THE CHARACTERISTICS AND ATTITUDES OF PASSENGERS TOWARDS THE QUALITY OF SERVICES PROVIDED ON THE COASTAL ROUTES OF SOUTHWEST CRETE

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Abstract

The ports of southwest Crete mainly concern those of Gavdos, Agia Roumeli, Loutro, Palaiochora, Sougia and Chora Sfakion. The main objective of this article is to analyze passengers' characteristics, market conditions, and attitudes of Cretan residents towards the quality of services provided on the coastal routes of this specific region. The research is unique and can be extended to high demand coastal lines worldwide. We focused mainly on the "Sfakia-Agia Roumeli" coastal line, which consistently gathers the highest passenger traffic, and on the coastal company which holds an almost monopoly position in the market. In this context, primary research through structured questionnaires took place. The results showed that the participants are not completely satisfied with the company and its services, consider safety on-board as the most important quality factor, are concerned by the age of the ships and are willing to pay more for any quality improvements. Also, non-parametric inferential tests revealed that passengers who travel with their vehicle are more satisfied than those who travel without it, while their degree of satisfaction is stronger the more times they have traveled on these lines and if they travel for business reasons.

Keywords: Financial report, Board size, Board diligence, Financial expertise, Board independence.

1. Introduction

Gavdos, Agia Roumeli, Loutro, Palaiochora, Sougia, and Chora Sfakion are the main ports in Southwest Crete (figure 1). There is a great amount of passengers transferred between these locations concerned 15.24% of the total passenger traffic of Crete and 0.97% of the total passenger traffic of Greece (table 1). Coastal lines in this area are primarily served by one shipping company (CC), although there are several smaller competitors. The weight of scientific research on Crete's coastal shipping has focused mainly on the high-traffic ports

of Heraklion and Souda (Boile, Theofanis, Perra, & Kitsios, 2023). There has been no research into the perceptions of coastal service users in southwest Crete.

Figure 1 – Map of Crete and its ports.

Source: Inspired by d-maps.com

The main objective of this article was to fill this gap and analyze the passengers' characteristics, market conditions, and attitudes of Cretan residents towards the quality of services provided on the coastal routes of southwest Crete (figure 1). The proposed research is both original and unique. As we mentioned, there are significant gaps in the literature about the characteristics and assessment of passengers' attitudes towards the coastal shipping lines of southwest Crete and the companies operating in them. In particular, the passengers' perception of the quality of coastal services provided on these lines, the analysis of the specific market, the effect of passengers' socio-economic characteristics on their satisfaction with the trip and the approximation of the price elasticity of demand have not been ever happen.

The main research questions we attempted to answer were many, but it was deemed necessary because the analysis is exploratory and nothing scientifically similar has been carried out in the past. Therefore, the above eight (8) questions were raised for examination:

RQ1. *What are the attitudes of Cretan residents towards CC based on: a) the reliability of its routes, b) the ships' comfort and the safety provided to passengers, c) its land and on-board services, d) its pricing policy and e) its potential competitors?*

RQ2. *What is the ranking of the importance of the coastal service quality factors for the passengers of this line (S-A)?*

RQ3. *To what extent are passengers willing to pay an additional fare, if a modern ship enters the market, with improved services provided and possibly halving the journey time?*

RQ4. *How do passengers rank the rest of CC's lines of activity in relation to their quality characteristics?*

RQ5. *How satisfied are passengers, on a more general level, with CC?*

RQ6. *Does "gender", "traveling with family" and "traveling with the vehicle" affect respondents' overall satisfaction with CC?*

RQ7. *Is there a difference between respondents of different "age", "educational level", "profession", "work area", "marital status", and "number of children", in terms of their overall satisfaction with CC?*

RQ8. *Is there a difference between respondents of "different number of trips" and "different reasons for traveling" on this line, in terms of their overall satisfaction with CC?*

At a structural level, after analyzing the ports and the coastal lines of southwest Crete, we described the quality factors of coastal transportation in GCS, as they emerge from the literature. We focused mainly on the "Sfakia-Agia Roumeli" (S-A) coastal line, which consistently gathers the highest passenger traffic, and on the coastal company (CC) which holds an almost monopoly position in the market. In this context we attempted to evaluate the demographic characteristics of passengers, the main reason for their trip, the times they have traveled on this line and the choice to take their vehicle with them. We also investigated the route reliability, the company's pricing policy, the ship's amenities (comfort), the security provided and the land and on-board services. In this context, primary research through structured questionnaires took place and descriptive statistics and non-parametric inferential tests were applied.

Additionally, there is much room for further in-depth research in the future. We hope that our results will add to the existing knowledge and extend the analysis to similar travel destinations worldwide. The following analysis can be used by shipowners as it has managerial implications. For instance, on highly seasonal coastal lines it may determine passengers' perceptions of the quality of service provided. This can help coasters on the one hand to faciliate their business strategy and on the other to implement appropriate marketing policies to attract passengers. Furthermore, it may have theoritical implications. On the one hand it can lead to confirmatory factor analysis to find the appropriate continuous variables for further inferential tests. On the other hand, the same methodology may be applied to other modes of transportation, such as airplanes, trains, and, of course, cruises.

