



## Article

# Towards Freight Forwarder Selection Criteria: Exploration of BWM and PROMETHEE Method

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**Abstract:** Freight forwarders are crucial to the global supply chain and their efficiency and capacity can improve a country's logistics performance. This study aims to explore factors influencing the selection of freight forwarders by exporters and importers. An analogy between ocean and air freight forwarders is investigated based on perceived operational efficiency and capacity-related factors. The study also explores choosing international ocean freight forwarders to maintain a competitive advantage over air services. By applying the Best Worst Method (BWM) and Preference ranking organization method for enrichment evaluation (PROMETHEE) I and II methods, this study provides the Multi-Criteria Decision Analysis framework to determine the significance of decision criteria for freight forwarder selection. Results suggest that faster services, commitment and responsiveness are significant operational efficiency-related decision criteria for freight forwarder selection, while competitive rates, financial strength, and tracking and tracing are significant capacity-related decision criteria.

**Keywords:** shipper; freight forwarder; PROMETHEE; best worst method; multi-criteria decision analysis

## 1. Introduction

Freight forwarders (FF) are one of the crucial elements of supply chain and facilitating international trade [1]. They work as agents of shipping lines, airlines, and road transportation agencies and assisting shippers in transporting goods and commodities [2]. Since a shipper conducts transboundary commerce regularly through freight forwarders, selecting freight forwarders is significant for both exporters and importers. Global corporations, such as sole international traders and enterprises, depend on international freight forwarders (IFFs) to complete worldwide business collaboration and development to gain financial success. Therefore, an experimental investigation is required to clarify the definition and selection criteria for international freight forwarders. The main function of an international freight forwarder is to carry goods from the origin point to the destination point [3,4]. To do these main tasks, international freight forwarders perform many related tasks, such as providing inland transportation services, packaging, warehousing, customs clearance (Clearing and Forwarding Agents—C&F), consulting, and so many [5,6].

As per the findings of the Bangladesh Freight Forwarding Association (BAFFA), a significant number of local entities, specifically 1273 Bangladeshi organizations, along with around 20 international logistics and freight forwarding firms, are actively engaged in facilitating the essential assistance required for the transportation of



goods in and out of Bangladesh. According to the Agility Emerging Markets Logistics Index (AEMLI) published by Agility Global Integrated Logistics, Bangladesh has experienced a notable advancement, climbing eight positions to secure the 15th place in 2019. This achievement positions Bangladesh as one of the foremost emerging logistics markets on a global scale [7]. These data represent the necessity and difficulty in selecting the best freight forwarders to work as intermediaries for international trading. Freight forwarders play a vital role in international trading. The inefficiency of freight forwarders, in terms of their knowledge-based and practical abilities, hinders cross-border commerce. In addition, it increases costs and lengthens the lead-time of the logistical process. Efficiency in operation and the ability to manage the logistical functions and documents are crucial for a freight forwarder to reduce the lead time in the process. Furthermore, this accentuates the importance of the strength of freight forwarders to shippers when planning to select a freight forwarder to transport the shipment. Hence, it has been found significant to identify the operational and capacity related influencing factors of a freight forwarder. Existing studies have yet to thoroughly explore the specific qualities shippers require from freight forwarders [6,8,9]. This gap in research highlights the need for a deeper investigation into the attributes that shippers value most when selecting freight forwarders to transport their shipments. Therefore, this study specifically examines freight forwarder selection criteria within the context of Bangladesh, using primary data collected from exporters, importers and academics. The primary objective of this study is to determine the operational efficiency and capacity-related factors influencing freight forwarder selection. Based on the aforementioned gaps and research objectives, following research questions (RQ) have been developed:

RQ1: What are the operational efficiency factors preferred by shippers when selecting the freight forwarders?

RQ2: What are the capacity related factors preferred by shippers when selecting the freight forwarders?

RQ3: How do these factors influence in selecting ocean and air freight forwarders?

The opportunity for this study has been well developed in all aspects based on the subject matter, area and time limit. Although certain aspects of ocean-based and air-based freight forwarders are related to logistics, concentration has been given to how shippers can find the right choices to select favorable freight forwarders [1]. Assessment measures are associated with all service providers; for instance, freight forwarders can manage four major parts: cargo sourcing, clearing and forwarding (C&F), ocean and air carriage [10]. In this case, emphasis is also given to the issues addressed by logistics and freight forwarders' stakeholders. Almost 92% of Bangladesh's ocean freight is handled by the Chattogram Port Authority (CPA), which handles the country's primary exports and imports. Bangladesh is situated in an unusual environmental position, allowing it to provide logistical assistance to neighboring nations and areas, such as the seven sisters of India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Tripura and Sikkim), Nepal and Bhutan [11]. The study's data collection and analysis were centered on the period from the middle of 2021 to the middle of 2022 since this is regarded as the ideal evolution era for international freight forwarders in Bangladesh. The questionnaire was developed based on two Multi-Criteria Decision Analysis (MCDA) tools: BWM and PROMETHEE I AND II. Pairwise comparison among the decision criteria was problematic for some respondents.

This study makes a theoretical contribution by reconceptualizing freight forwarder selection as a shipper decision problem rather than a service quality assessment problem. It extends existing service-quality theory by formally distinguishing operational efficiency and capacity-related efficiency as two separate decision constructs that shape shipper choice. By embedding these constructs within a unified multi-criteria decision framework, the study explains how shippers trade off operation-oriented and capacity-oriented considerations across transportation modes. These reframing advances freight forwarder selection theory from descriptive factor listing toward a decision-structured, mode-sensitive perspective.

The rest of the paper has been designed by elaborately discussing the existing literature in section 2, followed by data collection procedure and discussing adopted methodologies in section 3. The survey results have been analyzed and discussed in section 4. Finally, the study concluded by providing a description of recommendations, limitations of the study and future research directions.

## 2. Literature Review

### 2.1. Review of Existing Literature on Freight Forwarder Selection Criteria

The quality of service provided by freight forwarders has been a focal point of research in logistics and supply chain management. Sheng Teng Huang, Emrah Bulut, and Okan Duru [12] conducted an empirical study on the service quality of international freight forwarders in East Asia, particularly in Japan, Korea and Taiwan. They

