



Value Creation in Project Cargo Logistics: A Delphi Study

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Abstract

Project cargo logistics, with its idiosyncratic logistics processes and transportation of large, heavy and high-value cargoes, is a developing industry in Turkey. Value creation for project cargo transportation plays a critical role in gaining competitiveness in such a unique industry. Hence, the duties of related parties, the main value creation enablers, value creation outcomes and the barriers restricting such value creation should be explored. This paper sets out to provide an understanding on value creation concept of project cargo logistics. Its purpose is to identify the critical enablers of value creation as well as the main outcomes of value creation. An exploratory Delphi study with two rounds is employed. Key enablers include the partner-related and project cargo logistics operations-related dimensions. Critical outcomes have been classified as operational efficiency, service effectiveness and technology adoption/innovation. Findings can assist both operators and governmental bodies in aligning their services and procedures within the value creation perspective.

Keywords: Project Cargo Logistics, Delphi Study, Value Creation, Turkey.

Proje Yük Lojistiğinde Değer Yaratımı: Bir Delfi Çalışması

Öz

Proje yük lojistiği, geniş, ağır ve yüksek değerli yüklerin taşınması ve kendine özgü lojistik süreçleri ile Türkiye'de gelişmekte olan bir sektördür. Proje yük lojistiğinde değer yaratma, rekabet gücü elde etmede önemli bir rol oynamaktadır. Bu nedenle, ilgili tarafların görevleri, temel değer yaratıcı öğeler, değer oluşum çıktıları ve değer oluşumunu engelleyen bariyerlerin incelenmesi gerekmektedir. Bu çalışma, proje yük lojistiğinde değeri yaratma kavramına yönelik bir bakış açısı sağlamaktadır. Çalışma, değer yaratıcı öğeler ile ve değer yaratmanın ana sonuçlarını tanımlamayı amaçlamaktadır. Çalışmada yöntem olarak Delphi kullanılmaktadır. Değer yaratmanın ana sonuçları operasyonel etkinlik, hizmet etkililiği ve teknolojiye uyum/yenilik olarak sınıflandırılmıştır. Bulgular, hem uygulayıcılara hem de devlet kurumlarına, hizmetlerini ve prosedürlerini değer yaratma perspektifine uyumlu hale getirmede yardımcı olabilir.

Anahtar Kelimeler: Proje Yük Lojistiği, Delfi Çalışması, Değer Yaratımı, Türkiye.

1. Introduction

Logistics is considered as a value-creating driver for the customers [1, 2] and characteristics of logistics services provided to the customers determine the features of the value created. Some challenges in meeting the expectations of the customers in logistics services are discussed in the literature [3, 4, 2]. Such challenges are evaluated in terms of difficulties in balancing value and related costs and update of services based on the drivers of value [5, 4, 3] and building of relationship experiences encouraging a deeper understanding of value creation [2]. Reflections of such challenges can be catastrophic in the project cargo logistics operations where such cargoes pose different transportation challenges than traditional cargoes and each delivery is different from another [6]. Despite the increasing attention on project cargo in logistics industry due to the specific requirements of this type of cargo, current literature lacks studies concentrated on project cargo logistics. The relevant literature also overlooks critical enablers in project cargo logistics. The same applies to the studies focusing on Turkey's project cargo logistics.

Turkey is strategically located in the proximity of energy resources and trade routes and its foreign trade volume has increased from \$88 billion in 2002 to \$391 billion in 2017. Transportation and energy infrastructure projects dominate the public-private-partnership market in Turkey and infrastructure investments totaling up to 362 billion Turkish Liras were realized including various projects in road, railway, maritime and air transport [7]. Considering favorable conditions for the development of project cargo logistics both from the perspectives of energy infrastructure projects and infrastructure investment in Turkey, there is a gap in the literature in evaluating the current situation of project

cargo operations in Turkey. This paper focuses on the perspectives of different actors in the project cargo logistics through a Delphi study. Since each project cargo operation has unique characteristics, to what extent the logistics system satisfies the specific requirements of each project has become a critical determinant for project cargo logistics operations in Turkey. Project cargo logistics is unique in terms of the size, weight, and characteristics of the cargo as well as the considerable distinction of the logistics processes. Therefore, it is critical to put an emphasis on the project cargo logistics concept considering the main components and enablers in value creation. Hence, this study aims to identify the critical enablers of value creation in project cargo logistics through Delphi. The study also attempts to reveal the main barriers for project cargo logistics and the possible outcomes in the case of project cargo logistics value creation. The study is guided by three research questions:

1. What are the critical enablers for project cargo logistics value creation in Turkey?
2. What are the barriers preventing the development of project cargo logistics operations in Turkey?
3. What are the main outcomes for project cargo logistics value creation in Turkey?

An introduction to project cargo logistics and value creation in project cargo logistics is given in the following sections. Thereafter, the methodology of the study is presented, followed by the findings and discussion.

2. Project Cargo Logistics

Project cargo can be considered as heavy-lift, break bulk or out-of-gauge cargoes. UK P&I Club [8] defines project cargo as cargo or equipment that may be large, heavy or out-of-gauge, which may require specialized stowage, lifting, handling, may consist of high value or critical items and involve numerous goods

connected to the same project, and may be loaded from different ports. According to Sarı [9], project cargo logistics, as a niche area, is a transportation of the cargoes that are large, heavy, high value or critical pieces of equipment from one point to a destination with special tools by means of measures. Damage and loss of project cargo can cause very large costs, extensive delays and potentially lengthy and expensive litigation [8]. Due to the existence of a combination of different phases and actors and complex nature of delivery processes, it requires governing special caution and planning to ensure fluent transportation [10]. The process and the key success factors are described as planning and scheduling; determination of the route, cost analysis and research; creating an optimal budget with cost and related benefit analysis, operational suitability; checking the availability and applicability of the required team and equipment, regulatory compliance: obtaining clearance from local authorities for operations required by operations, operation phase; operations realized in accordance with the plan, controlling and supervision; control of the suitability of operations for the environment and human health [11]. All these point to the fact that the project cargo delivery process is particularly specialized work that strongly needs a proactive planning structure in order to avoid problems that may occur.