2. Literature review

2.1 The ports and the coastal lines of southwest Crete

The ports of Crete mainly concern those of Chora Sfakion (Sfakia), Souda, Sougia, Sitia, Rethymno, Palaiochora, Loutro, Kasteli Kissamos, Agios Nikolaos, Agia Roumeli, Heraklion and Gavdos (figure 1). Based on data provided by the Hellenic Statistical Authority (HSA), between 2000-2021 the passenger traffic in all Cretan ports was 31,258,707 passengers and represented 6.38% of the Greek region's passenger traffic (489,741,110 passengers) (table 1) (HSA, 2000-2022). The ports with the largest passenger traffic were Heraklion (50.69%), Souda (27.14%) and Agia Roumeli (8.97%) (table 1). The

main reason is that the first two connect Crete with the largest port of Greece (Piraeus) and the third welcomes tourists who cross the most famous gorge of Crete (Samaria Gorge). Then these passengers are transferred inland by coastal ships (Chora Sfakion) (figure 1).

Southwest Crete's ports are primarily located in Gavdos, Agia Roumeli, Loutro, Palaiochora, Sougia and Chora Sfakion (figure 1). Plakias and Agia Galini are two smaller ports, but they show little passenger traffic, and we will not take them into account. Between 2000 and 2021, Agia Roumeli had the biggest market share among southwest Crete ports (58.88%), followed by the port of Chora Sfakion (22.04%), the port of Loutro (11.27%), the port of Palaiochora (3.21%), the port of Sougia (2.69%) and finally that of Gavdos (1.91%) (HSA, 2000-2022) (table 1).

Table 1 – Passenger traffic statistics in Cretan ports from 2000 to 2021

Passenger traffic in all the ports of Crete	% of passenger traffic in Cretan ports, compared to the rest of Greek ports	N. of boarded passengers at Cretan ports of southwest Crete	% of passenger traffic in the southwest Cretan ports, compared to the rest of Crete ports	% of passenger traffic in the southwest Cretan ports, compared to the rest of Greek ports
1,258,707	6.38%	4,763,575	15.24%	0.97%
Cretan Ports	Passenger traffic per port of Crete	% distribution of passenger traffic per port of Crete	N. of passengers served per port of southwest Crete	% distribution of passenger traffic per port of southwest Crete
Gavdos	91,021	0.29%	91,021	1.91%
Heraklion	15,846,416	50.69%	0,00	0.00%
Agia Roumeli	2,804,668	8.97%	2,804,668	58.88%
Agios Nikolaos	184,832	0.59%	0,00	0.00%
Kasteli Kissamos	193,201	0.62%	0,00	0.00%
Loutro	536,991	1.72%	536,991	11.27%
Palaiochora	152,990	0.49%	152,990	3.21%
Rethimno	1,531,081	4.90%	0,00	0.00%
Siteia	255,403	0.82%	0,00	0.00%
Sougia	127,986	0.41%	127,986	2.69%
Souda	8,484,200	27.14%	0,00	0.00%
Sfakia	1,049,919	3.36%	1,049,919	22.04%
Passenger traffic in all the ports of Greece	*489,741,110*			

Source: Processing HSA data (2000-2021)

The rule of seasonality is evident in all Greek coastal shipping (GCS) (Goulielmos & Sitzimis, 2014; Sitzimis, 2021a; Sitzimis, 2021b; Sitzimis, 2022; Sitzimis, 2021c). Strong seasonality occurs in Crete during the summer (third quarter of the year), with percentages in many cases being above 50% (HSA, 2000-2022). It is worth mentioning that in the 3rd quarter (2000-2021 average), approximately 50% of Heraklion's passenger traffic boarded in Souda and approximately 50% of Souda's passenger traffic in Agia Roumeli (HSA, 2000-2022). A small port, due to the high tourist demand, is competitive with two of the largest ports in Greece.

In absolute terms, the coastal lines of southwest Crete with the highest passenger traffic (for the years 2019-2022) are the following seven (7): "Agia Roumeli-Sfakia", "Agia Roumeli-Sougia", "Loutro-Sfakia", "Sfakia-Loutro", "Gavdos-Sfakia", "Agia Roumeli-Palaiochora" and "Sfakia-Agia Roumeli" (HSA, 2000-2022). In particular, 617,568 passengers were transferred in the first four (4), with an average of more than 25,000 passengers. The line "Agia Roumeli-Sfakia" had an average of 57,929 passengers, followed by "Agia Roumeli-Sougia" with 43,409 passengers, "Loutro-Sfakia" with an average of 25,103 passengers, "Sfakia-Loutro" with 27,951 passengers, and "Sfakia-Agia Roumeli" with 9,051 passengers (table 2).

In summary, 696,355 people were transferred on all seven (7) lines, with an average of 24,870 passengers per year and per line (table 2). (HSA, 2000-2022). There is an obvious decrease for the years 2020 and 2021 when there were state restrictions on passenger movements due to the Covid-19 pandemic (Boile, Theofanis, Perra, & Kitsios, 2023; Kouhihabibi, 2021). For the year 2022, the "Agia Roumeli-Sfakia" coastal line gathered 33.87% of the total passenger traffic, the "Agia Roumeli-Sougia" line 29.90%, the "Sfakia-Loutro" line 14,49%, the "Loutro-Sfakia" line 10.33%, the "Sfakia-Agia Roumeli" line 5.03%, the "Agia Roumeli-Palaiochora" line 4.24% and the "Gavdos-Sfakia" line 2.14% (table 2).

