

Logistics in small islands: challenges for sustainable supply chain solutions

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Abstract

Small islands are striving for sustainable balanced growth and high quality services in the new and irreversible economic, social, physical and technological environment. Their overall functionality and attractiveness can rely upon an advanced “transport and logistics” system, based on collective capabilities for efficient use of their resources. The main goal of this paper is to contribute in understanding and diffusion of knowledge concerning the foundation of long-term value network holistic strategy by vertical integration through critical strategic alliances and supportive advanced planning and design of the process to interfirm unification. The main question is how the transport system analysis and policies can transform the today small islands “location disadvantages” and backwardness into chances and solutions for sustainable development (SD). The integrated modern value chain analysis is proceeding to the roots of the today small islands backwardness, to support a new strategy of SD in a dynamic interactive feed-back process; including various components, notably institutional reform, innovative transmodal transport system, supply chain infrastructure renewal, new short sea shipping technology, waste management, eco-tourism support and state commitment to a new vision of social responsibility. Useful insights in collaborative supply chain for value creation to final consumers may come out from retailing logistics practices applied in small islands. The issues addressed and the conclusions that came out from a survey study of retailing conducted in two small Greek islands may be useful more broadly and in particular for islands, the population of which rises considerably during summer holidays, leading to increasing needs for effective logistics, in terms of cost, quality and time-availability.

Keywords: Sustainable Development (SD). Supply Chain Management (SCM). Holistic Value Chain Strategy (HVCS). Sustainable Supply Chain Management (SSCM).

1. Introduction

This paper comes under a continuous study of the sustainability issue focusing on small islands sustainability and comprehended by the multidimensional importance and the role of small islands to the national economic prosperity and social cohesion, though they are physically

disfavored in location, sea split and distance from the today economic, commercial and capital centers.

A literature review of research addresses the main islands definitions and features, as well as the obstacles towards sustainability. It includes a brief literature review of comprehensive and fruitful research concerning the structural and institutional factors of Greek small islands SD in response to its importance to the national and the European economy, as Greece is a member country of the EU.

A survey study of retailing in two Greek small islands in prefecture of Cyclades, aims at identifying the potential opportunities that arise, based on the identification of the current situation, and providing useful insights for the possibilities of further strengthening the “collective capabilities” between them and all the involved participants in the value chain network.

Finally, there is a synopsis of the results and conclusions, along with certain recommendations for future research.

2. Literature Review

2.1 Small Islands definitions

As the concepts of sustainability and sustainable development have line of force in the islands, the research attention has particularized to the islands and more specifically to the small islands economies. The literature review has not presented so far a universally acceptable definition of what constitutes a small island. Concerning the definition of what constitutes a small island, Dolman has noted: “The definition of a small island is a matter of interpretation rather than fact. There are more than 500,000 pieces of distinctly subcontinental land territory which can be generically defined as islands. They range in size from sandbanks and pinnacles of rock, virtually without a measurable surface, to extensive land masses such as Madagascar” (Dolman, 1985). Although international law is the normal arena for settlement of definitional concerns, it was only in 1930ies that a first significant effort was initiated to define an “island.” Two main types of definitional and measurement approaches are found in the literature on small islands: the socio economic and the climatic [several of the papers in Dommen and Hein (1985) provide exhaustive reviews of these alternative definitional approaches]. The first, and dominant approach uses socio economic criteria to define smallness. The most common indicator used is that of population. Differing studies use a cut off point of 1, 10 or 15 million people or less to define small societies, with islands merely being a sub set of the general categorization. Other economic criteria used include land area (or arable land area) or size of Gross National Product (GNP). The second, less dominant, definitional approach uses the climatic influence of islands to distinguish small from continental types. Doumenge (1985) provided a helpful summary of this climatic approach: islands must be distinguished from continents. The effect of continental mass is to generate by its volume its own conditions of biological and natural environment and of partitioning of space. When an island has an emerged volume large enough to generate its own

climatic effects, it enters the continental category. In practice this threshold is reached when a mountainous mass of more than 1,000 meters of average attitude extends over more than 20 thousand sq.km. islands like Cuba, Hispaniola (Haiti and the Dominican Republic), Iceland, Sri Lanka, Taiwan, Tasmania, etc... not to mention vast entities belonging to "island arc systems" [island clusters usually present on the margins of shrinking oceans, such as the Pacific, where the majority of the island arcs are located, the Lesser Antilles (Caribbean) Arc and the South Sandwich (Scotia) Arc, in the western Atlantic, etc.] are to be classified in a continentalized island category (Kearey et al., 2009).