There are critical investments for transportation projects in Turkey. Turkey is expected to play a critical role in future projects to be carried out in Caucasus, Middle East, and North Africa utilizing the benefits of its geographical position [12]. According to The International Transporters Association (UNDTA) research, project cargo logistics has risen to the first place with a 17% market share in the logistics industry. Approximately 23% of logistics companies are specialized in this

area. As Turkey aims to be an actor in the global economy, increasing investment in industry, energy, and logistics leads to an increase in the share of project cargo operations. According to experts, Turkey remarkably has become conspicuous by new nuclear plants, pipelines that enable the construction of energy bridges [13] and power plants. Advanced transportation is vital for the carriage of large-scale investments. Energy investments have also become the heart of project cargo. The Turkish government is expected to have invested \$122 billion in the energy sector by 2023. There will be opportunities for 'project cargo' operations through natural gas and oil projects, nuclear power plants, and the construction of new Istanbul airport [14].

3. Project Cargo Logistics Value Creation

Value concept has received great attention as a major area for study in the marketing discipline [15, 16] and value is basically defined as a trade-off between benefits and sacrifices [17]. According to Vargo et al. [18], value creation plays a very critical role in the economic exchange. From the competitive advantage of a firm view, Porter [19] identifies two main perspectives for the demonstration of value. The first perspective is about the perception of value as the certain amount of cost that the customers pay for company's products or services. The second perspective focuses on the view that value is obtained through the successful execution of nine separate activities, namely value chain [20]. Logistics processes constitute a major role in value chain. Most of the primary activities taking place in the value chain are integrated to the logistics processes such as inbound and outbound logistics activities. Hence, generation of logistics value is critical for organizations to achieve competitiveness and create superior value for their customers.

Logistics customer value is generally created through effectiveness, efficiency, and/or differentiation. According to Baudin [21], in logistics, the ultimate goals are to increase organizational efficiency and effectiveness. Logistics efficiency depends on how a company can provide its services at a lower cost and faster speed; and effectiveness can be reflected in how the organization provides the organization with more flexibility, more responsiveness, and reliability [22]. Wang et al. [23] propose that the total customer value concept is complex and consists of four main categories: service, quality, lead-time, and cost. Similarly, according to Mentzer et al. [24], customer service, cost/profit balance, and quality can create logistics value, which is also a competitive advantage. Logistics is considered as a critical component for value creation in many industries especially in terms of providing customized services for the customers. When considering the role of supply chain management for the transportation, logistics managers have experienced a paradigm shift from logistics cost cutting to more flexible and specialized offerings. While, Saatçioğlu and Saygılı [25] indicate that supply products and services to target market and consumers should be under suitable conditions of place, time and price, total cost needs to be reduced and demand needs to be met on time. Today logistics service providers must be ready to adapt to the changing customer needs; therefore, supplier-customer-relationships can be flexible to ensure maximum value creation for the customer. Considering the project cargo logistics perspective, creation of value is vital since each project's performance is determined according to the value created by the service providers.

Project-cargo logistics operations involve the use of various transportation modes, and maritime logistics operations play a critical role in the process. Panayides and Song [26] state that arrangement of

the physical flow of goods in maritime transport, organization of the information flows between the parties as well as the execution of interfaces in the overall chain constitute the maritime logistics concept. The related parties range from manufacturers to end customers involved in maritime logistics chain. Lai et al. [22] group maritime logistics value criteria into two as efficiency related value (cost, assets) and effectiveness related value (reliability, flexibility, and responsiveness). Similarly, project cargo logistics value can be achieved by focusing on [27] each project's efficiency in terms of the main cost items and the assets required to run the operations safely and [8] effectiveness where there must be high level of flexibility in the operational levels, reliability in mostly the delivery processes of project cargoes and responsiveness to the needs and requirements of the customers since the cargo is mostly risky and high-value cargo.

In maritime logistics operations, while there are three key players of maritime transportation as shipping companies, port operators, and freight forwarders [28], additional parties as logistics service providers, road transportation companies, shipping agencies, and brokers can also be needed in project cargo logistics value creation. Compared to the traditional role of ports, recent years have witnessed a dramatic change in port logistics systems where various value-adding services have been added to the service scope of ports. The main parties taking the overall control and logistics of the project cargo can also provide such value-adding services. There are various implementations of Porter's [19] value chain to shipping and logistics cases. For instance, Song and Panayides [29] adapted value chain to maritime logistics in order to identify the main stages and activities in maritime logistics value chain. A similar approach may also be taken

for project cargo logistics operations. Value creation in project cargo involves many participants in order to satisfy customer's needs. Value creation needs integration and collaboration between all actors so that the partner selection component is viewed as a prerequisite to successful project cargo logistics value creation. In the project cargo process, all coordination and planning should be managed effectively with possible risk analysis and use of required modes of transport. Elimination of barriers, which impedes the creation of a true project-cargo logistics value, is also required. Lastly, value creation is achieved by the integration of critical elements of operational efficiency, service effectiveness with high quality, and technology adoption/innovation. Especially in terms of project cargo logistics, which mostly includes high value and hazardous cargoes; experienced staff, equipment, financial strength, governmental support, IT background are considered crucial in order to create superior value.