emphasized the importance of customer requirements such as cheaper agency fees, door-to-door service and instant response. The study employed the Quality Function Deployment (QFD) approach to identify key technical measures like customer relationship management, overall information systems, service points and network capabilities. Their findings underscored that enhancing these technical measures could significantly improve customer satisfaction and competitive advantage in a highly competitive market. The study also highlighted that most of the major customers are small to medium-sized manufacturers or traders, emphasizing the need for freight forwarders to tailor their services to meet the specific demands of these customer segments. Milorad Kilibarda, Svetlana Nikolicic, and Milan Andrejic [13] explored the logistics service quality (LSQ) in Serbian freight forwarding companies using the SERVQUAL model. Their research aimed to understand how different market segments assess service quality based on the structure of services and the relationship between freight forwarders and customers. They found that LSQ in Serbia was not at a satisfactory level, with significant variations in how different customer segments perceived quality. Key dimensions such as reliability, responsiveness and assurance were identified as crucial factors influencing customer satisfaction. The study's limitations included its geographic focus on Serbia and the use of a single measurement tool. Nonetheless, the methodology developed for measuring LSQ could be applied to other markets, providing a basis for improving freight forwarding services globally. S. Subhashini and S. Preetha [14] examined service quality factors specific to ocean freight forwarding services. Their study identified key factors such as tangibility, responsiveness, reliability, value, empathy and assurance, using a deductive approach and empirical analysis. They found a significant association between these factors and customer satisfaction, highlighting the importance of maintaining high standards in these areas to foster customer loyalty. The findings indicated that freight forwarders need to focus on these quality dimensions to improve service delivery and customer satisfaction. This research contributed to a deeper understanding of how various service quality factors interact and their impact on customer perceptions in the ocean freight forwarding industry. In another study, Sheelagh Matear and Richard Gray [15] examined the factors influencing freight service choice for shippers and freight suppliers. The study highlighted that freight suppliers use different criteria when selecting sea versus air transport services. This research provides strategic implications for marketing, suggesting that understanding these differing priorities can help freight forwarders tailor their services to better meet the needs of both shippers and freight suppliers. Likely, Ruth Banomyong and Nucharee Supatn [8] investigated the key attributes of freight logistics service quality from the shippers' perspective in Thailand, identifying 24 freight logistics service attributes categorized into six dimensions: reliability, assurance, tangibility, empathy, responsiveness and cost. They found that these attributes significantly impact shippers' selection of third-party logistics service providers (3PLs). The research suggested that attributes such as accuracy of documents, EDI and e-commerce services, customer relationship management, customer care, updated freight rates and consolidation provision are particularly influential in shippers' decision-making processes. Irene Gil-Saura, Gloria Berenguer-Contró, and Eugenia Ruiz-Molina [16] analyzed the determinants of satisfaction and loyalty in B2B relationships in the freight forwarding industry. They found that service quality directly impacts customer satisfaction and perceived value, which in turn influences customer loyalty. Significant differences in quality dimensions and satisfaction were observed between different transport modes (road, maritime, air). Despite the extensive research on freight forwarders' service qualities and selection criteria, a notable gap exists in the literature. While previous studies have extensively analyzed service quality factors and their impact on customer satisfaction from the perspective of freight forwarders and logistics providers, there is a lack of comprehensive research focusing on the approach and required qualities of freight forwarders from the perspective of shippers, such as exporters and importers. For instance, the studies by Huang et al. [12], Kilibarda et al. [13], and Subhashini and Preetha [14] provided valuable insights into technical measures, service dimensions, and customer satisfaction factors relevant to freight forwarders. However, they did not delve deeply into the specific needs and selection criteria of shippers. Understanding these criteria is crucial as shippers are the primary users of freight forwarding services. Research that addresses this gap could provide freight forwarders with strategic insights to better align their services with shippers' expectations, ultimately enhancing service quality and customer loyalty. Therefore, this study aims to identify and analyze the specific qualities and selection criteria that shippers prioritize when choosing freight forwarders, thereby filling this gap and contributing to the development of more customer-centric service strategies in the freight forwarding industry.

## 2.2. Multi-Criteria Decision Making (MCDM)

Multi-criteria decision-making (MCDM) is a branch of operations research (OR) [17]. Multi-Criteria Decision Making (MCDM), often called multiple-criteria decision analysis (MCDA), is a field of study that examines the different options that can be selected from a given circumstance. It encompasses a wide range of

fields, including the social sciences, engineering, medicine and daily life [18]. One of the most widely used decision-making instruments in a variety of fields is MCDM [19]. It's crucial to choose the appropriate criteria for MCDA. Because they serve as standards for achievement. Setting relevant criteria is crucial when it comes to the objectives [19]. Applying the theory of multi-criteria decision-making (MCDM) entails using computational techniques that take into account many criteria and preference order in order to assess and choose the optimal choice among several alternatives in accordance with the intended result.

### 2.3. Definition of Shipper

It is the shipper's responsibility to carry commodities and merchandise [20]. Packing and getting a shipment ready to be turned over to the carrier for delivery is the shipper's responsibility according to the bill of lading (BL) [21]. He is also an individual or business that coordinates the transportation of products from one location to another [22].

### 2.4. Freight Forwarders Selection Criteria (FFSC)

The existing research conducted in the related arena is mostly on operational efficiency, market mechanism, market development, service quality, and so on. However, very few studies have been conducted on selection criteria for freight forwarders. Table 1 summarizes and categorizes Freight Forwarders Selection Criteria and literature sources. Furthermore, the application of the MCDA has been found to be very low in the existing literature. Considering all the cases and previous literature, this study aims to explore the factors that influence freight forwarder selection using BWM and PROMETHEE.

**Table 1.** Freight forwarders selection criteria.

Broad Category	Individual Criteria	Supported Literature/Study
Operational Efficiency Factors (OEF)	Responsiveness	[5,6,23]
	Faster Services	[5,12,23]
	Door to Door Services	[23,24]
	Comprehensive Packages	[6,23]
	Responsibility in Cargo Damage	[5,6,23]
	Special Cargo Handling	[5,23,25]
	Customer Service and Commitment	[5,6,23]
	Licensing, Membership & Certification	[5,23,26]
Capacity Related Efficiency Factors (CREF)	Specialty in Different Sectors	[6,23,27]
	Financial Strength	[5,6,23]
	Bulk Service Facilities	[5,6,23]
	Competitive Rates	[5,13,23]
	International Networks	[5,23,28]
	Expertise in Mode of Transportation	[5,6,14]
	Tracking and Tracing Services	[5,6,23]

## 3. Data Collection and Methodology

This study aims to identify the factors influencing freight forwarder selection from the perspective of shippers. These factors are divided into two segments: operational efficiency factors and capacity-related factors. The best-worst method (BWM)-MCDA was used to determine the weights of the criteria which provides more compatible results than other MCDA methods [29,30]. Furthermore, the Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE) was applied to assess the ocean and air freight forwarders.

### 3.1. Data Collection

To collect data, an administrative survey was conducted among the selected exporters and importers to reach the research objective. The minimum educational qualification of the respondent was considered a bachelor's degree. However, to have precise fieldwork, the exporters and importers who are conducting their business in Dhaka city and surrounding areas have been considered as respondents. Furthermore, a minimum of three years of experience in either the export-import business or commercial manager was kept as the floor to filter among the respondents. Furthermore, a number of academics were also interviewed. 45 responses were collected through a questionnaire survey, but six were found to be incomplete and inconsistent. Ultimately, 39 responses were included in the analysis. Participants were required to provide their verbal consent before proceeding with the survey. Consent was obtained verbally to facilitate smoother participation, particularly because the survey was conducted

in a busy commercial setting where many respondents preferred a quicker process over filling out formal documents. The consent process was incorporated into the questionnaire, clearly explaining the purpose of the study and ensuring participants understood their voluntary participation. Table 2 presents details of the responses.

**Table 2.** Details of the responses.

Sector	Years of Experience	Location	Number of Respondents
Apparel Garments (Exporter)	5–7	Dhaka	13
Electronic goods (Importer)	4–6	Chittagong	7
Electronic goods (Importer)	3–5	Dhaka	14
Academician	3	Dhaka	4
Others	6–9	Dhaka	7
<b>Total</b>			<b>45</b>

### 3.2. Development of the Best Worst Method

The best–worst method (BWM) is a multi-criteria decision-making (MCDM) method invented in 2015 by [29] of the Delft University of Technology in the Netherlands. Owing to its simplicity, this approach has piqued the interest of researchers. The Best–Worst Method is particularly suitable for studies with limited expert samples due to its reduced comparison burden and high consistency, which further supports the reliability of the derived weights. This approach was used to determine the importance of the choice criterion. The following processes were used to determine the weights of the criteria.