Table 2 – Passenger traffic on the seven (7) main coastal lines of southwest Crete (years 2019-2022)

	Number of passengers						
Coastal Lines	2019	2020	2021	2022	Total	*Mean*	2022 (%)
Agia Roumeli-Sfakia	82,039	29,542	48,068	72,065	231,714	*57,929*	33.87%
Agia Roumeli-Sougia	49,341	22,650	38,035	63,611	173,637	*43,409*	29.90%
Agia Roumeli-Palaiochora	7,156	3,156	6,027	9,030	25,369	*6,342*	4.24%
Loutro-Sfakia	28,402	23,787	26,253	21,970	100,411	*25,103*	10.33%
Sfakia-Agia Roumeli	10,006	6,903	8,601	10,692	36,203	*9,051*	5.03%
Sfakia-Loutro	30,572	21,057	29,360	30,816	111,805	*27,951*	14.49%
Gavdos-Sfakia	3,865	4,835	3,956	4,559	17,216	*4,304*	2.14%
Total	211,382	111,930	160,300	212,744	696,355	*24,870*	100.00%

Source: Processing HSA data (2019-2022)

2.2 Quality factors of coastal transportation services in GCS

According to Cole (2005) the quality of transport service depends mainly on the departure or arrival times (frequency), standard of service, comfort, reliability, and safety. Sambrakos broadly endorses this view (2018). Other authors focus on, among other things, travel time and fare level (Grigoroudis & Siskos, 2004; Hensher, Stopper, & Bullock, 2003; Tyrinopoulos & Aifadopoulou, 2008). Yuen and Thai (2015) argue that quality is one of the pillars of user satisfaction of a service. Although the variables "quality" and "user satisfaction" are related to each other, they are not completely identical (Pantouvakis, 2010). The main difference is that user satisfaction reflects their experience of using the service, while quality improvements, which are not based on user needs, do not necessarily

lead to their satisfaction (Lacobucci, Ostrom, & Grayson, 1995). However, this correlation is basically positive (Qin & Prybutok, 2009; Senic & Marinkovic, 2014).

Liner and passenger (coastal) shipping show many similarities to each other (Dimitriadis, 2016; Drozhzhyn, Koskina, & Tykhonina, 2021). The market conditions of carriers operating passenger routes are similar to carriers operating general cargo routes. Yuen and Thai (2015) concluded that the descending order of the effect of quality factors on liner shipping user satisfaction is: reliability, speed, responsiveness (shippers' satisfaction) and freight charged.

In GCS, according to Goulielmos and Sitzimis (2014) quality of service depends on crossing hours, speed, age, and comfort. As they note, in relation to the liberalization of GCS (2006), the quality of service was never regulated and thus was never deregulated. Lekakou et al. (2011) examining the coastal routes on the island of Chios, they concluded that for conventional ships the most important quality factors are reliability, comfort, frequency of routes and crew attitude. The least important is recorded by the duration of the trip. On high-speed vessels, reliability, comfort, and crew attitude come first, while vehicle fare comes last. Extending the analysis to a "barren" (subsidized) line in northern Greece, they found the special role of route reliability, ticket price and crew attitude and not so much other factors such as the duration of the trip and the frequency of the route. Khan et al. (2018) used structural equation modeling to investigate the association between the passenger ferry's overall perceived quality of service and service variables. It can be shown that, out of the three endogenous variables, the ferry's fitness has the biggest impact on the degree of service provided by the passenger ferry, followed by riding safety and comfort level.

According to Profillidis (2016) the quality of transport service is the most critical parameter in determining the demand of a transport service, after the price. In fact, quality of service plays an important role in pricing. For instance, newer and faster coastal ships charge higher fares than conventional ships (Goulielmos & Sitzimis, 2014). Profillidis (2016) considers that in passenger transport quality depends on: a) transport conditions (comfort and service on-board), b) travel time (speed), c) reliability of the means of transport (departure-arrival time), d) transport safety (risk of accident), e) the frequency and flexibility in choosing the departure-arrival time. This article is largely based on this research perspective. We consider that the categorization listed by the author clearly and concisely describes the general research results around the issue and fully covers our objective. In fact, he also sets weighting factors for these quality factors. Safety scores 30%, journey time 24%, route reliability 21%, comfort 18% and flexibility in departure-arrival time selection 7%. What remains is to confirm the correctness of what he said.

3. Research methodology

As is well known, the population in a survey or statistical population is the set of examined individuals-elements that can be included in the survey (Babbie, 2018; Zafeiropoulos, 2015). In our case, we focused on Cretan residents and mainly on the residents of the prefecture of Chania, as they are CC's dominant customer base (mainly in the non-summer months). Our selection did not include domestic and foreign tourism, due to the time constraints of the survey. The research was carried out in the period between January (12/1) and April (13/4) 2023. Certainly, in the future the same analysis could and should be extended to them as well (i.e. to take place also in the May-November period). This does

not of course mean a qualitative lag in the conclusions as the residents are the ones who have traveled the most times with the company's ships and have a more crystallized view of the quality of services provided.