The true small islands are those which are subject to, and cannot modify, the influence of the oceanic hydroclimate because their volume is too small to have any effect other than to accentuate the contrast within one system. If there is no mountainous mass, oceanic insularity will keep all its characteristics on emerged areas of up to 3,000 to 4,000 sq.km. If there are important mountainous areas rising to above an average of 1,500 to 1,800 meters, oceanic insularity is already modified when the surface of the island exceeds 1,000 sq.km. (Doumenge, 1985). Other categorisations of islands include by latitude (tropical, temperate or arctic), or by altitude, underlying geology or island structure.

Against the background of the definitional and measurement debate, Dolman defined a small island, as: "...a territory surrounded by a large body of water with a land area of less than 5,000 sq.miles (13,000 sq.km.) and a population of one million or less" (Dolman, 1985). Streeten has taken a more pragmatic approach: "We all know that we can define a country's size by its population, or by its area, or by its national income. These criteria do not always give the same results, but we know a small country when we see it. The best simple measure is population." (Streeten, 1993). Streeten acknowledges that local regional problems are not the same as global problems, so that he maintained in this particular paper that SD calls for "differently composed growth" and that it is relevant to differences between local and global institutions for SD. Nevertheless, advanced communication technology and processes of globalization have created certain circumstances in which local decisions importantly impact global regulation, specifically, he argues that "the prisoner's dilemma complex and free riders call for coordination and enforcement of regulatory policies"!

Another recent research report refers to literature review and provides background material for the "Frontier/Remote and Island Definition", with the term "frontier" applying to remote, sparsely settled territories (Dermot et al., 2010). It also discusses related definitions of the term "rural" that are relevant to the goal of creating a frontier/remote and island geographic taxonomy. In addition, this review is intended to be a working document that is modified with additional input as the project team gathers more materials and as new publications become available. As is true for the many definitions of rural, this delineation of frontier areas could aid policymakers in efforts to improve the targeting of resources to underserved rural populations. Adopting the Eurostat (E.E., 1994) island definition of Klm.², with over 50 inhabitants, has distance over 1 klm. from continental area and does not contain a state capital (e.g. Excluding Britain, Ireland, Australia, etc.).

2.2 Small islands special features and obstacles for sustainable development

The literature review has been indicative that the today prevalence of small islands backwardness is in possible disagreement with their natural resources and sustainability potentials. Better understanding of the actual obstacles of the small islands SD in connection with policies can support collective design and cooperation against exhaustive assault and depletion of environment and ecosystem.

The emergence of Logistics and its further advance to value creation networks by collaboration to SCM and enhancement to BPR and SSCM, can be expected to become the engine of reversal the situation in small islands to sustainable development and new era of bright future. This paper has adopted modern integrated R&D methodology framework aligned with integrated SSCM.

The success of current and future development depends on sustainable management of all available resources, while with increasing unplanned use of them, the quality and quantity of the biophysical environment are declining. A big contradiction and dilemma is that lacked of governance provisions and commitment for environmental consideration in socioeconomic developments and unsustainable practices are more probable in disadvantaged islands and agriculture, which are in most need for development (Pelesikoti, 2003).

The fundamental challenges facing frontier and island communities are the relatively high per capita costs of providing services. The dominant and overwhelming concern of much of the literature, however defined, is with the delineation of the specific problems and obstacles which lie in the way the small islands are achieving economic growth and development, far less sustainable economic development. As expected, the majority of authors emphasized the disadvantages associated with small size.

