on observed data from a questionnaire survey and the projections of a logit model.
The results show that the competitiveness of the services depends on the selection of the business model and the assumed evaluation scenario. To be on the safe side, the latter is set to correspond to the worse-case; that is when the price equals the maximum possible value to the user and the number of expected passengers is minimum. To test the robustness of the results, an additional check is made to assess whether the minimum required value can be offered at a discounted price. The check involves testing: (a) if the discount rate is realistic; and (b) that the minimum booking quantity does not exceed the total number of standard-service users per user class.

Keywords: service bundling, value added services, value of time, transport competition

INTRODUCTION

This paper builds on the research project HERMES “High efficient and reliable arrangements for cross-modal transport”, and more particularly on the research for the

extension of the Adriatic – Ionian corridor from Peloponnese to Crete. The objective of this research is to analyze the existing connections and to evaluate the level of interconnectivity in the passenger terminals where short and long-distance transport networks cross and where fluidity between crossing networks should ensure the maintenance of the level of service when passengers are transferred from one to the other.

The aim of this paper is the investigation and development of a fully integrated intermodal 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 southern Peloponnese and c) the medium distance ferry transport from southern Peloponnese to Crete. However the main focus of the study is the currently "missing link" i.e. the inland leg between Patras and Southern Peloponnese which needs to be integrated to the network (see figure below).

Figure 1 – Study area

In the current situation, the 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 network (private cars or bus services) and

then, they use ferry services to Crete.

In this context the following sections deal with “accessibility” barriers between the various network components of the aforementioned corridor. These barriers are mainly of functional and operational “service” character, since from the physical viewpoint infrastructural connections exist and, therefore, the necessary conditions are fulfilled. The proposed business model which builds on a combination of transportation and value-added services offers an alternative –optimised- service solution for connecting the Adriatic corridor to Crete.

This paper investigates the viability of the proposed business model following an approach based on the breakeven analysis. Initially, the costs of providing the service are estimated for both service variants; that is the STANDARD and the PREMIUM. Then, the total value to be gained or lost by the end user is assessed for each variant. This value represents the maximum price at which the service may be offered. Finally, the required demand is estimated at the predetermined price level so that the service breakevens. This demand is then validated against the results of the multinomial logit model.

FOLLOWED APPROACH

Osterwalder et al. define ‘‘a business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm [Osterwalder, 2004]. The authors describe the objects and relationships that allow a simplified description and representation of what value is provided by a service, how this is done and with which financial consequences. They also present a business model canvas that exposes the rational of how it creates, delivers, and captures value. Nine building blocks are defined for the model which are shown below:

1. Customer segment
2. Value Proposition
3. Channels
4. Customer Relationships
5. Revenue Streams
6. Key Resources
7. Key activities
8. Key partnerships
9. Cost structures

Using the Ostenwalder methodology the following sections describe the business case of a transport service including ferry, bus and archaeological tourism in the Peloponnese. The viability of the service-bundle is then assessed by relating the cost of the proposed service to the quantified benefits resulting from its use.

Customer Segment

As known a services bundle is a package of services. This strategy of lumping services together is used in many industries and it can also be beneficial for both transport service providers and passengers [Collet, 2008].

The service-bundle assessed here is primarily aimed at tourists to and from Italy, traveling by ferry through the Adriatic.

The market shows some distinct features of a nice market. It includes a small proportion of tourist traffic from / to Greece, and consists of passengers of specific (low-medium) purchasing power, who choose to travel from this route because of the lower cost of the ferry compared to air. Higher income tourists are also traveling on the route, but they mainly use private transport so they're not considered in the analysis.

Value Proposition

The suggested service bundle includes:

- Improvement of the ferry service between Peloponnese and Crete
- Better coordination of the Adriatic and Aegean side ferry services
- Introduction of an inland 'shuttle' service (either bus or rail) connecting the port of Patras with the port of Kalamata in the southern Peloponnese
- Offering handling services at the port of Patras

Based on the characteristics of the above, it follows that the core value offered to passengers is efficiency, i.e. providing a better quality-cost ratio. This value proposition allows passengers to lower their transactional, interaction and other costs and in this way make savings of time and money. Due to supply aggregation, the service providers can offer a wide range of products that could be both best-sellers (ferry tickets from/to Italy), as well as niche products (e.g. car rentals or travel insurance). This leads to lowering customer transactional costs within listing and search. Of course, the reduction of transaction costs implies the existence of an online, one-stop-shop facility [Ezzedine, 2008].