Structured questionnaires were distributed online (google forms) to measure the conceptual framework variables and the correlations between them (Saunders, Lewis, & Thornhill, 2019; Schindler, 2019; Zafeiropoulos, 2015). Essentially, in this research we included in the analysis a single coastal line of southwest Crete (S-A). This focus allowed us to make detailed observations, something that cannot be done with large samples (e.g. in all other lines), without high costs (Saunders, Lewis, & Thornhill, 2019). Also, the method is useful, because being the research at a primary level, it can direct future study to other routes.

With the structured questionnaire we managed to collect useful data and information in a very short time. Compared to other research tools, it is minimally expensive (time, money, and effort), while the researcher, without interfering, often gets honest answers to delicate questions (Schindler, 2019). In our study, online questionnaires were administered as the majority of the target population was computer literate, there was certainty that the right person was answering, there was little chance of respondent bias, the questionnaire was easily readable, and automatic data entry occurred (Zafeiropoulos, 2015). The Statistical Package for the Social Sciences (SPSS 22) was used to analyze the structured questionnaire (Gnardellis C. , 2019; Gnardellis C. , 2013; Roussos & Tsaousis, 2020).

In relation to sample selection, we observed an equal percentage ratio in gender. In other words, we followed the quota sampling method. Our Sampling units were selected based on predetermined characteristics. The aim was for the sample to have the same distribution of characteristics as the general population. In other words, the sample can be considered representative (Dimitriadis, 2016). We know that the ratio of men to women in the Greek population is about 50:50. According to the most recent figures of HSA (population census 2021), in all the Municipalities of the prefecture of Chania, on average 51.5% were men and 48.5% were women (www.statistics.gr). The sample was therefore selected approximately based on this ratio, i.e. 134 men and 126 women, in a total of 260 questionnaires. The confidence level was set at 95%, the level of statistical significance at 5%, while the standard error ranged at 6% (Dancey & Reidy, 2020). Generally, the minimum acceptable error of estimation in these customer satisfaction surveys is 5% (Bartlett, Kotrlik, & Higgins, 2001; Hejazi & Fawzy, 2021), but as the sample is representative (only people who had traveled on the S-A line were selected), the small deviation is not expected to affect the validity of the research.

The design of the questions included:

- 31 closed-type questions (Likert scale of the form "1: not at all, 2: slightly, 3: moderately, 4: very, 5: extremely") and 4 similar questions of the form "1: worse, 2: relatively worse, 3: the same, 4: relatively better, 5: better', in order to measure the variables of our conceptual framework (quality of coastal services provided and passenger satisfaction with CC) and the correlations between them.
- 8 closed-type questions (multiple choice) on respondents' demographic and socio-economic data.
- 6 closed-type questions (multiple choice) regarding the respondents' general perceptions of the S-A line and a corresponding one (1) for the rest of the coastal lines operated by CC.

- 3 closed-type questions (multiple choice) and one (1) open-ended question for the S-A line passengers' more crucial factors for a high-quality coastal service.
- 2 closed-ended questions (multiple-choice) to assess qualitatively the price elasticity of demand on the 'S-A' line.

4. Descriptive statistical analysis of data and results

4.1 The demographic and socio-economic characteristics of respondents on the S-A line

The sample of research participants consists of 134 men (51.5%) and 126 women (48.5%), predominantly aged 25-54 years (64.6%), the majority of whom reside in urban areas (59.6%) in the city of Chania (88.8%). Basically, they are high school graduates (36.2%) and higher education graduates (65.4%). Most of them work as employees in the private sector (35.0%), are married (46.5%) and have no children (51.5%).

In relation to the respondents' general perceptions of the S-A line, 49.2% have traveled on this line 1-3 times in their life and 46.5% never, in the last two years (2021-2022). The most important reason for these trips was leisure (65.0%). Most passengers take this route together with their family (67.7%), without being accompanied by a vehicle (74.6%). This is mainly explained by the lack of need for a vehicle in Agia Roumeli (35.0%) and by the presence of regular public transport (e.g. public bus service Chania-Rethimnon S.A.), either in Omalos or in Chora Sfakion (30.8%) (figure 1). It should be noted that Agia Roumeli can be reached either by hiking from Omalos mountain (and crossing the Samaria Gorge), or by coastal ships from Chora Sfakion.

4.2 The attitudes of Cretan residents towards CC and the services provided on the S-A line

Descriptive statistics for the S-A coastal line were divided into five categories and related to thirty (30) questionnaire questions, almost identical to those of Profillidis (2016): a) the "route reliability" category (scheduled departure-arrival time of the company's ship, frequency of the company's sailings, punctuality of the company's sailings (adherence to the sailing schedule and timely notification of any changes), total duration of the trip), b) the "pricing policy" category (passenger fare, vehicle fare, fare offers), c) the "ship comfort and safety" category (the comfort of shared areas on the ship, cleanliness of the ship, feeling of safety on-board), d) the category "land and on-board services" (ship crew (willingness, service on-board), service time at the ticketing agency, passenger boarding/disembarking procedure, vehicle boarding/disembarking procedure), e) the category "preference for CC over potential competition" (passenger knowledge of the other coastal companies operating on the lines of southwest and northwest Crete, qualitative comparison of CC with the other companies on the same or nearby routes). The last category was added, as there is an increased possibility of new competitors' entrance (due to the high passenger traffic of the S-A line).