The evidence can be found in the titles of publications devoted to small islands, for example, UNCTAD, 1990 "Problems of Island Developing Countries and Proposals for Concrete Action"; Searwar, 1990 "Intrinsic Disabilities of Island Developing Countries", Blackman, 1988 "Problems of Island Developing Countries", Briguglio and Kaminarides, who in the Introduction to the 1993 special issue of the journal World Development devoted to "Islands and Small States: Issues and Policies" note, almost as a matter of incontrovertible fact that: two categories of problems or disadvantages listed in the literature": those inherent in the condition of "islandness" and non island specific socio economic problems. Given long time horizons, the definition issue of SD restates the moral principles of inter- and intra-generational equity (Grayson et al., 2008).

In broader perspective of the island economies, it is mentioned that the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil in 1992 has recognized as Small Island Developing States (SIDS) a distinct group of developing countries facing specific social, economic and environmental conditions. It was cleared-up that the seriousness of the disadvantages most SIDS suffer from in the global

economy. The Global Conference held in Barbados in 1994 finalized a Programme of Action for the SD of SIDS. There have been pointed out a series of characteristics of the SIDS (Hosenally, 2012):

- Significant differences in terms of size, population, social and economic conditions, infrastructure, standard of living, including relatively rich but also some of the poorest places in the world.
- Many common disadvantages of the small islands economies that derive from small size such as a narrow range of resources, excessive dependence on international trade, high transport and communication costs, high population density.
- Due to their small size, isolation and fragility of island ecosystems, their renowned biological diversity is among the most threatened in the world.
- Small islands are subjected to risks of natural disasters that impact significantly agriculture and tourism sectors.
- Most small islands specialize in a narrow range of products and have a limited domestic market. Several are single commodity exporters and rely heavily on export earnings. The external dependence increases further the vulnerability to external economic threats and shocks.
- Small islands economies are particularly vulnerable to global climate change, climate variability and sea level rise. As population, agricultural land and infrastructure tend to be concentrated in the coastal zone, any rise in sea level will have significant effects on economy and living conditions. The increased frequency and intensity of storm events that may result from climate change will also have effects on both the economies and the environments of small islands. To be sustainable and efficient in the context of climate change, adaptation and mitigation require enormous financial resources, technology transfer and effective national, regional and global policy and governance frameworks.
- The remittances from abroad often are important source of income acting as a buffer in the case of local hazards but also affected by current recession and global financial crisis.
- The development potential of islands is treated as dependent on specific common strategy goals and planning guidelines which will encourage development on the basis of a study of competitive island advantages. The differentiation of policy mix of incentives and infrastructure creation for reducing transport cost, housing and holiday homes, water availability, will depend from special island conditions, consultation with island representatives and citizens behavior and demands. Large tracts of land of islands are included in Special Areas of Conservation (SAC's), associated with the physical development of the islands.

We have already referred to the range of enterprise supports available to those wishing economic and social progress and establish and maintain commercial enterprise on the islands. While generally welcomed and regarded as necessary by those contacted as part of the assessment process, there was also a strong sense that stakeholders believe that more needs to be done.

There is a big amount of research concerning the role of public infrastructure in development (Gonzalez et al., 2007). It is mentioned that public infrastructure is a significant determinant of aggregate total factor productivity (TFP) (Aschauer, 1989). Returns on infrastructure investments are generally highest during the early stages of development, when infrastructure is scarce and basic networks have not been completed. However, returns tend to fall with development, sometimes sharply up to negative (Demetriades and Mamuneas, 2007). Using a large panel data set it has been found that infrastructure has significant growth effects, but that its contribution is affected by institutional factors (Esfahani and Ramirez, 2002).

Although the review of the literature dealing with island taxonomies makes certain provision with culture, race/ethnicity, histories and the like, no taxonomies associated with frontier/remote status are located. The inclusion of large tracts of land on the islands in SAC's reflect the need for "Island Designation" as necessary because: the sea is a significant barrier to accessing services, air transportation is expensive and often not frequent, in bad weather air and ferry traffic stop, the island populations are scattered over an immense area, many of the islands have few health care services (e.g., primary care providers, hospitals, and pharmacies, along with dependable electricity and water), lack of well-prepared administration, significantly underfunded health care services, many of the islands are extremely culturally diverse, health status on many of the islands is extremely poor, many serious infectious diseases remain significant health threats, and the costs of medical supplies and facility construction and upkeep are expensive (Document by the Hawai'i Primary Association entitled Island Designation (3/2008)).