Although project cargo logistics operations attracting considerable attention and investment opportunities both in the world and in Turkey require specialized work, expertise, control and planning, related literature in project cargo logistics is quite scarce. Depending on the evolving nature of project cargo operations, studies on the relevant area are also quite new. By focusing on the shipping perspective of project cargo operations, Fagerholt et al. [6] present a mathematical model for ship routing and scheduling problem by considering stowage onboard and cargo coupling issues. Apart from the shipping perspective, road network in project cargo operations is studied and criteria are suggested for planning and designing project cargo transportation routes [30]. Petraška and Palšaitis [31] suggest an instrument for evaluation of the overall route for project cargoes transportation. Another study concentrates on identifying

the characteristics and success factors of project cargo operations by presenting a lean system including the key parts for project delivery [32]. By focusing on a specific region, namely Barents Region, Aamuvuori [10] discusses the main barriers and opportunities in project cargo logistics by focusing on two project deliveries. From Turkey's perspective, Sarı [9] highlights the permits and regulations to be considered during project cargo logistics operations by concentrating on legal issues. Considering such scarce literature, it is observed that mainly routing-related issues, as well as criteria determination for achieving success in project cargo operations, have been studied by foreign scholars recently. However, critical components to be considered in project cargo logistics by focusing on a value creation perspective have not been discussed from Turkey's perspective. Besides, exploratory research focusing on the determination of the critical steps for project cargo value creation is needed in such a limited academic field. Hence, proposing the critical steps starting from partner selection to project cargo logistics value creation through the discussion of barriers as well as the project cargo logistics process is considered as the main motivation of the study.

4. Methodology

Exploratory Delphi study has been employed to assess the main factors in project cargo value creation in Turkey. Since there is limited research in the relevant literature both in project cargo logistics and critical components for value creation, an exploratory Delphi study has been employed. As Turoff [33] outlines, the use of Delphi method is appropriate for exploring the current research field and exposing underlying assumptions leading to different judgements. Since there are various actors involved in project cargo logistics and components of project cargo

logistics as well as value creation are not previously determined in Turkey, such Delphi approach is considered appropriate for the study. Delphi study is defined as an iterative process for combining opinions into group consensus [34] and for seeking out information for the generation of consensus [33]. Considering the research questions and the aim of the research, common points regarding the main components of value creation in project cargo logistics as well as the main barriers in Turkey have been investigated. Extraction of common points obtained from various actors in the industry would be possible through the use of such technique rather than other qualitative research methods (e.g. qualitative interviews). Loo [35] highlights the main advantages of Delphi approach over other group methods such as nominal group technique, focus groups that experts are not pressured by other participants and each participant generates his/her own idea independently. Secondly, interpersonal conflicts and communication problems do not exist because panel members do not interact. In addition, Delphi studies overcome the time and cost problems that may prevent experts from meeting at a single place and time [36]. Also, it has considerable benefits in terms of the research in which representatives from competing companies are involved in the study. Since most of the participants located in Istanbul and some of the experts are from competing companies, such a technique is also considered appropriate.

Several different types of Delphi techniques have been developed or identified as numeric, policy or historic [37], or as classical, policy, and decision Delphi methods [38, 39]. Classical Delphi is a decision-making tool and a forum for facts [39] that has been used in many Delphi studies and this type has been chosen in this research. Linstone and Turoff [40] point out that the Delphi technique is a research

method for building communication between groups of people for dealing with a certain problem. The main aim of the Delphi technique is to collect various opinions from a group of experts supported by a series of questionnaires integrated with opinion feedback [41]. Having a consensus is important in this case since the researchers can understand the critical issues or components in their research and facilitate their framework conceptualization process [42]. The main stages of the Delphi study are shown in Figure 1.

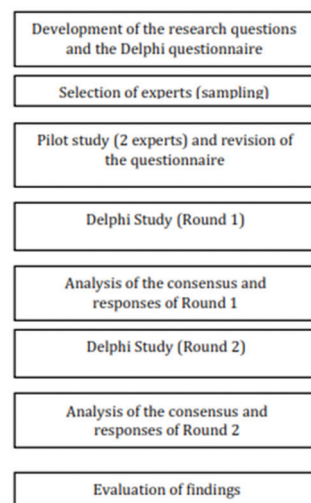


Figure 1. Delphi Procedure of the Study

4.1. Questionnaire Development

Considering the critical components in the project cargo logistics process and value creation, the authors have suggested critical enablers, possible barriers and value creation outcomes. Such enablers, barriers and outcomes have been borrowed from the related literature on project cargo logistics, logistics value and maritime logistics value. Statements in the Delphi questionnaire have mainly been developed considering the related literature. Figure 2 shows the main enablers, barriers, and outcomes within project cargo logistics value creation. As seen in Figure 2, two enablers exist for the generation of project cargo logistics value