For each question of each category, the minimum and maximum value of the answer, the mean, the median, the mode, and the standard deviation were recorded (Dimitriadis, 2016; Norris, Qureshi, Howitt, & Cramer, 2017). At the same time, the percentage distribution of the responses, based on the 5-point Likert scale, was used. Finally, the means of measures of central tendency and standard deviation were extracted. The general logic

was that responses with an average mean of 1-2 on the scale expressed dissatisfaction, responses of 4-5 satisfaction, and response 3 neither dissatisfaction nor satisfaction. Sitzimis (2023) successfully developed a similar methodology for the quality evaluation of a high-school textbook of the Greek educational system.

Of course, applying the mean to Likert scales to draw conclusions is not an appropriate methodology (Dancey & Reidy, 2020; Roussos & Tsaousis, 2020). As a measure of central tendency, it is not meaningful in ordinal variables as we can neither average out the 'not at all' and 'extremely' responses, nor can we assume equal emotional distance between the 'very' and 'extremely' responses. Moreover, respondents are often reluctant to take a clear position and give more weight to the neutral answer "moderately". To facilitate our analysis, we ended up using the mean, with the logic that in our research it reaches the same conclusions as the mode and the median. To establish the reliability of the structured questionnaire given to respondents, we used the Alfa (Cronbach's a), Split-Half and Guttman models (Anastasiadou, 2012). The assessment was done separately for each of the five categories of the questionnaire. All three models confirmed the internal consistency of the questions in all scales of the questionnaire (values greater than 85%) (Akinola & Okundalaiye, 2022).

In relation to the 1st research question, by comparing and summarizing the five (5) evaluation categories for the degree of passengers' satisfaction on the S-A line we find that (table 3) based on the answers' average mean, the greater dissatisfaction of the respondents is expressed for "pricing policy" (3.05) and the highest acceptance for "land and on-board services" (3.69). In no category did the result exceed the value of 3.69, i.e. no satisfaction was expressed by the participants. The mean of the variable (response) with the highest frequency (mode) appears in "land and on-board services" (4.00) and the lowest in "preference against potential competition" (2.80).

The average of the standard deviations across all rating categories ranges from 0.946 to 1.128. This shows that many results are within 0.946-1.128 points above or below the respective mean. It is generally estimated that 70% of all results fall within one standard deviation of the mean (Dancey & Reidy, 2020). For example, in "route reliability" the value 1.033 indicates that almost 70% of the participants answered from 2.34 to 4.40. The percentages of "not at all" to "moderately" responses are particularly high for all categories and reach 65.8% for "preference over potential competition" and 65.7% for "pricing policy". Only in the category "land and on-board services" do the answers "very-extremely" predominate (58.4%). The participants' concerns about the quality of CC's coastal services are evident.

In conclusion and based on the percentage (%) of respondents' answers from "not at all" to "moderately", that is, expressing relative dissatisfaction about the quality of the provided coastal services, we could rank the dynamics of their objections in descending order as follows: 1. Preference to CC over potential competition, 2. Pricing policy, 3. Comfort on-board and Safety, 4. Route reliability, 5. Land and on-board services.

Table 3 – The assessment of the five (5) qualitative variables that affect the level of passenger satisfaction by CC on the S-A coastal line

	Measures of central tendency and variance				Response rates	
Evaluation criteria	Mean	Mode	Median	Std. Deviation	Not at all-Moderately	Very-Extremely
Route reliability	3.37	3.43	3.43	1.033	53.30%	46.70%
Pricing policy	3.05	3.00	3.00	1.128	65.70%	34.30%
Comfort on-board and Safety	3.29	3.25	3.25	1.005	57.95%	42.05%
Land and on-board services	3.69	4.00	3.80	0.977	41.60%	58.40%
Preference to CC over potential competition	3.06	2.80	2.80	0.946	65.80%	34.20%

Source: Our elaboration, 2023.

4.3 The perception of the importance and the ranking of quality assessment categories on the S-A line

The elements that most concern the respondents and would possibly choose a competing company instead of CC (2nd research question) are the age of the ships (17.9%), the high prices of passenger tickets (14.1%), the long journey duration (11.9%), the problematic travel frequency (11.5%) and the feeling of insecurity on-board (11.2%). About six (6) to ten (10) respondents believe that the company's three oldest ships should be replaced immediately, which seems to be in line with its overall potential investment policy.

According to passengers, the most important quality factors are safety on-board (35.1%), route frequency (19.6%), departure-arrival time (18.2%), journey time (13.9%) and comfort on-board (13.2%). The proposals they submit for the improvement of the services provided do not differ significantly from the above answers.

4.4 The qualitative approximation of price elasticity of demand on the S-A line

Of great interest are the answers of the respondents regarding their degree of reaction and response to changes in the ticket price (3rd research question). About 87.5% are willing to pay an increase of 0.01-3€, 66.3% an increase of 3.01-6€ and 45.5% an increase of 6.01-9€ for a modern ship, closed-type, with improved services provided and maintaining the same journey duration. These rates increase significantly by adding the assumption of halving the travel time. They become 95.2%, 82.1% and 57.1% respectively. It appears that demand is relatively inelastic to small fare adjustments.