**Step 1:** Determining the decision criteria.

Considering  $n$  criteria for efficiency related factor and capacity related factors, can be denoted as  $C_1, C_2, C_3 \dots C_n$ .

**Step 2:** Determine the best (most important) and worst (least important) criteria.

Choosing the best criteria  $C_B$  and the Worst Criteria  $C_W$ .

**Step 3:** Importance of the best criterion over other criteria using the importance giving scale from 1 to 9.

$$A_B = (a_{B1}, a_{B2}, \dots, a_{Bn})$$

**Step 4:** Provide the importance of all other criteria over the worst criterion.

$$A_W = (a_{1w}, a_{2w}, \dots, a_{nw})$$

**Step 5:** Finding the optimal weights

$$\min \max_j \left\{ \left| \frac{w_B}{w_j} - a_{Bj} \right|, \left| \frac{w_j}{w_W} - a_{jW} \right| \right\}$$

Subject to,

$$\sum_j w_j = 1$$

and  $w_j \geq 0$  for all  $j$ .

**Consistency Ratio:** The contrast between the best and others and the worst and others is completely constant when  $a_{Bj} \times a_{jW} = a_{BW}$  for all  $j$ , where  $a_{Bj}, a_{jW}, a_{BW}$  are the preferences of the best criterion over criterion  $j$ , preference criterion  $j$  over the worst criterion, and preference of the best criterion over the worst criterion, respectively.

The robustness of the comparison and perceived results depends on the consistency ratio [31], which is calculated by applying the following formula:

$$\text{Consistency Ratio} = \frac{\xi^*}{\text{consistency Index}}$$

A mathematically proven and well-designed consistency index was used to identify the robustness of the analysis (Table 3).

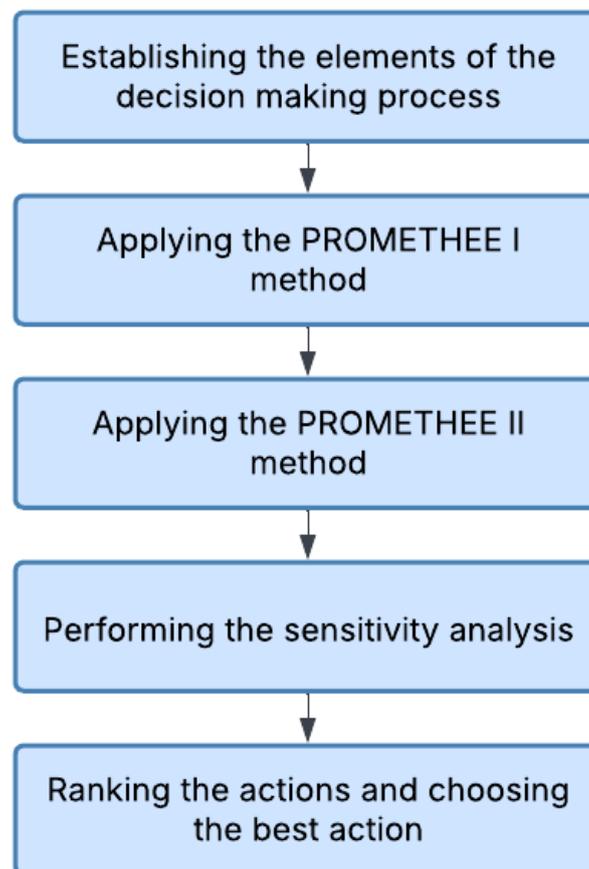
**Table 3.** Decision criteria wise consistency index (source: [31]).

Criteria	3	4	5	6	7	8	9
Consistency ratio (for 9-point pairwise comparison scale)	0.2122	0.3653	0.4055	0.4225	0.4445	0.4587	0.4747

Consistency Ratio (CR)  $\in [0,1]$ . The lower the CR, the greater the number of comparisons; hence, the results are more reliable. A  $CR \leq 0.25$  is considered as a very high consistency level.

### 3.3. Development of PROMETHEE I and II

Figure 1 shows the research design of PROMETHEE (Preference Ranking Organization Method Enrichment Evolution) I, PROMETHEE II were developed by Professor Jean. Pierre, Belgium. Brans in 1982 and is used for the partial and complete ranking of alternatives [32]. The MCDA method is used for both weighing the decision criteria and outranking alternatives. In the previous discussion, it was determined that the BWM method was used to determine the weightage. To apply the PROMETHEE method, the five stages shown in Figure 1 were followed.

**Figure 1.** PROMETHEE stages.

[32] recommend the analyst and the decision-maker use PROMETHEE I and II. Complete ranking is easy to use, but the analysis of incomparability often helps to finalize a proper decision. Following mathematical formula for PROMETHEE has been adopted to solve the problem:

#### Step 1: Calculate the Preference Function

For each pair of alternatives,  $a$  and  $b$ , and for each criterion  $c$ , the preference function  $P_c(a,b)$  is calculated. This function measures the degree to which alternative  $a$  is preferred over alternative  $b$  with respect to criterion  $c$ .

$$P_c(a,b) = f(d_c(a,b))$$

where  $d_c(a,b)$  is the difference between the evaluations of  $a$  and  $b$  on criterion  $c$ .

#### Step 2: Aggregate the Preference Functions

The aggregated preference index  $\pi(a,b)$  is calculated by summing the weighted preference functions for all criteria.

$$\pi(a, b) = \sum_{c=1}^m w_c \cdot P_c(a, b)$$

**Step 3:** Calculate the Outranking Flows

The positive outranking flow  $\Phi^+(a)$  and the negative outranking flow  $\Phi^-(a)$  for each alternative  $a$  are calculated as follows:

$$\Phi^+(a) = \frac{1}{n-1} \sum_{b \neq a} \pi(a, b)$$

$$\Phi^-(a) = \frac{1}{n-1} \sum_{b \neq a} \pi(b, a)$$

**Step 4:** Calculate the Net Outranking Flow

The net outranking flow  $\Phi(a)$  for each alternative  $a$  is the difference between the positive and negative outranking flows.

$$\Phi(a) = \Phi^+(a) - \Phi^-(a)$$

3.4. Framework and Design of the Research

This study was designed to explore two important research objectives. The first is to identify the factors influencing the selection of freight forwarders (Table 1). Second, to identify the best alternative from the primarily chosen fifteen questions. To answer the first question, BWM was used to identify the weights of criteria and outrank the criteria. For the second question, PROMETHEE I and II are used to outrank the factors. In that case, the analyzed and derived outcomes from the BWM analysis were used with PROMETHEE. The entire research process is shown in the flowchart in Figure 2.