Following Ostenwalder's typology, the proposed service seems to combine features of performance and price value proposition.

Channels

To decide upon the channels to deliver the value proposition, the following questions should be answered:

1. Explore the characteristics of demand to determine whether it is one-shot or recurring;

2. Specify who offers the services to the final customer; the public transport operators jointly (ferry and bus operators), or a 3rd party (3P) provider – e.g. a system integrator, a platform operator, etc. (see relevant discussion in 'Key Partnerships' section below).

Regarding the first question, and assuming that the target market consists primarily (but not exclusively) of tourists of low-medium income, it is expected that demand tends to be more one-shot (between strangers). This means that it relies on an indirect flow of reputation information (a tourist uses a service if the service has been reliable to other tourists) and price competition. A feature like that advocates for community-aware, low-cost advertising channels such as the Internet.

Regarding the second question, in the case the services are offered jointly by the carriers, the advertisement channels should be indirect. This is because the carriers, should they own any market channels are tuned to their previous customer segment, so no significant leveraging is expected in terms of marketing the services as a whole.

In the case the service bundle is offered by a 3rd party provider, the choice of using direct or indirect channels is related to the provider itself. A system integrator for example, has own means of channeling the value proposition to the customer segment. A company like that would normally rely on AdWords and ad network buys in order to acquire users. For businesses with a clear network dimension like the transport and tourist industry, there's often a word-of-mouth or viral component that plays an important role. This component is expected to play a crucial role in the service advertisement.

Customer Relationships

The decisions to be taken with respect to customer (passenger) relationships are also related to whether the services will be provided to the end user directly by the public transport operators or by a 3rd party provider.

In the first case, the model of personal assistance should be adopted in transit hubs as well as on-board. Also, some form of integrated automated services should be developed to provide users with a one-stop-shop capability.

In the second case, the model of automated services is more customary in practice. Personal assistance should also be available to passengers at the points of interaction with the transport system such as ports and transit terminals.

Revenue Streams

The main income for transport operators results from usage fees. For handling operators (if they are different from the previous) revenue results from withholding a share of usage fees (brokerage fee). In the same way, i.e. by retaining brokerage fees, the 3rd party provider will

receive income –if a 3P service model is chosen [EC, 2000; 2010], [EuroTraCS, 1998].

To match the specific revenue mix, suitable payment methods must be selected. These methods should be closer to the pay-as-you-go model, which means that subscriptions or postpaid payments that allow periodic use or access to the services are unnecessary. Instead, it would be appropriate to use a yield management system of payments, with the option to provide significant discounts when passengers do their reservations well in advance.

Key Resources

Resources to be committed by the public transport operators include:

- Physical (vehicles, vessels, customer support centers, terminals)
- Human (on-board personnel, office stuff including management and helpdesk)
- Financial (investment for upgrading transport means and infrastructure).

Assets required by the 3rd party provider (should this model is selected):

- Human (manager, administrator, technical support, helpdesk, operators)
- Financial (investment for the development of upstream interfaces and, if necessary, for increasing platform capacity).

Key Activities

Major procedures, activities, and events required by the transport operators:

- Production (provision of transport / handling services, booking, customer support)
- Problem solving (contingency planning in case the continuity of services is threaten).

Procedures and activities required by the 3rd party provider (should this model is selected):

- Platform (system management, service provisioning, and platform promotion)
- Problem solving (expedited repair services in case of a system failure).