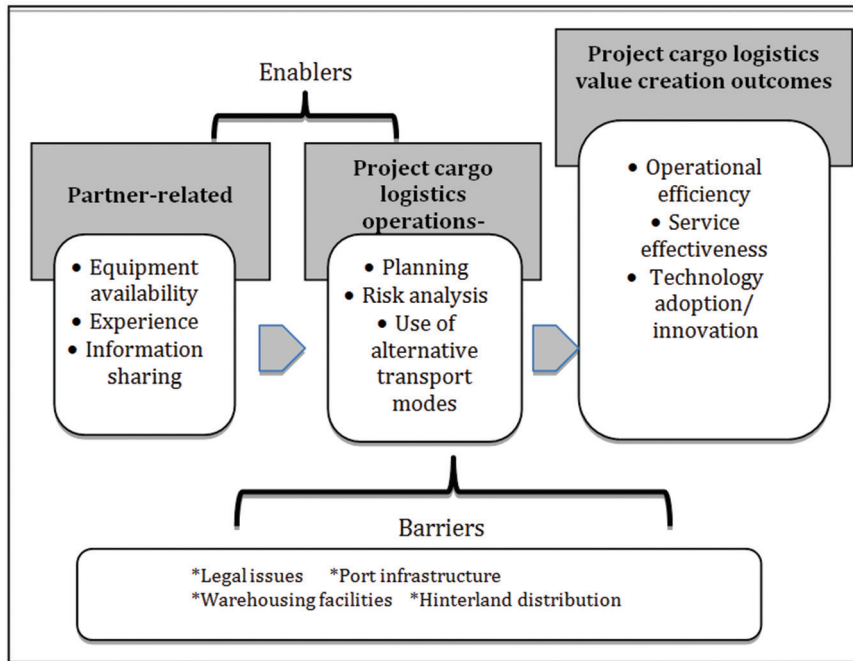


Figure 2. Components in the Delphi Study

outcomes as; partner-related and project cargo logistics operations-related.

Partner-related: As seen in Figure 2, the first enabler in the Delphi study is a **partner-related enabler**. Project cargo logistics services are considered as complex operations requiring security and attention. Selecting true partners in the execution of project cargo logistics services is expected to minimize the risks and difficulties throughout the overall process. Considering related literature on project cargo logistics, three main dimensions as equipment availability, experience, and information sharing have been considered.

Specific equipment used in project cargo operations facilitate the movement of project cargoes without possible risk and damage to the cargoes so that the parties providing such services should consider possible investment schemes to use specific handling equipment. By shedding light on the importance of equipment availability and use in project cargo operations, Andersson et al. [27]; Fagerholt et al.

[6] state that actors should consider the availability and the type of the handling equipment required for specific project cargo. Hence, equipment availability dimension has been added.

In project cargo operations, the presence of parties who are committed and cooperative is required to ensure the smooth flow of project cargoes. Heidemann and Gehbauer [32] assert that effective communication and information sharing between actors results in time savings and increased customer satisfaction. Experience of the actors involved in the project cargo logistics is also another critical factor. When the actors involved in the project cargo logistics have low levels of experience, it is much harder to conduct effective project cargo operations. Experienced partners orchestrate the overall process, even starting from the manufacturing stage of the equipment or units to be transported. Project cargo logistics' unique requirements necessitate the consultancy of experienced logistics experts together

with engineers involved in the process [27] [6]. Value is created through the know-how, capabilities and skills of the experienced logistics experts and engineers.

Information sharing is closely linked with experience levels of the actors. Involvement in project cargo operations necessitates efficient collaboration and information sharing between actors, which are basically driven by experiences from earlier projects [10]. Hence, seamless information exchange between the partners is necessary for the execution of value-added services for each project cargo operation.

Project cargo logistics operations-related: The second enabler is about **project logistics operations**. Such enabler includes correct planning and execution, mapping the possible risks throughout the process and using alternative modes of transport (other than mainly sea and road transport modes) in case of a possible need in the project cargo operations. Branch [43], Guzman and Norgaard [44] and Aamuvuori [10] point out the importance of planning in project cargo logistics by focusing on cargo handling processes. There are sub-processes that should work efficiently in order to ensure that each component is delivered at the right time [6]. Apart from the planning dimension, risk analysis should be considered to reveal the possible risk factors in project cargo logistics. Branch [43] highlights that it is crucial to stay in schedule and implement the project carefully, and combination of plans including effective risk management techniques should be incorporated to project cargo logistics. Lastly, the use of alternative transport modes is considered as one of the dimensions of project cargo process. Since project cargoes are usually transported with several transport modes, the involvement of possible mode variations as well as actors can be evaluated [43, 10, 30]. Hence statements related to the use

of air and road transportation in project cargo deliveries have been added to the questionnaire.

Project cargo logistics value creation outcomes: Considering the characteristics of project cargo operations, some elements mainly highlighted in maritime logistics value creation, and logistics value literature generated the main outcomes listed under this component as operational efficiency, service effectiveness, technology adoption/innovation. Project cargo logistics value should reflect how efficiently and effectively the system meets the needs of the customers. Building on the studies of Lai et al. [22], Lee et al. [45] and Song and Lee [28], first two outcomes of project cargo logistics value creation have been considered as operational efficiency and service effectiveness. While efficiency is concerned with the utilization of resources, service effectiveness determines the reliability, responsiveness/flexibility of the service providers in logistics [22]. Since project cargo operations differ from each other, a customized care towards the projects is needed both from operational efficiency and service effectiveness. The level of performance for two aspects in project cargo logistics should be monitored by the service providers with regards to what the customer values. Zhao et al. [46] propose customer-focused (responsiveness, flexibility etc.) and information focused (information technology, information sharing and connectivity) capabilities in logistics value. Yazdanparast et al.[2] concentrate on the skills and knowledge of the employees in logistics operations in the creation of logistics value. Hence, a statement regarding the human resources in project cargo operations has been added to the questionnaire. The last outcome builds upon the inevitable requirement for most logistics service providers, namely technology adoption and innovation. As Yazdanparast et al. [2] highlight the service

delivered to the customer should include some aspects of innovation and it should be customized to the requirements rather than a service menu of the provider. Panayides and So [47] highlight the importance of organizational learning and innovation in increasing the overall performance in logistics and supply chain operations.