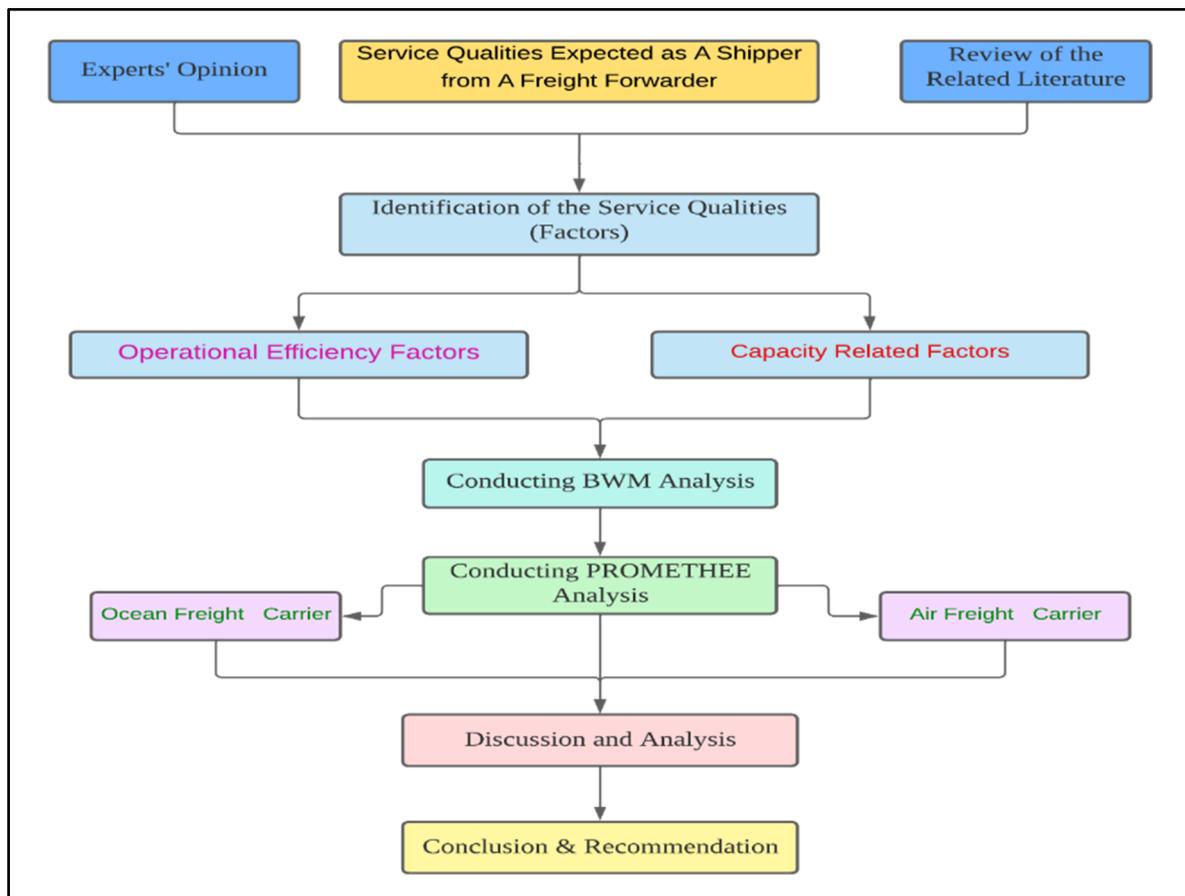


Figure 2. Research design and process.

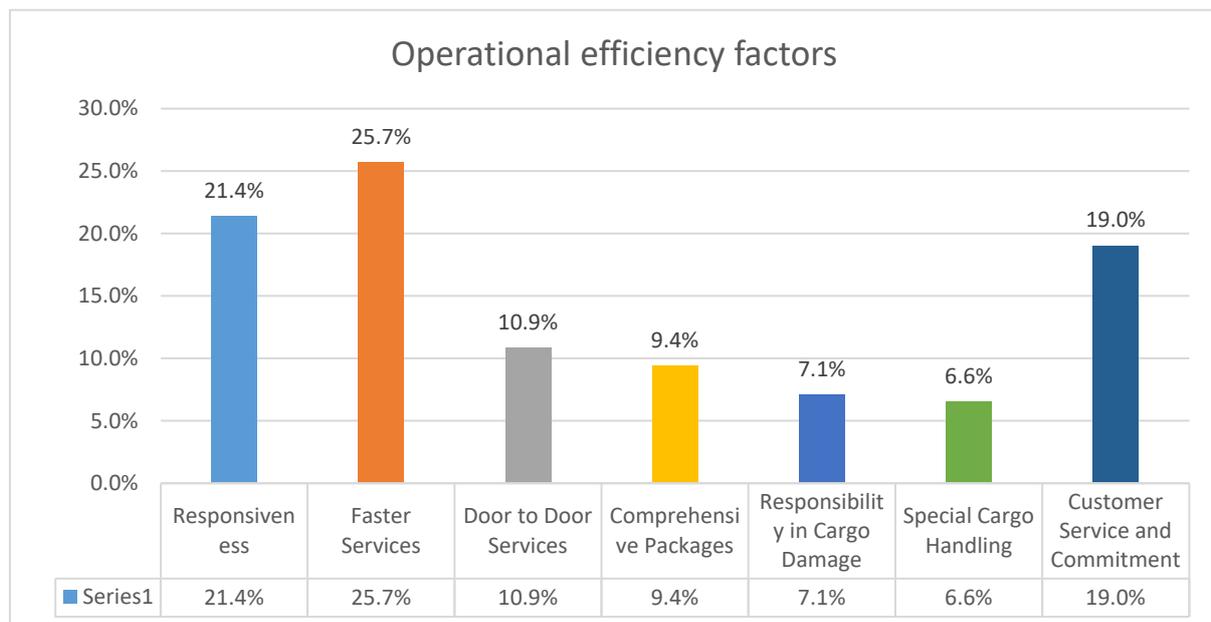
#### 4. Analysis and Findings

The primary goal of this study was to identify the best criteria for shippers to choose international freight forwarders in Bangladesh. Since Bangladesh is heading toward being a developed country, identifying international freight forwarders is the highest priority for both exporters and importers. In particular, exporters bring foreign remittances in Bangladesh and this could occur through cross-border business as well as transboundary business depending on ocean freight or air freight. Consequently, these works are conducted by Bangladeshi and Foreign Freight Forwarders on behalf of shippers. Thus, shippers always determine the operational and capacity efficiency of international freight forwarders.

##### 4.1. Operational Efficiency Factors

Figure 3 shows the difference in the priority of a shipper when choosing operational efficiency. Depending on the form of transportation, a shipper selects the freight forwarders based on certain efficiency factors of a freight forwarder. The most critical operational efficiency factor is Faster Services, which holds the highest importance at approximately 25.7%, indicating that shippers highly value quick delivery times. Responsiveness follows closely, with a weight of about 21.4%, showing that timely and efficient communication is also crucial. Customer Service and Commitment is found at 19%, highlighting the importance of reliable and supportive customer interactions. Door to Door Services is important as well, with a significance of approximately 10.9%, emphasizing the convenience of comprehensive service offerings. Comprehensive package is 9.4%. Responsibility in Cargo Damage and Special Cargo Handling are less critical, with weights of about 7.1% and 6.6% respectively, but still important considerations for specific shipping needs. Overall, the outcome underscores that speed, responsiveness and customer service are the top priorities for shippers when choosing a freight forwarder.

Moreover, the maximum consistency ratio threshold for seven decision criteria and 9-point scale is 0.4445 (Table 3) which is less here. From this, it can be concluded that the results derived are reliable and acceptable.



**Figure 3.** BWM: Operational efficiency factors.

##### 4.2. Capacity Related Efficiency Factors

Figure 4 displays competitive rates, with about 24.49% on the leading position of capacity-related efficiency and on the contemporary holding only of 6.79%, expertise in Mode of Transportation is on the least of the criteria. Among the other factors, Financial Strength and Licensing, Membership & Certification have also been found crucial for a shipper when negotiating for a freight forwarder. Subsequently, International networks, and tracking and tracing services with mid-range acceptance among shippers. Bulk Service Facilities and specialties in different sectors are the least prioritized factors after Expertise in Mode of Transportation.