The need and usefulness of the study of islands lays down from two aspects: The distance and the sea separation from continental regions on the one hand and the development potential of them in relation to the natural, physical and human resources, the vision of the natives, etc. In technical language, these two aspects of the study of islands specify the costs and the benefits that can accrue from their development design and performing implementation. The transportation problem on the one hand from the mainland has to be seen in relation to the natural, hypogeal, surface and seashore wealth that can overbalance the distance and sea disadvantage of the islands. In particular, small size islands may have a series of known or disguised advantages that can be seen as chances, provided a "business plan" and sufficient infrastructure and motivations by the state. History has noticeable examples of leading roles of islands in the development of oceangoing maritime, economic and social progress and major contributions to human civilization, to mention the Minoan civilization from Ancient Greece and the Athens "Alliance with Islands" that resisted to imperial domination and saved the today "western civilization".

Therefore, the backwardness of islands and more particularly small islands in different periods of history can be faced as challenge to a bright future, insofar as it is a properly executed task, without any preoccupation about the role of history and the so-called "continental school" of economic thought. This study aims to offer substantial support in building-up a holistic strategy of island SD and formulation of the appropriate policy mix for its performing implementation.

The natural separation of the small islands implies increased transport cost, the installation of production units is discouraged and this results in either underdevelopment, or one-sided and non-domestically controlled development. The isolation combined with “regionality” lead to increased costs regarding the following (Mitoula and Economou, 2007) :

- Financial cost, due to the operational expenses which businesses have to sustain. The cost of living is increased, since transportation to and from the islands, requires the use of costly means of transport, either by sea or by air, which in its own turn equals to increased transportation expenses. Thus, the transport cost to the islands is often 30 - 40% higher than on the continental regions.
- The cost of infrastructure works and services, even if this is not justified by the number of islands residents, it is essential that basic infrastructures are necessary for their economic and social growth (for example, energy, transport, telecommunication, social health etc.).
- The opportunity cost, mainly for the young who may be benefited less by business, financial, etc. opportunities and health, education, recreation services, etc.
- The cost of information, since information flow reaches these remote regions at slow rates, while information sharing comes at a cost (“asymmetric information”).

Transport is most expensive for islands, because beyond geographical locations, the unit costs for shipping small quantities are generally higher. In addition, producers may be reliant on monopoly carriers, restricting their ability to bargain for lower prices (Winters and Martins, 2004; FAO, 2005; Bernal, 2005; von Tigerstrom, 2005).

The WTO (2002) has found that transport costs were higher for islands but not necessarily for small countries generally. Although only a weak correlation was found between population size and transport costs, it was also found that higher transport costs were correlated with a smaller share of world trade (WTO, 2002.2; Armstrong and Read, 2002). It would be dare to add the relative high inflation rate and prices level, impacted from unofficial cartels in the distribution channels, by wholesalers and rise in supermarkets

It has been maintained that a R&D framework that can support the design of economic resilience – defined as the policy induced ability of an economy to withstand or recover from the effects of vulnerability exogenous shocks, arising out of economic openness – can succeed relatively good economic performance and adequacy of policy in four broad areas, namely macroeconomic stability, microeconomic market efficiency, good governance and social development in small economies and states (with a number of examples of high level of development and sustainability) (Briguglio et al., 2009). The multiple criteria analysis (MCA) is used as complementary economic evaluation tool to the dominant economic evaluation technique of benefit-cost analysis (BCA). This combination is facilitated by use of cost effectiveness analysis (CEA), and cost-utility analysis (CUA) (Hajkowicz, 2008). It is noticed that the MCA approach emerged within the field of operations research during World War II, with early applications in military planning, and has mostly received a positive reception in environmental and

resource economics (e.g., Eckenrode, 1965) and its theoretical foundations can be traced back to multiattribute utility theory (MAUT) developed by Keeney & Raiffa (1993) and axioms of utility measurement first supplied by von Neumann & Morgenstern (1944) (Dunning et al., 2000).