Barriers: When project cargo operations and value creation is the case, the current situation of the operating environment and the country should also be considered. As the third component, barriers in project cargo operations in Turkey impact the current operations negatively, and project cargo logistics value creation can be interrupted accordingly. Especially poor port infrastructure, limited warehousing facilities, interconnectivity and infrastructure-related problems in hinterland distribution of project cargoes as well as government regulations give rise to changes, which have profound impacts on logistics decisions in project cargo logistics. These barriers also have a negative impact on the value creation processes of service providers. Dimensions related to the barriers have basically been taken from the studies of Aamuvuori [10], Sari [9] and Bazaras et al. [30].

4.2. Sampling and Data Collection

In this study, purposive and snowball sampling methods have been used for sample selection. The purposive sampling technique is a kind of non-probability sampling that is most effective when one needs to study a specific field with knowledgeable experts. Also, snowball sampling has been used in which the contacted experts suggest other potential experts who could contribute to the study. In order to reflect important outcomes from the Delphi study, it has been decided to include experts from industries including logistics service providers, freight forwarders, maritime agencies, port

businesses, shipping companies, brokers and government bodies. The main logic behind the participation of such parties is that they are involved in project cargo logistics operations. Moreover, Linn [20] states that main actors in maritime logistics are shippers, carriers, port operators and freight forwarders. Besides, maritime logistics players include the government authorities, which deal with customs and port management, warehousing operators, inland transport operators, customs agents, shipping agents, and insurance and banking companies. Some Delphi studies conducted in this area such as Saldanha and Gray [48], Islam et al. [49], Deveci and Cerit [50], Brett and Roe [51] also include a panel of experts from different industries, such as shippers, academia, road, rail and sea transport operators, government etc. In the light of these, twenty-five experts have been contacted for the study, however, the final number of experts in the first round have been fifteen due to some excuses and busy schedules of the potential participants. The response rate has been 60%. The response rate has also been 60% in the second round of the study since there have been no dropouts. Table 1 shows the profile of the respondents in the study.

It may be concluded that most of the sample have experience in the industry for 5-10 years. In selecting the sample for the Delphi study, participants considered to be experienced in the field such as general manager or operations manager have been chosen. Most of the participants have a graduate degree. It has been decided that the Delphi study rounds should be conducted by e-mail due to time and financial constraints. Also most of the participants are located in Istanbul. The first round of the Delphi study was conducted on Dec. 24, 2017 through Jan. 05, 2018. The second round of the Delphi study was conducted on Jan. 06, 2018 through Jan. 12, 2018 and sent to the same experts who participated in the

Table 1. Profile of the Respondents Included in the Study

Position	N (%)	Experience in the industry	N (%)
General manager	5(33%)	5-10 years	7(47%)
Operations manager	6(40%)	11-15 years	1(7%)
Specialist	4(27%)	16-20 years	2(13%)
Industry	N (%)	More than 20 years	5(33%)
Logistics service provider	4(26%)	Education	N (%)
Freight forwarder	3(20%)	Graduate	9(60%)
Broker	3(20%)	Postgraduate	4(27%)
Port business	2(13%)	PhD	2(13%)
Maritime agency	1(7%)		
Shipping company	1(7%)		
Ministry of Transport, Maritime Affairs and Communications	1(7%)		

first round of the study by e-mail. After evaluation of the first round and the results related to each statement, new statements were re-formulated and it was aimed to reach a consensus with the second round. After receiving comments and answers of 15 experts for the second round of the study, the same procedure was applied as in the first round. As for the analysis of the second round, frequencies were calculated for each statement and the degree of consensus (70%) was determined.

4.3. Design of the Delphi Study

For Round I, the Delphi questionnaire was used after the feedback regarding the pilot survey had been evaluated. Following the pilot survey necessary changes were made. Pilot questionnaires were sent to two experts (one academician and one

practitioner) involved in project cargo logistics operations. They provided useful insight especially in terms of the wording of the questions. Subjective criteria or descriptive statistics have been used in many Delphi studies for the determination of consensus and the quantification of its degree [52]. In order to determine if consensus has been reached, the APMO (The Average Percentage of Majority Opinion) technique has been employed as a consensus measurement. It has calculated by Kapoor [53] as:

$$APMO = \frac{\text{Majority Agreements} + \text{Majority Disagreements}}{\Sigma \text{ Opinions Expressed}}$$

In the calculation process, statements with “agreement”, “disagreement” and “no comment” have been calculated. Statements with a percentage over 50 % have been accepted as the ones with a majority. Second, the researcher had to sum up the majority agreements and disagreements [52]. According to the Brett and Roe [51]; a statement achieves consensus when it reaches 70% or more. There are Delphi studies where the consensus is defined as 51% while some others use a consensus rate of 70% or 80% [54]. The comments and the responses for each question have firstly been listed on the Excel spreadsheet and then frequencies for each statement have been calculated. For this research, 70% was chosen as a consensus rate because the agreement/disagreement of 15 experts over 25 experts has been considered as a sufficient rate and is keeping with previous empirical work. A second round has been conducted since there were six no-consensus statements from the first round and consensus has been achieved in five statements in the second round. Consensus rates of five statements in the first round are respectively 50%, 53.3%, 60%, 60% and 64.3%. According to the feedback from 15 participants, APMO cut-off percentage rate for the second round Delphi study has been

found 95%. The first round of the Delphi study has included sixteen questions with "agree", "disagree" or "unable to comment-neutral" options.