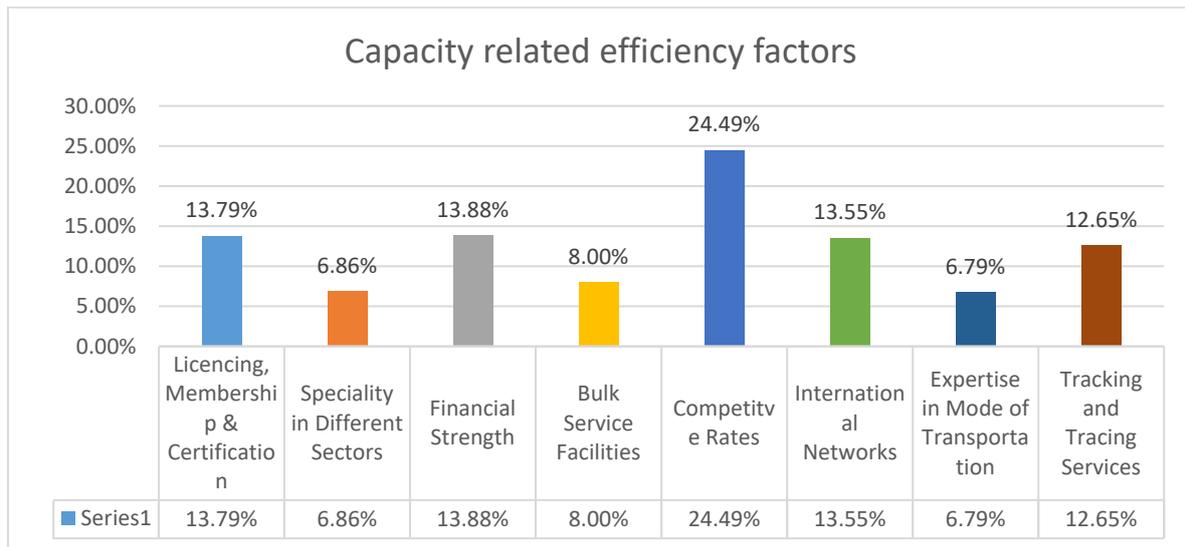


Figure 4. BWM: Capacity related efficiency factors.

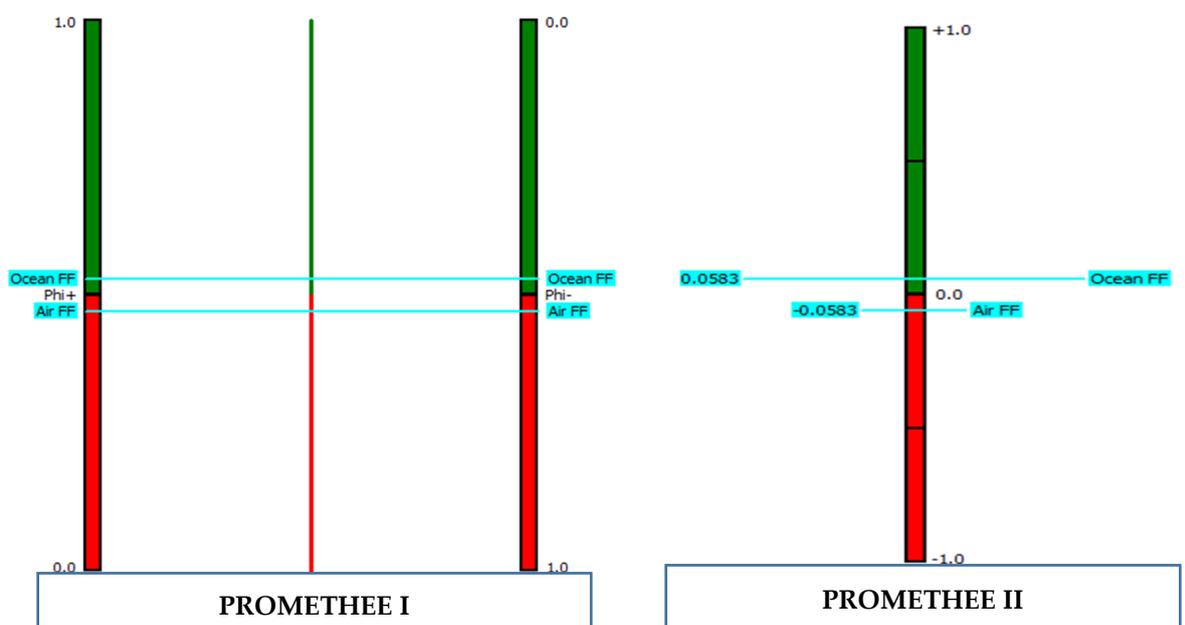
Moreover, the maximum consistency ratio threshold for eight decision criteria and 9-point scale is 0.4587 (Table 3) which is less here. From this, it can be concluded that the derived results are reliable and acceptable.

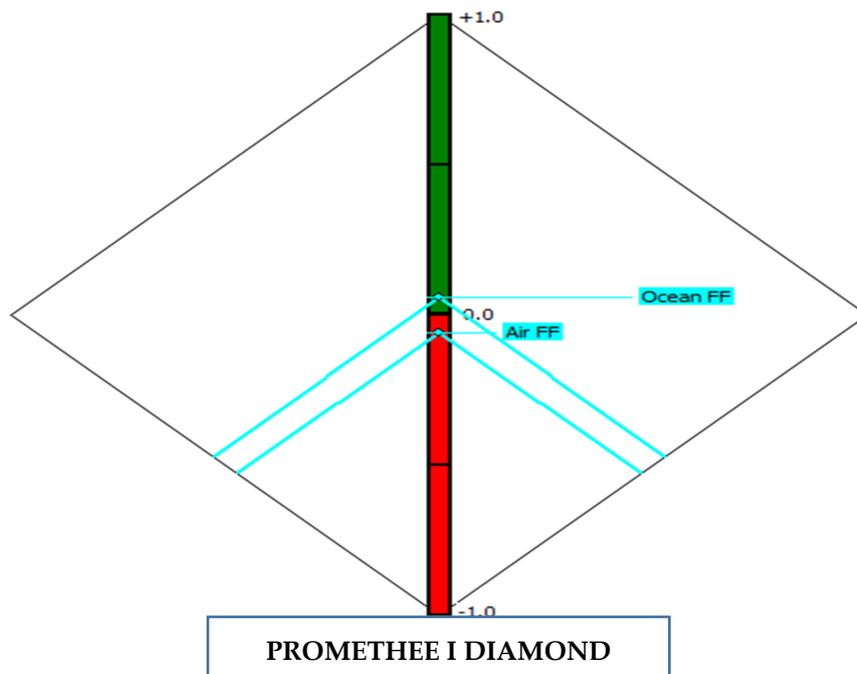
4.3. Ocean vs. Air Freight Forwarder Selection Based on Operational Efficiency

The PROMETHEE I partial ranking calibrates the comparison between the outgoing (Phi+) and incoming flows (Phi-). The left column correlates to Phi+ scores, and the right column corresponds to Phi- values. The vertical line in the center balances the two lines representing the outgoing and incoming flows. In this study, no lines seemed to overlap, indicating that the top line had a clear advantage over the bottom line.