According to “central place theory”, population size and remoteness determine not only the number of retail establishments in a community, but the lack of availability of higher order services. Population decline has been a major contributor to decline in the retail and wholesale sectors, at least in the Great Plains (Hart and Cromartie, 2011). The purpose for inclusion of the nation’s islands use a single classification fails to distinguish sub-categories so that differing sizes and levels of remoteness frequently obscures emerging problems at the local level. As a result, policies may fail to include appropriate intra rural targeting (Hart et.al, 2005; Hart and Cromartie, 2011). It has been maintained that an appropriate rural / island and urban geographic taxonomy should: (1) measure something explicit and meaningful; (2) be replicable; (3) be derived from available, high-quality data; (4) be quantifiable and not subjective; and (5) have on-the- ground validity (Hart et.al, 2005). In addition, it should be (6) clear cut objective, (7) reliable, (8) practical and straightforward, (9) reproducible, (10) policy relevant but independent of specific program biases, and (12) considered one of several toolkit geographic taxonomies.

2.3 Recent studies in Greece

The area of Greece – a Mediterranean country in the South/East Europe– is covered by an archipelagos with several thousand of small islands, most of which are rocky and only 227 are occupied with 15,000 Klm. coastline. The Greek academic research has attributed noticeable attention to the current conditions of short sea shipping (SSS) in terms of technological change, institutional rigidity, unbounded development of tourism during the post war period, no sufficient transport shipping system, decay of small islands economy, abandonment and population decrease. In a study of freight flows for Cyclades islands and the island of Crete, it has been concluded an unbalanced situation of technological progress in main route lines with two central ports of Piraeus and Rafina and rudimentary among islands, besides lack in transport system consideration, institutional rigidity and delayed follow up of EU legislation (Psaraftis, 1992; 2008). Another study has pointed out the importance of the introduction of small containers, an important new technology, in an effort to reengineer coastal freight shipping in the Aegean Sea in Greece. Infrastructure problems of island ports are documented and strategic planning is analyzed by known supply and demand constraints and a pilot network of 13 ports (including a depot port) and 25 sea links were taken into consideration. Utilizing the full network sensitivity analysis, it has estimated significant savings by re-designing island operational needs with respect to fleet size, demands sites and loads and gives a more comprehensive account with respect to cost and fleet efficiency and utilization (Sambracos et al., 2004).

Another study has pointed out that the European Union (EU) with more than 90% of its external trade and some 43% of its internal trade transported by sea was engaged with the legal framework and policy regarding the liberalization maritime transport from the year of 1992 for influencing the development of distant island regions. The first attempt for harmonization of the Greek state framework with the EU directives took place nine years later, in 2001 (Chlomoudis et al., 2007).

A paper presents the results of a contributory scientific study concerning forwarding of logistics in transport by collection of scientific trends for the institutional intervention in developing the SC, their valuation and their shift in the political community so that to be implemented immediately. This paper elaborates the basic proposals that would allow the reorganization of the SC in Attica for the benefit of the Greek economy and the competitiveness of services both for Greek and other passing products. Its contribution to the Greek SC, to the Greek economy and environmental balance is the scientific substantiation of the necessity of concentration of SC services and forwarders cross-docking in the Logistics Center (LC) of Thriassio Pedio, as their subsequent physical area (Iakovou et al., 2009).

A recent paper, involved directly in record and analysis of the existing institutional framework of transport in Greece and with the necessity for its revision. It pointed out the weakness of flexibility of legislation and the subsequent difficulties in the organization of means of freight transport is characterized by shared jurisdiction of many government bodies, which fall into different ministries with shared responsibilities (three Ministries). New trends treat the contributors in the SC, as a part of a big transportation system, disassociated from the traditional view of treating each mean of transport separately. Through the improvement of transportation systems, parallel objectives emerge, such as sustainable development and sustainable mobility (COM336/2006). Similar problems are faced regarding the safety of dangerous goods, which are transported to islands with no legal ways, using ordinary passenger ships, since they do not always have RoRo ships, with consequence constant risk of accidents (Siamas and Balkamos, 2010).

An International Workshop on Freight Transportation and Logistics (ODYSSEUS) – the 5th of which was held in Mykonos, Greece, May 21-25 (ODYSSEUS 2012) – provides a quality forum for recent developments, trends and advances in the theory, practice and application of models, methodologies and decision support systems in the field of freight transportation and logistics.