Key Partnerships

The business offering of the considered service-bundle, to be realistic, it should be marketed in one of the following (mutually exclusive) ways:

1. The transport operators and handling firms should jointly participate in an SLA, which defines clearly the terms of cooperation in the services offered. The agreement shall describe the role and obligations of each, the resources to be shared and the risk involved. It will also stipulate participation in the financing of joint actions, such as

advertising and communication, and define the bearer of legal responsibility (a board of authorized representatives, a Special Purpose Vehicle, etc).

2. The transport and handling operators continue their business as usual. The integration of their services into a single service bundle, takes a 3rd party provider. The service bundle is constructed from the composition of one or more of the suggested services. It is provided not by any individual operator, but by a third party, making use of one or more offered services of the cross-modal chain. The bundle provides added value to the passengers of the individual services[1].

The offered service-bundle has defined requirements and properties. Note that these apply to the cross-modal chain as a whole - the bundle as an offering is not identical to the summation of offerings of individual services; nor can it be readily or arbitrarily decomposed into discrete offerings of individual services. In other words, the business case of the bundle offering cannot be built bottom up by summing up the business cases of individual services.

Following that, partnerships are required to effectively market the service bundle. They should be set according to whether the services will be provided jointly by the transport operators or by a 3rd party provider.

Should the services are provided by the public operators, partnerships are needed between the transport carriers and handling firms, to reduce or better control risk/uncertainty of delivering the services as a whole. Also, expanded partnerships with travel agents, hotels, local tourist offices, car rentals, etc. could contribute to a more efficient acquisition of resources & activities.

Should the services are provided by a 3P provider, partnerships must be sought aimed at the acquisition of resources & activities. Such partnerships, in addition to an SLA with transport operators, could include agreements for the deployment of services online, using SaaS (Software as a Service), PaaS (Platform as a Service), etc.

Cost Structure

The suggested business model is clearly cost-value driven.

From a management accounting standpoint there are two types of costs in delivering the planned service bundle:

- Fixed Costs – they are asset acquisition and administration costs, calculated on an annual basis. They remain the same no matter how many passengers there are – additional (incremental) passengers add no incremental costs.

[1] In a 3rd party business configuration it is possible for the individual transport operators to broaden their scope and build diversified business portfolios. This is a typical example of value creation through increased accessibility. Since this value corresponds to the upstream part of the value chain, i.e. the operators, it does not change the initial (efficiency) value proposition offered to passengers.

- Variable Costs – they are capacity and support provision costs, calculated on an annual basis by assuming a range of total passengers – additional (incremental) passengers add incremental costs, which for reasons of simplicity can be estimated using a cost scaling factor.

- Total Costs – the sum of fixed and variable costs.

There are also two ways to look at profitability – overall, and per service (or product[2]) sale.

- Total Profit – The sum of all sales minus the total costs to make and sell the service (or product), including overhead.

- Contribution Margin – The difference between service (or product) revenue and the variable costs to make and sell the service / product.

When the total revenue from product sales exceeds the total costs to make and sell that product, the product is profitable.

From a decision-making standpoint, a price must be selected so that the contribution margin is positive. Finally, the number of service tickets that need to be sold for the suggested business to be profitable is the fixed costs divided by the contribution margin.

ASSESSMENT OF VIABILITY

As mentioned, the aim of this paper is to assess the viability of the proposed business model, by relating the cost of the proposed service to the quantified benefits resulting from its use. In this way a realistic pricing is determined on the basis of which the required demand is calculated so that the service breakevens. The resulting demand is finally validated based on observed data from the questionnaire survey and the estimates of the logit model.

To assess the viability of the model seven steps have been followed:

1. Services exploited
2. Saving areas and assumptions of savings parameters
3. Drivers causing savings
4. Average trip value
5. Quantification of trip value
6. Cost of providing the service
7. Breakeven analysis

[2] It could be a tourist package including transportation, accommodation, etc.

Services exploited

For the Peloponnese leg of the Italy-Crete corridor two (2) service variants will be offered:

1. The STANDARD, including combined transport from the port of Patras to the port of Hania (Crete), i.e. bus from Patras to the city of Kalamata (South Peloponnese), changing to a ferry for the last leg of the trip. The STANDARD service comes with a luggage handling service at the ports of Patras and Kalamata.