4.5 The perception of the quality of services provided in the rest of the coastal lines of southwest Crete

Some of the passengers of the S-A line had also traveled on other lines of southwest Crete (4th research question). The dominant responses are "Sfakia-Loutro" (46.9%), "Agia Roumeli-Sougia" (7.3%), "Agia Roumeli-Loutro" (6.9%), "Agia Roumeli-Palaiochora" (6.5%), "Palaiochora-Loutro" (6.5%) and "Sfakia-Gavdos" (6.2%). Since this research is focused on the S-A line and "Loutro" is an intermediate stop (so roughly the same market conditions), we have given weight to the remaining four (4) lines. In other words, we ignored the routes "Sfakia-Loutro" and "Agia Roumeli-Loutro" (table 4). There were four

(4) questions per coastal line. The first referred to route reliability, the second to pricing policy, the third to comfort and safety of the ship and the fourth to land and on-board services.

On the "Agia Roumeli-Sougia" line, the average mean of the answers is 3.58 and the median is 4.00, which shows that the respondents are relatively positive about the quality of the provided coastal services. The highest average values concern question 4 (mean=3.74>3), about land and on-board services and question 1 (mean=3.63>3) about the reliability of the route. On the contrary, the least satisfaction stems from the pricing policy (question 2, mean=3.42>3). On the line "Agia Roumeli-Palaiochora", the average mean is 3.68 and the median is 3.75. The highest mean values are related to land and on-board services (question 4, mean=3.88>3) and route reliability (question 1, mean=3.76>3). Less satisfaction is expressed by the respondents for the pricing policy (question 2, mean=3.53>3) and the comfort-safety of the ship (question 3, mean=3.53>3).

On the "Palaiochora-Loutro" line, the evaluation of the quality of the provided coastal services shows an average mean of 3.54 and a median of 3.50, with none of the mean values being below 3. The greatest satisfaction is related to the reliability of the route (question 1, mean=3.82>3) and with the land and on-board services (question 4, mean=3.71>3) while the lowest average value is again related to the company's pricing policy (question 2, mean=3.29>3). In the line "Sfakia-Gavdos" the quality is evaluated by the respondents as above average (average mean=3.52>3 and median 3.75). All answers are relatively positive, with land and on-board services being the strongest of them (question 4, mean=4.00>3). This is followed by route reliability (question 1, mean=3.69>3), while neither dissatisfaction nor satisfaction is expressed about the pricing policy (question 2, mean=3.00).

In table 4, we compare and summarize the respondents' assessment of the quality of services provided on the coastal lines of southwest Crete "Agia Roumeli-Sougia", "Agia Roumeli-Palaiochora", "Palaiochora-Loutro" and "Sfakia-Gavdos". Based on the percentage of respondents' answers from "not at all" to "moderately", that is, expressing relative dissatisfaction with the quality of the provided coastal services, we could rank the dynamics of their objections, by line, in descending order as as follows: 1. Palaiochora-Loutro, 2. Sfakia-Gavdos, 3. Agia Roumeli-Sougia, 4. Agia Roumeli-Paliochora.

4.6 The general level of passenger satisfaction from CC on the S-A coastal line

In relation to the general level of respondents' satisfaction with CC on the S-A coastal line, concerns not dissatisfaction, but only relative satisfaction (5th research question). About 12.3% are dissatisfied (answers "not at all-slightly"), 44.6% neither dissatisfied nor satisfied ("moderately" answer) and 43.1% satisfied ("very-extremely" answers). However, the latter percentage is weighted more towards the answer "very" (31.2%) and less towards the answer "extremely" (11.9%).

5. Inferential statistical analysis of data and results

5.1 The effect of "gender", "travel with family" and "travel with vehicle" on the overall degree of passengers' satisfaction with CC on the S-A coastal line

In order to answer the 6th research question, we used the non-parametric Mann-Whitney test (Chalkos, 2020; Norris, Qureshi, Howitt, & Cramer, 2017). It is indicated in this

analysis because the values of the dependent variable do not follow the normal distribution (according to the results of the K-S test [D(260)=0.25, p<0.001]) (Roussos & Tsaousis, 2020), the independent variables "gender", "travel with family" and "travel by vehicle" are 2-level categorical and the dependent variable "general satisfaction with the company" is continuous (Dimitriadis, 2016; Roussos & Tsaousis, 2020).

Table 4 – Quality assessment for services provided on four (4) coastal lines of southwest Crete

	Agia Roumeli-Sougia	Agia Roumeli-Palaiochora	Palaiochora-Loutro	Chora Sfakion-Gavdos
Mean	3.58	3.68	3.54	3.52
Mode	3.75	4.00	3.25	3.75
Median	4.00	3.75	3.50	3.75
Std. Deviation	1.063	1.201	1.005	1.164
Not at all-Moderately	42.1%	39.7%	48.6%	42.3%
Very-Extremely	57.9%	60.3%	51.4%	57.7%

Source: Our elaboration, 2023.

We initially set as a null hypothesis that the values distributions of the four populations from which the four (4) groups under consideration are derived are the same. As an alternative hypothesis we assumed that the values distributions of the four (4) populations from which the four (4) groups are derived, while identical in all their characteristics, differ in their means (Norris, Qureshi, Howitt, & Cramer, 2017). In other words, our null hypothesis is that the distributions of the degree of satisfaction of men and women, those traveling alone or as a family, and those traveling with or without their own vehicle, from the CC will be exactly the same (in the alternative hypothesis will vary).