Research concerning freight transport in Greece, has searched the issue of lack and rigidity of legislation and of institutional framework to follow-up the structural changes in economic, social, physical and technological environment towards a globalised economy, from the period of carts to logistics and use of integrated systemic SC solutions to face collectively the hard international competition (Iakovou et al., 2009; Sambrakos, 2008; Siamas and Balkamos, 2010).

3. Survey Research in two small Greek Islands

A survey research was conducted in two small islands, Andros and Syros, which belong to the Aegean sea and more particularly to the prefecture of the Cyclades islands. The survey was carried out between December, 2010 and May, 2011.

It aims at the provision of useful information regarding logistics and supply chain issues, the impact of freight transport systems on their effectiveness and drawing policy recommendations based on perceived challenges, concerns and difficulties. These enlightened, on the one hand, the problems associated with current practices and on the other hand they revealed significant opportunities for collaborative action and synergy effects in exploitation of all available know-how for attaining efficient flows of goods from and within the islands. The study of the positions, views and behavioral patterns are closely related with the policy choices menu and their effectiveness in the sustainability. It is expected to add to the literature which, as was shown, has been concentrated apart on various policy forms and means related with the island(s) development and sustainability.

This is a questionnaire based survey, with sixty retailers from two small Greek islands, from various sectors of the economy (food and beverage, pharmaceutical, etc.) : 34 (57%) from the island of Andros and 26 (43%) from the island of Syros. The majority of the shops are located in or near by the island capital town center (77%).

The following subjects have been more thoroughly investigated, through a questionnaire which included 24 closed type questions :

- The basic means of transport of products and people to island
- The opinion of interviewees about the time-table of ships from the two central ports of Pireaus and Raphina to the islands Cyclades
- The replenishment problems appear during the summer season of demand as peak tourist period
- Their opinion about the potential benefits derived from the exploitation of synergies between the companies and the building-up of a co-partnership

One main issue for the sources of their procurements is that sea transport between the islands are provided via the older, slower and more conventional ferries, whose schedules are released no earlier than three weeks prior to departure, upon port authority approval. Thus, the small islands hardly make their procurements from other nearby islands, breaking down the historical complementarity of their economy. Similarly, air transport, inter island connections via air is almost nonexistent, as the two conventional domestic airlines, Aegean and Olympic Air do not offer inter island connections and connection between two islands by air through Athens airport. Therefore, the procurements among and from outside of the small islands is not a matter of preferences of the citizens, though the substitution of straight transactions with triangular procurements impacts transport cost, prices and the level of living, leading to the significant reduction of the local development and debasement of the economy of some islands.

The main survey's results are outlined in the following:

Procurement sourcing and frequency of replenishment : 51% of total purchases of the responded shops come from the Greek capital Athens Attica area, 43% from inside the island, while only 2% come from other islands.

45% of the shops conduct replenishment daily throughout the year. A significant number of the total shops (38%) make replenishment between 2 and 3 times a week. The 12% of the shops makes replenishment once a week and the 5% of the shops do it once a month.

Road transport means and warehousing :

Main transport means of the products is the liner ships. In very few cases airplanes are used or special small ships for transport of some products, such as fragile products, special pharmaceuticals, even helicopters for emergent transport of seriously illnesses.

45% of the shops use their own transport means for their goods replenishment, 40% public transporters and much smaller proportion of shops receive their goods by the wholesalers transport means (figure 1).

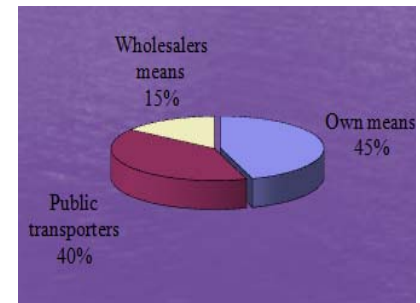


Figure 1. Road transport means used

The warehousing of foodstuffs in 83% of the cases is established within the shop, while the rest shops the warehousing is served outside the shop.