Validity of the study has been considered by following some steps suggested by Fink et al. [55] and Murphy et al. [56]. Appropriateness of the method chosen for addressing the problem, choice of relevant experts, explanation of data collection procedures, revealing justifiable consensus levels, as well as dissemination and implementation, can be considered as the features determining the validity of Delphi studies Fink et al. [55] and Murphy et al. [56]. Delphi method is preferred in resolving situations where no definite evidence is available by considering the knowledge and experience of experts [57]. Project cargo logistics is widely neglected in logistics literature and such exploratory research supported by experts' opinions can be useful in understanding the main factors as shown in Figure 2. Also as shown in Table 1, the experts selected for the study represent the main actors involved in project cargo operations with considerable experience in the logistics industry. Consensus levels appropriate with previous research have been selected as explained in the design of the Delphi study. In addition, the researchers have followed all the procedures required for the execution of two rounds.

5. Findings

Findings of the study have been evaluated and discussed by considering the enablers, barriers, and outcomes as shown in Figure 2. Statements with related consensus degrees are provided in Table 2 for the first round and in Table 3 for the second round. The first enabler was related to partner selection for the value creation in project cargo logistics since the performance levels of each partner in collaboration and coordination mainly

determine the success of the overall process. Even though all participants have had a consensus on the importance of information sharing, some of them have been hesitant and mentioned that the exchange of 'all' information can be harmful both for the process and the partners so this statement has been revised in the second round, as 'required information should be shared'(2nd statement).According to the findings, in the partner selection, the experience has been perceived as the most important factor compared to equipment availability, portfolio and information sharing with 80% consensus rate(4th statement). Some participants even argued that experience in project cargo logistics has equal importance with equipment portfolio and cost factor. This supports the view that the level of experience in project cargo logistics is mainly related to dealing with unexpected issues such as loss and damage, managing the process smoothly and providing superior value-added services. Since no consensus has been achieved in the role of equipment portfolio in partner selection, that statement has been revised in the subsequent round (3rd statement). Similarly, the brand name and the company's past businesses have not been considered more important than the cost factor so that this statement has also been revised (5th statement). In the statement related to role of parties (10th statement) in terms of value creation in project cargo logistics, freight forwarders have been accepted as the most important partner in project cargo logistics (80% consensus). Apart from freight forwarders, experts have declared that maritime transport companies, shipping agencies and logistics service providers are also critical partners who should work in coordination with each other in order to avoid additional costs and delays.

Table 2. Results of the First Round of the Delphi Research

Delphi Statements	Number of Answers			TOTAL RESULTS	
	Agree	Disagree	Unable to Comment	Consensus	Non* Consensus
	N	N	N	N	%
S1.Planning is the most critical step in project cargo logistics operations.	15 (100%)	0	0	100% agreed	
S2.In project cargo logistics, it is necessary to share all the information about the project in order to rely on business partners and to ensure smooth transport.	12 (80%)	3 (20%)	0	agreed with 80%	
S3.In project cargo logistics, the most decisive factor of partner selection is the availability of equipment portfolio .	6 (40%)	9 (60%)	0		40% (a) 60%(d) (Second-round applied)
S4.In project cargo logistics, the most deterministic factor in choosing a partner is the experience.	12 (80%)	3 (20%)	0	agreed with 80%	
S5.When choosing partners for project cargo logistics, the brand name and the company's past actions are more decisive than cost factor.	9 (64.3%)	5 (35.7%)	1		64.3% (a) 35.7% (d) (Second-round applied)
S6.In project cargo logistics, port infrastructure and handling equipments are at satisfactory level.	3 (20%)	12 (80%)	0	disagreed with 80%	
S7.In project cargo logistics, the port's storage activities that can safely keep the cargo are at sufficient level.	3 (20%)	12 (80%)	0	disagreed with 80%	
S8.There is a congestion (traffic/vehicle intensity) which interferes with the project cargo operation, in the distribution of the hinterland areas of ports.	14 (93.3%)	1 (6.7%)	0	agreed with 93.3%	
S9.In project cargo logistics, operational efficiency (reducing costs and time at a minimum) is more important than service effectiveness (flexibility, responsiveness and reliability in services).	8 (53.3%)	7 46.7%)	0		53.3% (a) 46.7% (d) (Second-round applied)
S10.A forwarder who undertakes the logistics process of the project burden is the most important part in terms of coordination of all the parties.	12 (80%)	3 (20%)	0	agreed with 80%	
S11.Turkey's regulations and rules related project cargo transport adversely affect the flow of the process.	6 (60%)	4 (40%)	5		60% (a) 40% (d) (Second-round applied)
S12.The actors involved in the project cargo logistics process can adapt to the latest changes in technology.	4 (26.6%)	11 (74.4%)	0	disagreed with 74.4%	

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Table 2. Results of the First Round of the Delphi Research (Cont')

Delphi Statements	Number of Answers			TOTAL RESULTS	
	Agree	Disagree	Unable to Comment	Consensus	Non* Consensus
	N	N	N	N	%
S13.The packaging servicesduring the transportation of the project cargo areat the level that meets the needs.	6 (50%)	6 (50%)	3		50% (a) 50%(b) (Second-round applied)
S14.There is lack of human resources with the sufficient knowledge to manage the project cargo transportation processes.	14 (93.3%)	1 (6.7%)	0	agreed with 93.3%	
S15. Risk analysis is carried out from the beginning to the end of the process with the partners before the initiation of the transportation processes.	13 (86.6%)	2 (13.4%)	0	agreed with 86.6%	
S16.In project cargo logistics, air transportation mode is used at delivery points that are not suitable for road transportation.	3 (25%)	9 (75%)		disagreed with 75%	