PROMETHEE I selects the partial ranking for selecting the criteria of freight forwarders, and PROMETHEE II selects the complete ranking for selecting the criteria of freight forwarders. Figure 5 shows the preference of shippers in assessing and choosing a suitable freight forwarder between two popular modes of transportation: ocean freight and air freight. The responses gather a strong speculation, which in Figure 5 weighs towards ocean freight more than air freight options. The ease of transporting goods by air is not an option for shipping heavy/bulky items.

This study outcome attempts to wrap up a strong argument that shows how ocean freight is the best option. Shippers prefer air freight as one of the most difficult ways to ship goods, because of the high costs involved. Therefore, shippers rely on ocean freight as the main transportation method to make it affordable for businesses and other clientele.



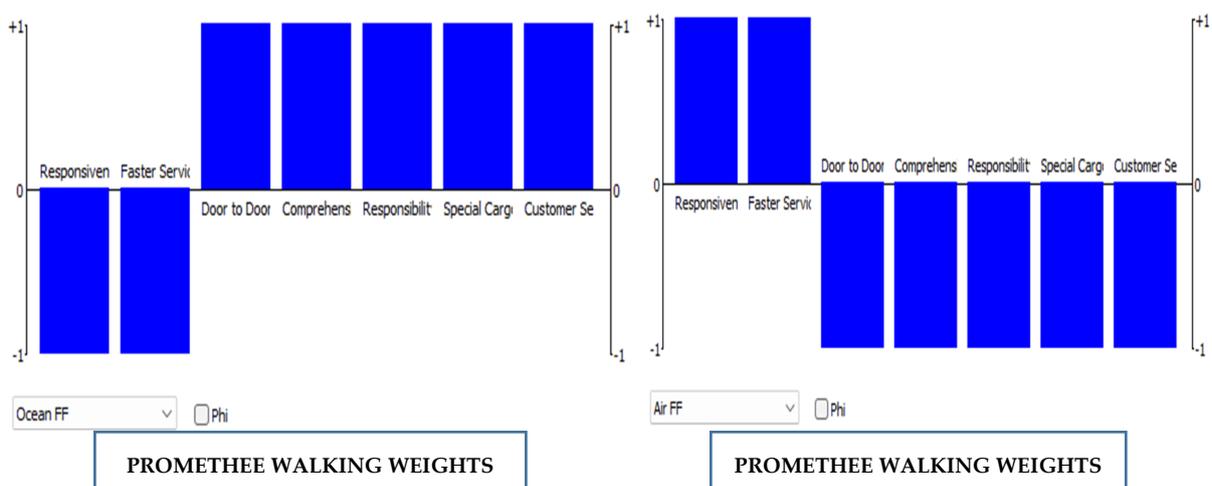


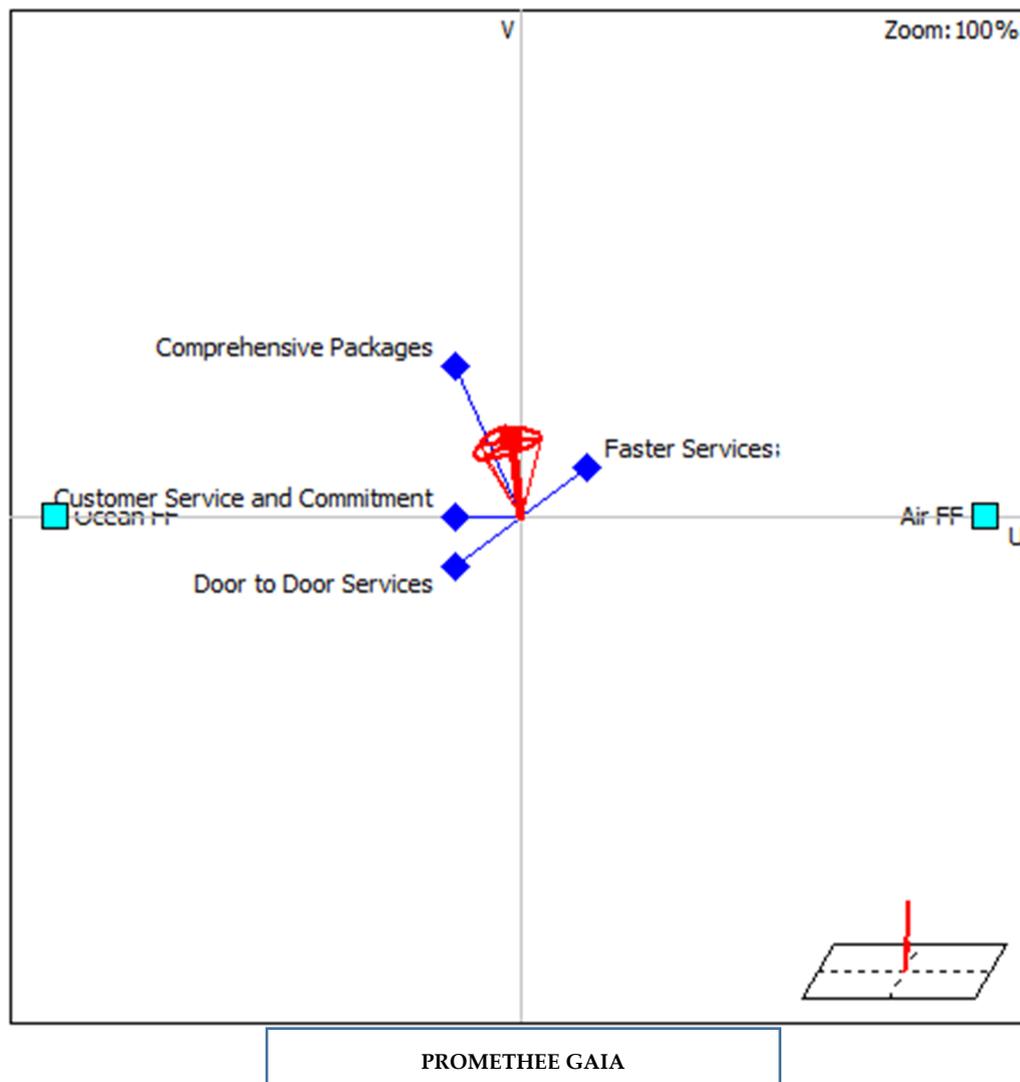
**Figure 5.** PROMETHEE I, II, diamond based on operational factors.

The results shown in Figure 5 provide valuable information that can be used in the best decision-making process by shipping companies and shippers. In addition, Figure 5 shows a similar preference for shippers in choosing the mode of transport on the basis of operational efficiency of freight forwarders. In the PROMETHEE II model, the Phi score is positive for ocean freight and negative for air freight, which sets the preference sequence from air to ocean in an ascending manner. Another crucial takeaway from Figure 5 is the mean distance from the Phi score of the ocean to the Phi score of air freight, which is the bare minimum based on the operational efficiency of freight forwarders.

Finally, Figure 5 compares the preferences of ocean freight and air freight on the basis of operational efficiency in the PROMETHEE diamond. Figure 5 shows the positive score of Phi for ocean freight and the negative score of Phi for air freight. Phi scores denote the optimal preference for ocean freight to respondents consisting of shippers and commercial institutions.

The Figure 6 denotes the preferability of shippers in choosing freight forwarders over a number of operational efficiency factors, among which ocean freight is favorable over almost every factor. However, ‘responsiveness’ and ‘faster services’ negatively affect in choosing the ocean freight forwarders as ocean freight lacks these two types of services. However, other services are offered under more suitable conditions. By contrast, the main offerings of the air freight mode of transport are responsiveness and faster services. However, other factors that affect the decision of shippers to choose freight forwards do not favor the air freight mode of transportation.