2. The PREMIUM, which includes the ferry from Kalamata to Hania, the handling service at the ports plus a daily tour to popular destinations in the Peloponnese. These destinations might be places of cultural interest, recreational facilities, areas of exceptional natural beauty, etc. The PREMIUM package also includes an overnight stay at an affiliated hotel.

Saving areas and assumptions of saving parameters

The two most important areas of value savings are:

- Travel costs
- Travel time

The assumptions made for assessing the costs, are best explained under the section "Costs of providing the service". The assumptions made for assessing the time savings are:

- Arrival at Patras 11h30 – is the case of one major sea liner serving the connection between Greece and Italy. Other vessels arrive at 13h30.
- Departure from Piraeus 21h30 – all services depart from Piraeus at the same time
- Average time from Patras to Piraeus 9h (land leg)
- Average travel time from Piraeus to Crete (Itaklion) 9h (sea leg)
- Departure from Kalamata 16h00 – passengers from both sea liners can be collected
- Average time form Patras to Kalamata 4h (land leg)
- Average travel time from Kalamata to Crete (Hania) 5h (sea leg)
- Average length of stay for PREMIUM users 24h.

Drivers causing savings

The most important drivers causing the savings in each of the selected areas are distinguished below:

1. Speed: Impacting the lead time of individual services in the cross-modal chain, also including the Italy-Patras leg.

2. Reliability: Impacting the variability of individual services[3] in the cross-modal chain

3. Notification: Impacting the efficiency with which information is provided (integrating different types of information)

The table below lists which of the above drivers are crucial for the specific savings areas:

Table 1 – Drivers for savings

	Drivers		
Savings area	Speed	Reliability	Notification
Travel cost		X	X
Travel time	X		X

Average trip value

As shown further below, the quantified benefits per trip are strongly related to the average trip value. In that sense trip value strongly influences the business case.

Because the bulk of demand for the proposed services is leisure travelling, the Travel Cost Methodology (TCM) was used to assess the average value of a leisure trip. According to the literature, the TCM provides effective means to do so [Bockstael, 1987; Cesario, 1976].

The TCM translates the physical, psychological, and social benefits, generated by the individual use of non-marketable recreational resources, into monetary terms, making possible the comparison with the costs associated with visiting the resources. Basically, TCM uses the expenses that a user has to bear, including time spent on travel and at destination, as a proxy of the user's total disposition to pay for the right of recreating at destination. The method describes individual preferences and yields trip values depending on the value adopted for the expenditure of scarce time. From a theoretical point of view, this means that travel time is interpreted as a resource rather than a commodity and therefore its value is equal to its scarcity. In this interpretation, the Value of Travel Time (VTT) is the value a user attaches to gaining additional units of it, which is the value of leisure time per se. Of course, leisure time is conceived differently by different user classes. In our case for example, non-stop travellers consider leisure time as time spent entirely at destination, whereas stop-making travellers seem to gain utility from the travel itself.

The table below illustrates the average values assigned, by the different user classes, to quality time at Crete. The values are obtained from the results of the "Mixed Multinomial Logit Model" developed as part of the HERMES project [Kapros et al, 2013].

Table 2 – Average trip values by user class

	Average Trip Values (EUR/h)		
User Class	Car	Bus	Rail

[3] The 'individual service' whose reliability is affected is actually the land connection between Patras and Kalamata.

Non-Stop Travellers	17,31	7,34	8,34
Travellers with Stops	5,45	4,71	2,18

It is noteworthy that for the needs of this paper the values of transit time were used instead of waiting time values, as a better proxy of total trip value [Hsu, 2010]. That is because, in the case of premium users -who gain more utility from out-of-vehicle time, the two values do not differ much. In the case of standard users, this assumption leads to a safer estimate of the required demand and to a better check against the predictions of the model. Of course for the above to apply, it would require that users do not experience any major time drag, which means there are no significant reliability problems of the new services and that information about arrivals and departures is adequate.

Quantification of trip value

The benefits or losses incurred by the users of the services are quantified below. The results will be shown per service-variant (STANDARD and PREMIUM).