Table 3. Results of the Second Round of the Delphi Research

Delphi Statements	Number of Answers			TOTAL RESULTS	
	Agree	Disagree	Unable to Comment	Consensus	Non* Consensus
	N	N	N	N	%
1.In project cargo logistics, although there are some important factors in partner selection, the partner's large and sufficient equipment portfolio is important too.	15 (100%)	0	0	100% agreed	
2.In project cargo logistics, cost factor is an important criterion in choosing partners.	14 (93.3%)	1 (6.7%)	0	agreed with 93.3%	
3.Operational efficiency (reducing cost and time) is important in the project cargo transportation process.	15 (100%)	0	0	100% agreed	
4.Service effectiveness (flexibility, responsiveness and reliability) is important in the project cargo transportation process.	15 (100%)	0	0	100% agreed	
5.The rules and regulations must be well defined in project cargo logistics in Turkey.	14 (93.3%)	1 (6.7%)	0	agreed with 93.3%	
6. During the project cargo transportation, the packaging service (open-top container, foam, pallet etc.) is demanded by the customers.	9 (64.3%)	5 (35.7%)	1		64.3% (a) 35.7% (d)

The second enabler in the study focuses on the project cargo logistics operations. All the experts are aware of the importance of planning process (100% consensus), which includes contingency plans, permissions, and routing alternatives (1st statement). Project cargoes differ from the other cargo types with a high-risk profile. 86.6% consensus agreement rate shows that the participants of the study are aware of the risks of project cargoes. Risk analysis has been categorized under project cargo logistics operations since it should be integrated to each movement or the stage of the project cargo logistics operations (15th statement). The last dimension categorized under project cargo logistics operations is the use of alternative transport modes (16th statement). The findings related to the statement (In project cargo logistics, air transportation mode is used at delivery points that are not suitable for road transportation) revealed that although some delivery points are not suitable for road transportation, in most cases airway is not considered as a possible alternative by the actors. Especially, project cargoes' characteristics are considered quite limited for the use of such high-value cargoes. Hence, the participants have reached a consensus with 75% disagreement on the probability of air transport use for project cargo logistics.

Statements related to the barriers impeding the development of project cargo logistics operations have been included in order to gain an insight regarding the operations in Turkey. Experts have mainly concentrated on the problems that they had faced in their operations in Turkey. Port infrastructure and handling equipment availability in Turkish ports are mainly considered insufficient which negatively affects project cargo logistics. Findings show that experts have reached 80% consensus on port infrastructure and handling equipment as well as ports' storage

and warehousing facilities insufficiency (6th and 7th statements). Remaining 20% have agreed that port operations have been developing in favor of project cargo logistics and such improved port services are expected to grow in the future. Apart from the maritime transportation leg of the project cargo operations, it is inevitable to use land transportation for the safe distribution of project cargoes. Concerning barriers experienced in Turkey, another statement with high consensus degree (93.3%) is related to the hinterland distribution of project cargoes (8th statement). Since most of the cost items are mainly experienced in the road transportation leg of project cargoes with certain risks of accidents, damage to the cargo, insurance-related costs, claims, road and railway connections to the ports should be developed by considering alternative routes in the hinterland distribution of project cargoes. Another barrier related to project cargo logistics is considered as regulations and rules slowing down and restricting the logistical processes of project cargo operations. No consensus has been achieved in this statement (11th statement) so it has been revised in the second round. Non-consensus could be due to the fact that there are no specific procedures, rules or codes for the logistical processed of project cargo in Turkey. Hence, the gap in the project cargo industry with regards to legal implications of the processes should be removed.

Project cargo logistics value creation outcomes have been suggested to identify the main areas for development. No consensus (53.3%) has been achieved in the statement (9th statement) "In project cargo logistics, operational efficiency (reducing costs and time at a minimum) is more important than service effectiveness (flexibility, responsiveness and reliability in services)". The value is referred to as how well a project cargo logistics system

responds to customer demands, which is largely reflected in operational efficiency and service effectiveness. Project cargo logistics value is expected to cover both efficiency (reducing costs and time at a minimum) and effectiveness (flexibility, responsiveness and reliability in services), and 9th statement aims to find out which one is the more critical from perspectives of actors in the project cargo logistics process. Experts with both agree or disagree opinions have laid emphasis on inseparability of these two concepts and the service providers should maintain all of these factors to create value in the project cargo logistics process. Only 53.3% consensus has been achieved on operational efficiency's importance, therefore this statement has been revised in the second round of Delphi study. One of the value creation outcomes is added as technology adoption/innovation by the partners involved in the project cargo logistics. However, no consensus (74.4%) has been achieved in the statement of "The actors involved in the project cargo logistics process can adapt to the latest changes in technology" (12th statement). This can be due to the fact that the actors and the experts in the study are still not well equipped with regards to technology adoption. Another dimension investigated in the study regarding value creation is about the satisfaction regarding the packaging services for project cargoes. There has been 50% agreement and 50% disagreement with the statement (13th statement) with three no-comment participants. The experts who disagree with the statement highlight that packaging is not viewed as the top priority so it has been revised in the second round of the study. As a supporting finding to the value creation concept in project cargo logistics, most of the participants (93.3%) agreed that there is lack of human resources with the sufficient knowledge to manage the project cargo transportation processes in

Turkey. Hence, skills and capabilities of both the employees in the field operations (ports, warehouses, hinterland distribution etc.) as well as the employees involved in the activities such as marketing, cargo-related dispute settlement, scheduling etc. are accepted as value creation factors in project cargo logistics.