It emerged that there is no statistically significant difference in the mean rankings (or medians) of the groups related to the variables "gender" and "traveling alone or with family" (U=8311, p=0.818 and U=7311, p=0.879) (Norris, Qureshi, Howitt, & Cramer, 2017). Only for the variable "travel with or without a vehicle" was the result statistically significant (U=4763, p=0.001) (table 5). The magnitude of the effect of the independent variable on the dependent variable is r=z/square root N, i.e. r=0.2. According to Cohen's classification of effect sizes which is 0.2 (small effect), 0.5 (moderate effect) and 0.8 and above (large effect), this is a small effect (Lakens, 2013). Finally, we found the median separately for passengers who travel with their vehicle versus those who do not. It seems that the former (median=4) are more satisfied with CC than the latter (median=3).

5.2 The effect of "educational level", "age", "work area", "profession", "marital status", "number of children", "number of trips" and "reason for travel" on the overall passenger satisfaction with the CC on the S-A coastal line

In relation to the 7th and 8th research questions, to find out whether the "educational level", "age", "work area", "profession", "marital status", "number of children", "total number of trips on the line", "number of trips on the line in the last two years" and "reason for travel" influence the respondents' overall degree of satisfaction with CC, we applied the non-parametric Kruskall Wallis test (Chalkos, 2020; Norris, Qureshi, Howitt, & Cramer, 2017). The main reasons were that these were categorical variables with more than two levels and

that the basic condition of data normality was not ensured (Dimitriadis, 2016; Roussos & Tsaousis, 2020).

Based on the data analysis, it was found that only the "total number of trips on the S-A line" [H(3)=14.719, P=0.002)], the "number of trips on the S-A line, in the last two years" and the “reason for traveling on the S-A line” affect the general degree of passenger satisfaction. [H(3)=27.053, P=0.000)], [H(3)=10.658, P=0.014)] (table 5) (Norris, Qureshi, Howitt, & Cramer, 2017). The remaining variables do not exert statistically significant effects. From the pairwise comparisons carried out it appears that for the 1st independent variable the distribution of the group of people who have traveled on the line more than 10 times in their life differs significantly both from the distribution of the group of people who have traveled 1-3 times (p=0.001) as well as from those who have traveled 4-6 times (p=0.007) (Norris, Qureshi, Howitt, & Cramer, 2017; Roussos & Tsaousis, 2020). We conclude that the degree of satisfaction is stronger among passengers who have traveled more than 10 times on this particular line.

Also, for the 2nd independent variable the distribution of the group of people who have traveled on the line, in the last 2 years (2021-2022) more than 6 times in their life differs significantly from the distribution of the group of people who have traveled 1-2 times (p=0.000), from those who have traveled 3-4 times (p=0.029) and from those who have never traveled (p=0.000) (Norris, Qureshi, Howitt, & Cramer, 2017; Roussos & Tsaousis, 2020). It is obvious that the degree of satisfaction is stronger among passengers who have traveled more than 6 times on this line.

Finally, it appears that for the 3rd independent variable the distribution of the group of people who have traveled for business reasons, on the S-A line, differs significantly both from the distribution of the group of people who have traveled for leisure (p =0.024), as well as from that which they have traveled to cross the Samaria gorge (p=0.006) (Norris, Qureshi, Howitt, & Cramer, 2017; Roussos & Tsaousis, 2020). We conclude that the degree of satisfaction is stronger among passengers who have traveled for business reasons on this line.

6. Discussion and conclusions

The main purpose of this paper was to analyze passengers’ socio-economic characteristics, market conditions, and attitudes of Cretan residents (mainly the residents of the Prefecture of Chania) towards the quality of services provided on the coastal shipping routes of southwest Crete. As a case study we used the coastal line "Sfakia-Agia Roumeli" (S-A) and the main shipping company in the area (CC). Structured questionnaires were distributed, and we collected a sample of 260 respondents, predominantly aged between 25 and 54. Most of them live in urban areas in the city of Chania, work as employees in the private sector, are married and have no children. Basically, they are high school graduates and graduates of higher education. The first half of respondents have traveled on this line 1-3 times in their life while the second half haven’t, in the last two years (2021-2022). The most important reason for these trips was leisure. Most passengers travel on this route together with their family, without being accompanied by a vehicle.

Table 5 – Appropriate inferential tests between the dependent and independent variables of the research and results (gray surfaces show statistical significance differences)

Research Question	Factor List (independent variables)	*Dependent Variable: General satisfaction with the company*		
		Inferential Tests	*Statistically significant result*	*Results interpretation*
RQ:6	*Gender*	Mann-Whitney U test	-	-
RQ:6	*Travel with family*	Mann-Whitney U test	-	-
RQ:6	*Travel by vehicle*	Mann-Whitney U test	U=4763, p=0.001	Passengers who travel with their vehicle are more satisfied with CC on the S-A line
RQ:7	*Educational level*	Kruskall Wallis H test	-	-
RQ:7	*Age*	Kruskall Wallis H test	-	-
RQ:7	*Work area*	Kruskall Wallis H test	-	-
RQ:7	*Profession*	Kruskall Wallis H test	-	-
RQ:7	*Marital status*	Kruskall Wallis H test	-	-
RQ:7	*Number of children*	Kruskall Wallis H test	-	-
RQ:8	*Total number of trips on the S-A line*	Kruskall Wallis H test	H(3)=14.719, p=0.002	The degree of satisfaction is stronger among passengers who have travelled more than 10 times on the S-A line
RQ:8	*Number of trips on the S-A line in the last two years*	Kruskall Wallis H test	H(3)=27.053, p=0.000	The degree of satisfaction is stronger among passengers who have travelled more than 6 times on the S-A line, in the last two years
RQ:8	*Reason for traveling on the S-A line*	Kruskall Wallis H test	H(3)=10.658, p=0.014	The degree of satisfaction is stronger among passengers who have travelled for business reasons on the S-A line

Source: Our elaboration, 2023.