Assessment of ship transport: The great majority of the respondents stated their satisfaction depend on the season (72%). 13% recognized as totally satisfactory situation, the 10% as just tolerable and 5% as surely unsatisfactory.

During the summer season when the tourism is in peak and consequently the pressure on the transactions and on the demand are higher, shipping schedules seem satisfactory as a rule.

The main criterion of choice of transport mean of line ships is the transport cost (50%) followed by the security of products transport (45%). In effect, the bulky products cannot be transported with other transport means but the ship liners.

Quality at delivery : The products delivered are in almost satisfactory condition (55%), totally satisfactory (20%) or often unsatisfactory (25%). The main reason of unsatisfactory condition of the products at delivery is the way of loading and the transport conditions (73%) (figure 2)

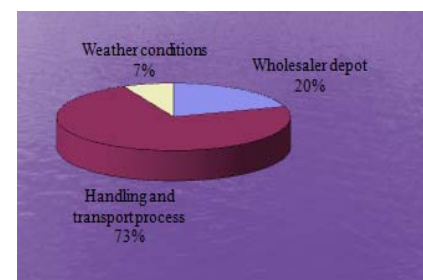


Figure 2. Quality dissatisfaction reasons

Assessment of different factors : Concerning the cost factor, the views of the respondents are in the same level for those who are very much satisfied with those who are modestly satisfied (both in 30%). Also the respondents are

very much satisfied in relation to the time the orders are executed and reach their shops (43%). A significant percentage of the respondent are enough satisfied with the quality of products (50%) and a somewhat smaller proportion are perfectly satisfied (42%).

Factors of island replenishment effectiveness: The most important factor that impacts the effectiveness of the replenishment is the frequency of the trips from the central ports of Piraeus and Rafina in the Attica area, as stated by 92% of the respondents. Important factors were considered to be the distance of the island from the central ports, the infrastructure and the organization of the local island port. The trips between islands is not considered as a significant factor for the majority of the respondents (62%), as also the existence of an airport in the island.

The replenishment in summer season do not face significant problems in general, according to the shoppers' statements. When these problems arise, they are mainly due to the low frequency of the trips (37%) and the high temperatures during the summer months (39%).

VAT reduction impact in cost prices: 77% believe that it would contribute in reducing retail prices in the two islands.

Co-partnership establishment : 50% believe that they would benefit from the establishment of a co-partnership association, while 27% stated that this could be possible. From those who expect benefits 72% believe that these will derive from goods procurement (reduction of prices) and 28% from transportation cost reductions. Similar picture is given on the expected benefits of the co-partnership common warehouse (77%).

4. Discussion and conclusions

Islands in broad sense and even more small size islands or small islands are today broadly in backward economic situation in relation to continental country areas and capitals of countries, apart from the cases of national economies consisting of island groups mainly in Pacific and Caribbean areas. As a consequence, the general contemporary "challenge" of sustainability to the new economic, social, physical and technological environment is definitely more acute in the case of small islands, calling for integrated research to improve long-term strategic planning and policy performance. The research has focused attention dominantly to the physical sea and location characteristics of islands attributed today as "disadvantages", disproportionally to the strengths and potential capabilities to achieve sustainable development. This in part reflects an unbalanced past theoretical and practical engagement with the "development", in comparison to the "sustainability" that received attention just in the last quarter of the 20th century. As the sustainability of small islands is a matter of location, the transport problem is the corner stone to their SD. The identity of the transport product and services diversifies from other sectors in that it is inherently transport networks referring directly to systems by logistics and value chain

analysis. The transport integration and development faces complications of networks analysis in association with transport economics and environment impacts (in sea and rivers waters, air, etc.).

In historical terms, it is noticed that some of the islands had become pioneers of economic and social progress and even cradles of civilization under different economic, sociological and political circumstances, while today they are facing serious sustainability problem. In long-term perspective, the today development and sustainability backwardness situation of the small islands must be related with neglect or undermining their transportation network system. In addition, it may likely have a possible hidden connection with a postwar trend of concentration of income and wealth distribution at worldwide level and the development strategy and policy governance with the international institutional set-up at the end of the world war II (Bretton Woods agreement of the international monetary system, trade liberalization and punishing solely deficit countries with the IMF “stabilization program” and a set of international organizations such as UCTAND, FAO, WTO, World Bank Group under aegis of the UN organization in place of prewar League of Nations, “for progress in peace”).