**Figure 6.** PROMETHEE walking weights and PROMETHEE GAIA based on operational factors.

Looking at the performance of air freight and ocean freight services in Figure 6, it is clear that ocean freight has better offerings for almost every factor. When we compare certain factors, such as responsiveness and faster services, ocean freight does well here, too. On the other hand, there are certain factors that favor air freight services, such as time to delivery and availability of basic services, which makes it an ideal choice for respondents consisting of shippers around Dhaka.

#### 4.4. Ocean vs Air Freight Forwarder Selection Based on Capacity Related Efficiency

Figure 7 shows the preference of shippers in assessing and choosing suitable freight forwarders considering the capacity of the freight forwarders between two popular transportation capacities: ocean freight and air freight. The outcome of the analysis leads to a strong conclusion, which, as shown in Figure 7, heavily favors the ocean freight forwarders with very high acceptance. When it comes to sending large or bulk cargoes, that is, the capacity of transportation, air transportation is not as convenient. The analysis presents a convincing case for why ocean freight is the best choice. Owing to its limited capacity, air freight is considered one of the most challenging modes for shipping products by shippers. As a result, shippers rely on ocean freight as their first and foremost choice as the mode of transportation for transporting the highest amount of goods simultaneously. The outcomes depicted in Figure 7 offer useful conclusion that transportation firms and shippers may utilize to make the best possible decisions. That is, the figure clearly shows that, in terms of capacity, the only accepted mode is ocean freight because of its higher capacity to carry goods. Owing to their limited capacity and high cost, shippers concur that air freight is one of the trickiest methods for moving products.

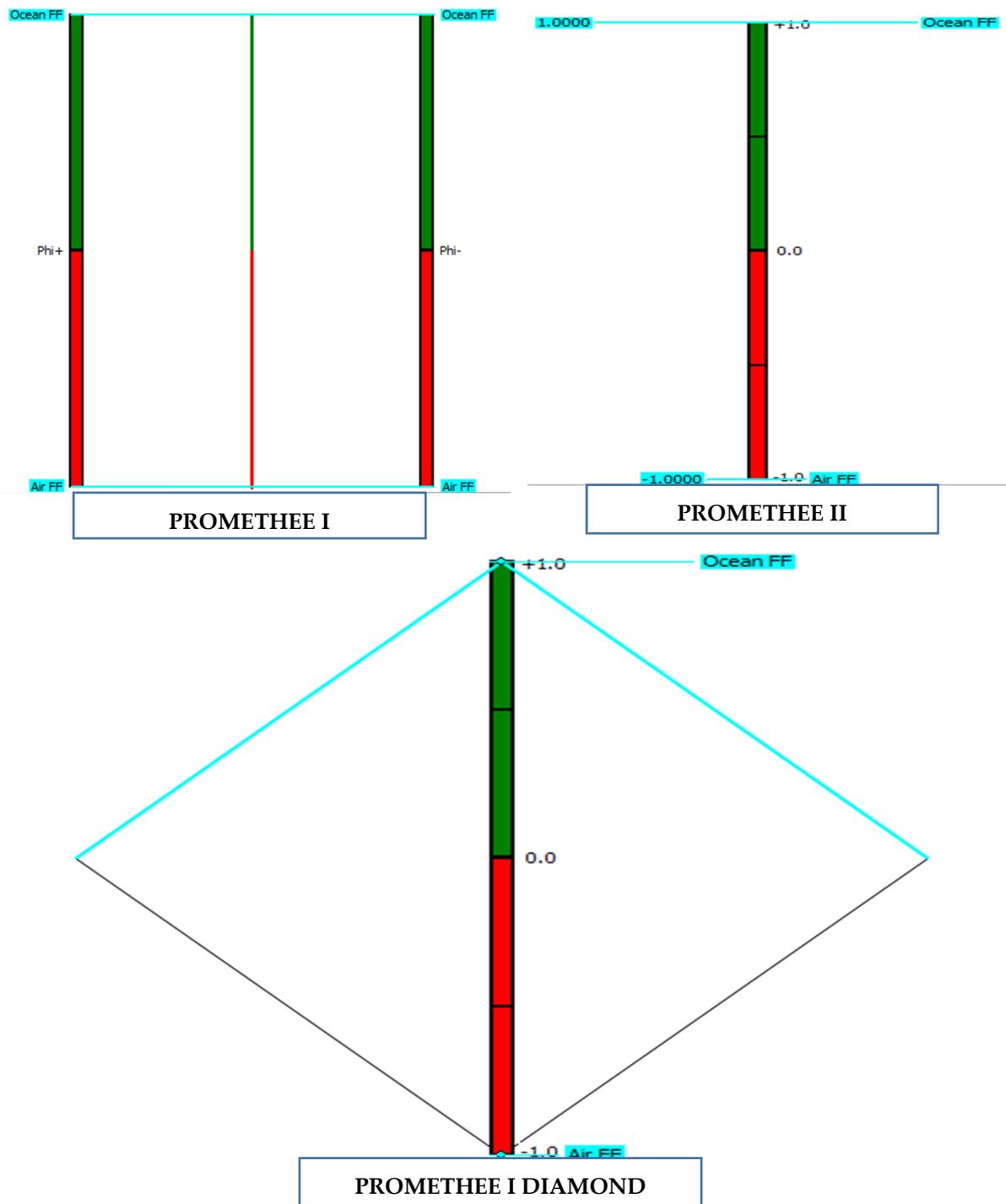


Figure 7. PROMETHEE I, II, diamond based on capacity related factors.

Figure 8 illustrates a comparative analysis of freight forwarders based on capacity-related factors, highlighting a strong preference for Ocean Freight Forwarders over Air Freight Forwarders. The Ocean freight forwarder is positioned to the right, showing high performance and acceptance in factors such as Bulk Service Facility, Transportation and Tracking Services, and Financial Strength. The convergence of red lines towards Ocean FF indicates that these factors are closely aligned with ocean freight services. This suggests that shippers prioritize ocean freight for its robust capacity to handle large volumes and comprehensive service offerings, as opposed to air freight.