The second round of Delphi research includes six revised questions with the feedback obtained from the same experts participated in the first round. According to the answers of 15 participants, APMO cut-off percentage rate for the second round Delphi study is considered as 97%. According to the results of second round of Delphi Research, 1st, 3rd, and 4th statements as shown in Table 3 have achieved consensus degree with 100%. The results show once again that the factors such as partners' large and sufficient equipment and portfolio, operational efficiency and service effectiveness are considered very important during the project cargo logistics process. In addition, 2nd and 5th statements have achieved the consensus with the 93.3%. The second statement highlighting the role of cost factor in choosing partners in project cargo logistics has been accepted. Only one expert has disagreed and he has stated that cost factor was insignificant due to the high value of the project cargoes. Considering the statement on the necessity for specification and definition of the rules and regulations for project cargo transportation in Turkey, only one expert has stated that the current outlook on the legislation regarding project cargo operations is very satisfactory. This mainly shows that regulatory bodies involved in logistics and transportation should shed light on the specification of rules and regulations in project cargo logistics. In the second round, consensus has not been achieved (64.3%) in the last statement. The meaning of packaging has been asked more descriptively and the results showed

again that packaging service is not widely used during project cargo transportation in Turkey.

6. Conclusions, Limitations and Suggestions for Further Research

Although studies in logistics domain have made a remarkable development during years, literature on project cargo logistics remains limited in many ways. This study attempts to shed light on value creation enablers and outcomes of project cargo logistics and generate an understanding of the main barriers hampering the development of project cargo logistics from the perspectives of main actors who perform their operations in Turkey. Due to the unique and distinctive characteristics of each project, it is considered to be the most complex cargo types whose movements require skilled rigger, training, lifting and moving equipment and teamwork. Therefore, there is an increasing need for both academics and practitioners to observe and understand the critical components of project cargo logistics operations from value creation perspective. In addition, this research provides both theoretical contribution and managerial implications by describing project cargo logistics value from the viewpoint of related parties. To the best of authors' knowledge, this study is a pioneer research on understanding and identifying the value creation enablers and outcomes of project cargo logistics operations from the case of Turkey.

The study provides an attempt to support the literature on logistics value creation by focusing on the specific case of project cargo operations by combining the relevant outcomes of the previous studies. Enablers describe the critical factors to be considered in value creation for achieving operational efficiency and service effectiveness. Operational efficiency and service effectiveness have mainly been discussed by scholars in maritime logistics

field [47][28][2]. Findings show that the participants consider both operational effectiveness and service effectiveness critical for project cargo logistics value creation. Another outcome is suggested as technology adoption/innovation. In line with the previous literature Lynch et al. [58], Langley and Holcomb, [59], Yazdanparast et al. [2], Panayides and So [47], such outcome is considered critical for increasing customer satisfaction in project cargo operations. However, participants are mainly dissatisfied with the current situation of service providers concerning technology adoption/innovation. Hence investments for improving IT systems, handling equipment can be suggested for developing the current situation in project cargo operations in Turkey.

In terms of managerial implications, the enablers, as well as the outcomes, intend to provide a starting point for understanding the project cargo logistics value creation. Enablers show the critical factors to be considered by the practitioners prior to and during the project cargo logistics operations. These enablers suggest that managers should focus on partner selection and operations-related factors in order to achieve value creation by eliminating possible barriers in the system. Specifically, continuous information sharing with experienced partners and skilled personnel should be achieved in operations. Risk analysis should also be conducted to achieve a smooth flow of project cargoes. Governmental bodies should focus on developing the required infrastructure, namely port storage areas, road and railway connections of the ports to the hinterland. Enablers, barriers and the outcomes offer the initial knowledge of what is needed to constitute a value-creating project cargo logistics operation.

Delphi method has been applied in this research to gain insight about value creation perspectives of main actors

involved in project cargo operations. The study consists of 2 rounds. Statements over 70% consensus degree have been accepted. Project cargo logistics can be highly costly and risky, so not only freight forwarders but also various partners have significant importance. In the partner selection, the experience is seen as the most critical factor. In addition, equipment portfolio is heavily highlighted as a decisive factor in the partner selection. Moreover, cost, brand name, and experiences are viewed as critical criteria in the partner selection for project cargo logistics processes. There is a strong emphasis on the existence of barriers for the creation of superior project cargo logistics value with high consensus degree. Most of the participants declared that Turkey has a great potential in terms of the project cargo logistics but the current logistics environment is considered poor regarding limited port infrastructure, hinterland connections with alternative modes of transportation, legal procedures hampering the smooth flow of cargoes and lack of developed warehousing facilities.

There are some limitations in this study. One of the limitations of the study is the limited number of academic studies on project cargo logistics in the literature. This scarcity has directed the authors to adopt some of the concepts from maritime logistics to project cargo logistics and value creation as well. In addition, there is a very limited sample in project cargo logistics operations in Turkey so great attention has been given to selection process of the experienced participants from such limited sample. Considering the limited academic resources on project cargo logistics process, this study may provide a basis for future studies on project cargo logistics. The components with sub-components in this study may be employed in a future survey research aiming to identify the relationships between the value-creating activities in project cargo logistics. Such

empirical research may provide fruitful outcomes to understand the impact of firm size, nationality, operation and service scope on the value creation capability of the firms. Descriptive statistics and hypotheses tests may be employed to identify such relationships. Qualitative studies such as in-depth interviews or focus group studies may also be conducted to gain a deeper insight on the views of the experts in the field regarding value creation processes and components.

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