Regarding the STANDARD variant, which includes direct transit services from Patras to Crete via Kalamata, the benefits for each extra hour at destination is 17,31 EURO for car owners, 7,34 EURO for bus passengers and 8,34 EURO for rail passengers (see table 2). These values correspond to the non-stop travellers who attach more value to the destination. It is worth noting that the sole consideration of non-stop travellers as potential users of the STANDARD service stems from the need to assess the minimum required number of passengers for making the service viable; this allows assessments on the safe side.

Based on the above, the total benefits / losses of using the STANDARD service on the Patras-Kalamata-Crete can be calculated as follows:

Total Benefits / Losses = Value of Time savings +Value of money not spent on Patras-Piraeus-Crete route

Substituting in the above equation the values of time of table 2 and the values of section “Saving areas and assumptions of parameters”, we can assess the maximum benefit (positive sign) or loss (negative sign) incurred by the user as a result of embarking on the STANDARD service. The relative benefits / losses are shown in table 3.

Similarly, the benefit or loss resulting from the use of the PREMIUM service is derived as follows:

Total Benefits / Losses = Value of Time * Average length of stay in Peloponnese

After substituting the corresponding time values of table 2 and the values of section “Saving

areas and assumptions of parameters" the total losses are assessed for the PREMIUM users - also given in table 3.

Table 3 – Total trip benefits/losses by service variant

	Total Trip Benefit / Loss (EUR)			
	Non-Stop Travellers		Stop-making travellers	
Service Variant	Car	Bus/Rail[4]	Car	Bus/Rail
Standard	245,79	156,06	139,05	132,39
Premium			-130,80	-113,04

In the above table, one can observe that significant benefits (positive sign) result for users of the STANDARD service, regardless of the user class to which they belong. This is because those users enjoy time savings due to shorter distance travelled. In contrast, users of the PREMIUM service[5], suffer significant losses because of their extra 24-hour stay in the Peloponnese.

Costs of providing the service

This section assesses how much does it cost to service the Patras-Kalamata-Crete users. The cost includes wages, maintenance, etc. It also factors in upstream costs such as marketing, ticketing and insurance costs plus administration / office / etc to get the right order of magnitude.

For a better overview of the costs, they were grouped by category (fixed and variable) and individual service they refer to (i.e. bus, ferry, terminal handling and recreation).

The following table lists the various costs per category and type of individual service:

Table 4 – Costs per category and individual service (bus, ferry, handling, recreation)

	Bus (EUR/year)	**Ferry (EUR/year)**	**Terminal Handling (EUR/year)**	**Recreation (EUR/visitor-day)**
Total Fixed Costs	**16.000**	**602.000**	**62.350**	**132**
▪ Acquisition/ leasing/ rental (vehicles, equipment, facilities)	0	500.000	28.800	
▪ Cost of Service	**15.000**	**102.000**	**33.550**	
- Wages	12.000	80.000	29.550	
- Maintenance	1.000	0	1.000	
- Administration	500	2.000	2.000	

[4] Rail services between Patras and Kalamata have been abandoned since the completion of the survey. Therefore, the two user classes have been combined into one and the bus VOT was used as reference.

[5] As already stressed, for the safe assessment of breakeven demand, PREMIUM users include at least stop-making travellers.

- Upstream	1.500	20.000	1.000	
▪ Accommodation, F&B				100
▪ Recreation (cultural, sports)				20
▪ Shuttle services				12
▪ Other	1.000			
Total Variable Costs	**8.000**	**1.000.000**	**2.000**	**0**
▪ Fuel / Energy	8.000	1.000.000	2.000	
▪ Tolls				
▪ Other				

It should be noted that all the above costs were assessed assuming a seasonal service of 4 months.

In the case of the bus, it was assumed that the vehicle is available - in another route from which it should be transferred.

For the ferry a deck-engine, bareboat chartering solution is recommended. The vessel should have a maximum capacity of 500 passengers, 100 vehicles and cruising speed of about 26 knots.

As concerns the luggage service, the costs consist mainly of the operating expenses of 2 warehouses in Patras and Kalamata, and the personnel costs.