The literature review converges in that the today sustainability situation of small islands is associated largely with “exogenous influences”, so that main question waiting answers is whether is it possible a new zero start concerning the SD of the small islands in order to overcome, detach and overstep from any inertia interjected in the second half of the last century and see how adjacent small islands can restore by clustering their historical long-term cooperation, as mostly in need. More specifically, the central state policy authorities and the local authorities have turned their partial attention in correcting the small islands “disadvantages” roughly in the last 25 years after a new economic and institutional structure and order was established since the end of the last world war in 1944. For example, besides the question whether the EU has actually revised the regional development and equity policy associated with small islands in 1992 or a decade later, it is noticed that the EEC was created by the Treaty of Rome in 1957. In addition, it does not seem that much easy to fill the “gap between words and action” concerning established past research methodologies and practices and associated interests and pass to packaged institutional and structural reforms according to the requirements of collaboration and coordination at network value chain level and commitment to SSCM. Thus, the “action plans” are confirming the important potential role attributed to logistics and value SCM by the EC, although it remains to be included in the tenders of EU programs.

The survey conducted in two small Greek islands aimed at the identification of the current situation and the problems in the flow of goods of two small islands. Retailers were asked, as critical representatives of the ‘value’ that reaches the final consumers in the supply chain, provide useful insights for the possibilities of further strengthening the “collective capabilities” between them and all the involved participants in the value chain network.

In brief, this study came out with the following results, borrowing from contributions of previous relevant studies and indicating future research guidelines :

- The literature of contemporary research of islands development revealed the need to focus on small islands “disadvantages”, through integrated R&D framework of system analysis, driving to interfirm collaboration at value chain network level and offering sufficient recommendations to the required policy shift.
- The definition of small islands has to be cleared up, on a number of technical criteria of disadvantages, such as the physical separation from continents, in size, distance, transport costs etc. (designation criterion for policy purposes).
- The EU has shifted the attention during the last decade to an integrated transport policy for the sustainability of member countries and the European economy, including the islands. This shift of attention of the enlarged EU of 27 has called for closer alignment of member states in broader upward and downward collaboration by recognition of the primary role and the promotion of the use of Logistics and Maritime Transport Chain by integration and intermodality. In consequence, there is a closer look for complete integration with the regional development policy towards the multivariate integration process of the small islands SD and SSS. There is, therefore, the need for developing regional / island areas, overcoming post war development model of strategic bearing up concentration and hydrocephalus urbanization to big cities.
- The current transport network system of small islands has to be reconsidered rather than the transport means. To become functional and reliable, it is necessary to reinforce the trend of hub development in specific locations (serving a cluster of islands in case of Greece and other countries with many islands), accompanied by an innovative flexible ship connection between the islands. The benefits will be critical in terms of goods availability, speed of replenishment, quality, cost and in general islands functionality, mainly in periods of increased demand requirements, during the touristic periods.
- Specification of a major policy shift including facilitating cost induced development of the small islands. It is obvious that economic recovery can come through Trade & Transport promotion, which are closely related with the islands prosperity. Moreover, research on small island economic resilience has to be conducted, to inhibit the relatively high vulnerability from exogenous shocks, arising out of economic openness, climate changes, etc.
- Special focus to “Reverse Logistics” to objectify the recycling of any waste and emission throughout the process of production and products life cycle, proceeding to policy “greener redirection”, etc.
- An integrated institutional framework by a single institution is necessary for improving transport processes. Particular aspects inclusive: public administration reform, bureaucracy suppression, one stop shop in licensing, fast track processing, state decentralization system, social capital infrastructure, restoration of competitiveness, reward/punishment rule, fiscal and credit incentives for value network partnerships, education system and continuous personnel training, information flow mechanism for symmetry and sharing, etc.

The conclusions of this study concerning islands and more particularly small islands in theory and practice were largely affirmed by the results of a survey research of two small Greek islands at the retail trade level. Consequently, these may be used for support in guiding policy formulation for SD of small islands.

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