Assessment criteria for the quality of services provided were "route reliability", "pricing policy", "comfort on-board", "Land and on-board services" and "Preference to CC over potential competition". The descriptive analysis showed in general that the greatest dissatisfaction of the respondents is expressed for the "pricing policy", the highest acceptance for the "land and on-board services", while no satisfaction is expressed by the participants in any category. Based on the percentage of respondents' answers from "not at all" to "moderately", the dynamics of their objections in descending order are: 1. Preference for CC over potential competition, 2. Pricing policy, 3. Comfort on-board and Safety, 4.

Route reliability, 5. Land and on-board services. This means that while our research agrees at a general level with the existing literature on the qualitative factors that influence passengers' attitudes, it disagrees about the most important of them. The "land and onboard services" factor is not found as primary in Yuen & Thai (2015) Lekakou et al. (2011) Kahn et al. (2018). Of course, these surveys do not refer to the coastal shipping lines of southwest Crete.

The elements that most concern the respondents and would possibly choose a competing company instead of CC are the age of the ships, the high prices of passenger tickets, the long duration of the trip, the problematic frequency of the trip and the feeling of insecurity on-board. According to passengers, the most important quality factors are safety on-board, route frequency, departure-arrival time, journey time and Comfort on-board. In relation to Profillidis' point of view, the first (safety) and the third position (route reliability-departure and arrival time) of the quality factor rankings formulated by him are confirmed. Differentiation is observed on the one hand in the second place as the research showed flexibility (route frequency) and not the journey time (4th place) and on the other hand in the fifth place where the comfort is located (and not the flexibility).

On a percentage scale, 87.5% of respondents are willing to pay an increase of 0.01-3€, 66.3% an increase of 3.01-6€ and 45.5% an increase of 6.01-9€ for a modern ship, closed-type, with improved services provided and maintaining the same journey duration. These rates increase significantly by adding the assumption of halving the travel time. In relation to the rest of the lines in southwest Crete, the dynamics of respondents' objections to the quality provided, in descending order, is recorded as follows: 1. Palaiochora-Loutro, 2. Sfakia-Gavdos, 3. Agia Roumeli-Sougia, 4. Agia Roumeli-Palaiochora. The general level of respondents' satisfaction with CC, on the coastal line S-A, revealed no dissatisfaction, but only relative satisfaction.

The non-parametric "Mann-Whitney" test showed that there is no statistically significant difference in the mean rankings (or medians) of the groups related to the variables "gender" and "travel alone or with family". Only for the variable "travel with or without a vehicle" was the result statistically significant. This is a small effect. It appears that passengers who travel with their own vehicle are more satisfied with CC than those who do not travel with it. The non-parametric test "Kruskall Wallis" clarified that only the "total number of trips on the S-A line", the "number of trips on the S-A line, in the last two years", and the "reason for traveling on the line" affect the general degree of passenger satisfaction". The degree of satisfaction is stronger for passengers who have traveled more than 10 times in their life on this line, for passengers who have traveled more than 6 times in the last two years and for passengers who have traveled for business reasons.

As a result, there is plenty of room for more in-depth research in the future. We expect that our findings will contribute to existing information and broaden the analysis to similar tourism locations worldwide. Shipowners can apply the previous investigation, which has managerial consequences. For example, on heavily seasonal coastal routes, it may emerge passengers' attitudes about the quality of the services provided. This can assist coasters streamline their company strategic plan and establish effective marketing policies to attract passengers. Also, there are some theoretical implications. Confirmatory factor analysis could be used to deepen the analysis by identifying the relevant continuous variables for further inferential tests. The same analysis could be extended to other means of transport such as the plane, the railway and of course the cruise.

The specific research, although it is innovative for the region of southwest Crete, could undergo specific improvements. Over time, several passenger satisfaction surveys have emerged in the transportation industry. This should have led us to the confirmatory factor analysis to confirm the correctness of the selection of all questions per assessment axis (scale) and to see which of the axes (scales) best fit the data we have. In fact, because on the one hand the questionnaire of the present research was synthesized from other similar questionnaires and on the other hand similar research has not been carried out on the S-A coastal line in the past, perhaps the exploratory factor analysis would be a good choice too. It would lead to the appropriate continuous variables for the inferential tests on the survey data. Thus, one way or another, using the multiple regression approach, could be helpful to estimate the overall degree of individual's satisfaction with CC, the real factors' overall predictive power for assessing the quality of the provided coastal services, and their relative importance. Moreover, the study might be expanded to include the summer months, taking into account the opinions of both the tourists and the Cretans as a whole. From a statistical perspective, the respondents' sampling could be probabilistic.

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