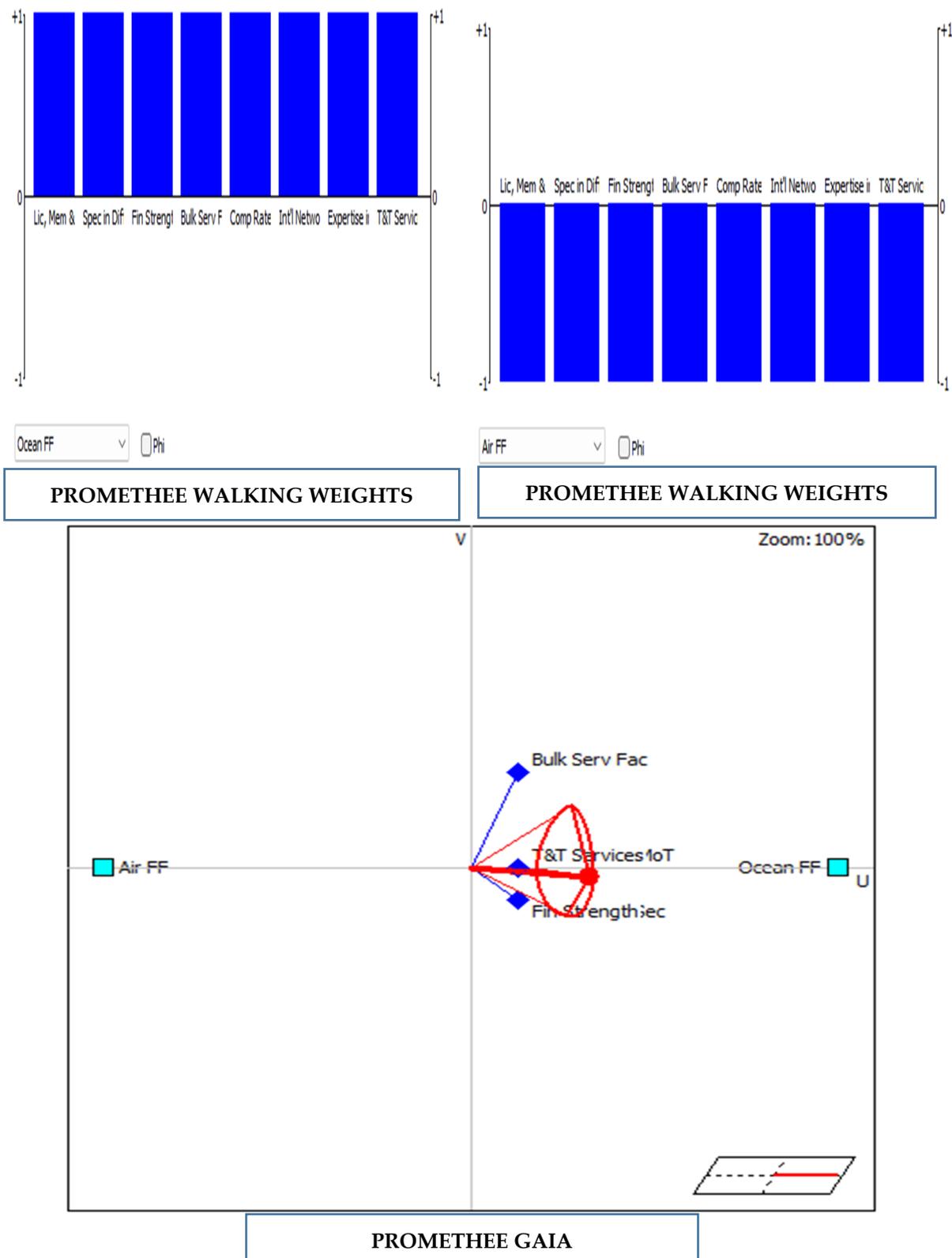


Figure 8. PROMETHEE walking weights and PROMETHEE GAIA based on capacity factors.

### 5. Conclusion and Recommendations

This study addressed three research questions related to freight forwarder selection from the perspective of shippers. In response to RQ1, the findings show that faster services, responsiveness and customer service and commitment are the most important operational efficiency factors influencing shippers' selection decisions. Regarding RQ2, the results indicate that capacity-related factors which are particularly competitive rates, financial strength, licensing and certification and tracking and tracing services, play a key role in shaping shippers'

preferences. Finally, in response to RQ3, the analysis reveals a clear preference for ocean freight forwarders over air freight forwarders when both operational efficiency and capacity-related factors are considered together.

This study categorizes the factors of freight forwarders' activities, such as operational and capacity strength, that influence shippers' choice and the best selection for international freight forwarders in Bangladesh. The role of freight forwarders in their relationship with shippers is also highlighted. The decision criteria of the "closeness of the shippers to the freight forwarders," "nearness of the freight forwarders to exporters and importers," and "user-friendliness to high operational and capacity factors of freight forwarders" have been used as vital assessment criteria [33]. The Logistics Performance Index (LPI) of a country depends on freight forwarders' organizational structure and adequate logistics maintenance as part of their strategy to provide services globally. Since freight forwarders are an important element of Bangladeshi logistics [9], a new study could be introduced to identify the impact of freight forwarder throughput on LPI. This might help governments and private companies to defend freight forwarders' establishment decisions. Freight forwarders' abilities and execution are determined by their capacity and operational base management [6]. Additional exploration can be used to identify the factors affecting the accomplishments of freight forwarders. Furthermore, identifying the factors influencing Bangladeshi freight forwarder throughput can be useful for predicting the required number of freight forwarder service developments in Bangladesh.

From the perspective of Bangladesh's transboundary business, exports and imports are increasing day by day in the field of economic growth and national development. Consequently, in the transboundary business, freight forwarders play a significant role in the transnational business development of Bangladesh. Researchers have demonstrated how to nominate international freight forwarders to successfully complete the transverter business. The selection of international freight forwarders plays an emergent role in cross-border business for global trade personalities, such as shippers and consignees, in the field of export and import. Since, to do the universal business, every shipper and consignee relies on international freight forwarders for piloting the cargo from one country to another countries. Hence, shippers have to wake up making strong win-win decisions so that they can execute more profit and minimize risk for their purchase and purchase commerce. As a result, international merchants must segregate criteria to sort the qualities of international freight forwarders.

The top export-related sectors of Bangladesh are RMG, Leather, Fish, Vegetables, and many are dependent on freight forwarders [34], which could be ocean freight or air freight. Alternatively, the top import-related sectors are machinery, mineral fuels, electrical items, and medical items, depending on ocean and air freight. These sectors are leading Bangladesh towards developed countries. Freight forwarders also play a significant role.

According to the breakdown of the decision-making criteria for freight forwarder selection in the context of ocean and air freight, using two MCDA methods in the BWM analysis, the proximity of the ocean carriage to the air carriage and the proximity of both ocean and air freight to exporters and importers have been found to be extremely important for international freight forwarders. Most exporters and importers are situated in Dhaka, who want to be strongly capable of, in particular, ocean freight facilities against air freight facilities.

These analyses have been experimentally verified by the recognition of Operational Efficiency Factors of shippers who want Faster Services, Responsiveness, and Customer Services and Commitment, in contrast to the capacity-related factors exporter and importer want Competitive Rates, License, Membership, and Certification, as well as updating tracking and Tracing Services.

Based on the aforesaid discussion, the following recommendations are strongly suggested:

- Freight forwarders should emphasize the "Faster Services" when considering the development of operational efficiency.
- They are also required to accentuate on the "Competitive Rates" when they are bearing in mind to improve the capacity building.
- Shippers should negotiate with ocean freight forwarders when considering the "Bulk Service Facilities, Track and Tracing Services, and Financial Strength."
- Shipper should deal with air freight forwarders when he is focusing "Faster Services.

The study's findings may be influenced by regional contexts specific to Bangladesh, potentially limiting generalizability to broader international contexts. Furthermore, the reliance on perceived factors without direct operational metrics may introduce subjectivity in evaluating freight forwarder selection criteria.

However, future studies could conduct comparative analyses across different regions to validate the identified criteria's universality and contextual relevance. Investigating the integration of emerging technologies such as blockchain and AI in enhancing the operational efficiency and transparency of freight forwarding services would provide insights into future advancements.

### Author Contributions

M.M.H.C.: conceptualization, supervision, data curation, formal analysis, writing—original draft preparation; H.R.A.: methodology, validation, writing—reviewing and editing; M.H.A.: software, visualization, investigation; M.Z.H.: methodology, resources, data curation. All authors have read and agreed to the published version of the manuscript.

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Data will be made available upon request.

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The authors declare no conflict of interest.

### Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.

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