The recreational reference package includes hotel accommodation at the ancient Olympia, a guided tour at the archaeological site and shuttle services (optional) for visitors without a private car. The recreation costs represent the expenditures a visitor has to bear in order to travel and stay at the recreation facility for one day. According to TCM, these costs are a money proxy of the benefit (the value) the visitor puts on the site, for the right of using its recreation resources (hotel, museum, archaeological, sports site, etc). The costs correspond to the minimum required value of a site in order to attract PREMIUM users (it should match the total losses of table 3). Should the recreation services are offered at a discount, more PREMIUM users will be attracted.

Summing the total fixed and total variable costs of table 4, results to the total cost per individual service as shown below (table 5):

Table 5 – Total costs per service variant (standard, premium)

Total Costs	**Bus (EUR/year)**	**Ferry (EUR/year)**	**Terminal Handling (EUR/year)**	**Recreation (EUR/ visitor-day)**
Standard	24.000	1.602.000	64.350	
Premium				132

Break-even analysis

Having calculated the total costs for each service-variant (table 5), and knowing the maximum possible gains resulting from their application (table 3), the viability of the services was assessed by calculating the minimum required demand.

To be on the safe side, we assumed the worse case scenario; that is the price equals the maximum possible benefit. At this price the minimum number of passengers is assessed for which the service breakevens. To check the validity of the results, the breakeven demand is compared against the projections of the logit model: when the latter is greater than the former, the service is considered plausible.

In the case of the PREMIUM service, an additional check is made to assess whether the minimum required value (see table 3) can be offered at a discounted price. The check involves testing (a) if the discount rate is realistic; and (b) that the Minimum Booking Quantity[6] does not exceed the total number of standard users per user class.

In the table below the results of the breakeven analysis are shown per service variant and user class.

Table 6 – Breakeven passengers per service variant

	Breakeven Passengers			
	Non-Stop Travellers		Travellers with Stops	
Service Variant	Car	Bus/Rail	Car	Bus/Rail
Standard	**6.707**	**11.039**	**11.705**	**12.952**
Premium			465	11.206
Discount rate			**1%**	**14%**

The green colour in the cells of table 6 indicates that the corresponding service variant has passed the validation checks and is feasible. The red colour indicates the contrary.

In summary, after having tested several service prices and validated their breakeven demand, it appears that the service-variants are generally sustainable. In particular:

1. For 245,79 EUR, the minimum required demand for the STANDARD service is 6.707/year – no PREMIUM service at this price;

2. for 156,06, EUR the minimum (breakeven) demand is 11.039/year – no PREMIUM service at this price;

3. for 139,05, EUR the breakeven demand for the STANDARD service is 11.705/year, from which 465 passengers (that is 4% of the min STANDARD demand) make the PREMIUM service viable;

[6] To assess the MBQ the average number of daily visitors of recreation facility was set to 200 (representing typical hotel occupancy at the area) while the average GP was set to 40%.

4. for 132,39, EUR the breakeven demand for the STANDARD service is 12.952/year, from which 11.206 passengers (87%)[7] make the PREMIUM service viable.

CONCLUSIONS

The paper provides low-competition-service providers with the means to assess the viability of their services bundled together with VAS.

It does so by relating the cost of the proposed service to the quantified benefits resulting from its use. A realistic pricing scheme is then determined on the basis of which the breakeven demand is calculated.

The results show that the competitiveness of the services depends on the selection of the business model and the assumed evaluation scenario. To be on the safe side, the latter is set to correspond to the worse-case; that is when the price equals the maximum possible value to the user and the number of expected passengers is minimum.

This paper contributes to research in transport business and management, especially regarding ways to improve the service's quality-cost ratio. Due to supply aggregation, the service providers can offer a wide range of products that could be both best-sellers (e.g. ferry tickets), as well as niche products (e.g. car rentals).

As a result passengers can lower their transactional and interaction and other costs and in this way make savings of time and money.

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[7] It can be seen that the minimum required demand for the PREMIUM service increases significantly with the implied discount rate.

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