Original article

Identification of factors affecting Port cluster performance

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Abstract

Port clusters have been major concept driving competitiveness and creating an edge over other ports over a period. The clusters also have been developing in many geographical regions across the world due to various factors depending on the location and need of the region. The purpose of this research article is to study various factors affecting the Port clusters growth in Malaysia and to identify the main factors based on the variance. The responses for the factors affecting the Port clusters have been collected using the Likert scale, and Principal component analysis has been used. Four prominent factors have been identified among 19 factors based on variance using Principal component analysis. Shipping services and primary service providers were found to be major factors for the growth of Port Clusters in Malaysia. The article brings forth that there is a need for government to formulate policy concentrating towards the growth of the Shipping services lined shipping lines and primary service providers like Custom house agents and stevedoring agents for the development of port clusters in countries like Malaysia. The study shows the need to focus on Port clusters and factors that affect the development of the same.

Keywords: Port Clusters, Agglomeration, Port Performance, and Cluster Constituents

1. Introduction

Strategic management literature suggests the formulation of clusters of interlinked industries, organizations, and institutions helps the constituent units to obtain regional competitive advantage (Porter 2003, 2002). Practical application of such clustering can be seen in different sectors such as software industry and various manufacturing industries. Other segments, such as seaports industry are relatively new to the concept of clustering. A significant driver for port clustering is competition as contemporary seaports are competing for individual market share in respective geography. In a competitive environment, port clustering brings improvement in regional competitiveness by delivering higher values to demand community. The spillover of cluster synergies also helps port linked industries, organizations, and institutions to achieve a sustainable business environment. These trends can be identified in existing port clusters of   Malaysian ports. The overall experience around the world has shown that the concept of clustering suits particularly well to port businesses.

Although the port clusters seem beneficial and relevant, the conceptualization of its performance is yet a matter of discussion for cluster-interested researchers. This is because of two primary reasons, the first being presence of many constituent stakeholders for seaports services and associated activities. Seaports serve a heterogeneous customer base, making their services vague and complicated. As a result, the final value delivered in port service has contributions from associated players apart from the port itself. These players are then acting as constituents in the formulation of port clusters. With many constituents, a firm-level approach in measurement of the overall performance of a cluster seems complicated. The second reason is the approach in an approximation of contributions in cluster performance. Theoretically, cluster performance measurement is by taking the cluster as a unit of analysis. In this approach, the results are macro, and it is difficult to identify the relevance of constituents in the performance of the cluster. As the dimensions of a port cluster are not established physically or legally, port cluster performance is approximated in this approach. As both the approach, seem inappropriate in considering the unit for actual measurement of performance; it becomes critical to identify the "correct" unit of analysis of the performance of a port cluster.

The literature regarding port clusters is in maturing state and seems limited. Moreover, we identify only a few attempts addressing the measurement of actual port cluster performance and units for its measurement. At the practice level, existing port clusters also realize the difficulty in measuring its performance and its contributory units due to lack of understanding in its organizational formulation. Even the impact of a policy on a cluster performance cannot be improved due to such shortcoming. Thus, in this research, we are organizing constituent stakeholder of ports based on their functions to introduce a middle-level unit of analysis in a port cluster. By identifying these groups, the study indents to strengthen the understanding of analysis level units for measuring the actual performance of the port cluster at both managerial and academic front.

The current research motive is to identify the major constituents of a port cluster among the various constituent groups based on their functionality in a port cluster.

To attain the objective of the research, we are using an understanding of stakeholders and formulation of groups from the literature on port clusters and constitution of a port cluster. Formulation of these groups is based on constituents of existing port clusters and are addressed in the literature. Also, since the strength of the industry changes over time, analysing the strength patterns of the maritime industry will be of help in developing suitable national policy and strategies. Malaysian maritime industry cluster comprising three main sectors: shipping, shipbuilding, ports and terminals. The maritime communities in Malaysian ports can be considered as a cluster and are progressing toward a strong level (Othman, et al., 2011, p.9). Taking accounts of understanding of constituent's functionality for the port cluster's objectives, the study performs a principal component analysis by taking inputs from 299 participants associated with the Port Klang, Malaysia. The distribution of respondents from the constituents is shown in Fig.1 and details are shown in the annexe. 1
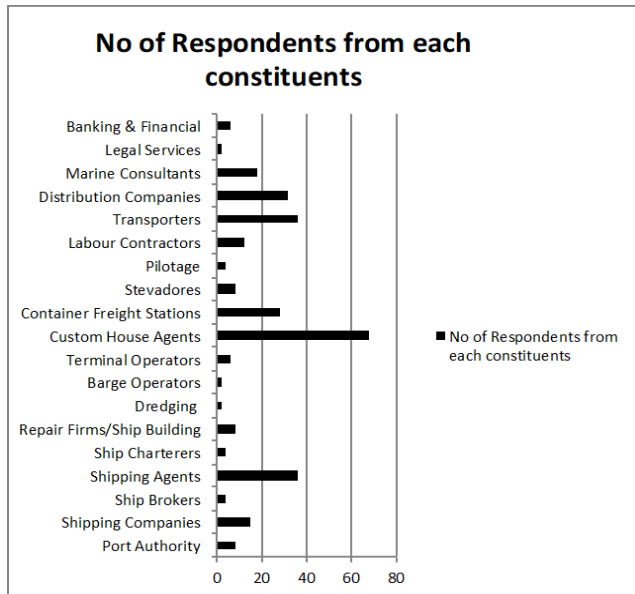
Fig.1. No of the respondent from each category of cluster constituents

2. The concept of clustering: a literature review

Literature defines clusters as geographical agglomerations of entities with competencies similar or complementary. (Richardson 1972, p.8) (Ellison, Glaeser, and Kerr 2010, p.1). After earlier discussions made in the context of clusters by authors Marshall, (1890) the concept was discussed as clustering theory by Michael E Porter (1994, p.27) can be realized as the first paper explicitly describing the cluster and he related his theory to the context of the development of economies. According to Porter (2000, p.10), clusters are a strong presence of associated business units to create synergies and enhance overall value in the product then value delivered as a sum of consisting population. Other than Michael Porter, many authors have also tried to define a cluster. Table 1 summarizes the outstanding works in the direction.

Table. 1 Summary of the outstanding works in Cluster Concept

Article	Definition
(Marshall 1890)	Clusters are a geographic agglomeration of economic entities formed by labour market consolidation and create the benefits of redeploying people across
	constituent entities and thereby facilitate knowledge spillovers.
(Paul Krugman 1991, p.4)	Clusters are formed due to decisions of firms to locate in proximity to facilitate enhanced returns to scale and reduced costs of moving goods across space.
(Porter 1998, p.2)	Interrelated businesses and organizations in a domain, coupled by commonalities and complementarities in a geographical boundary are identified as clusters. This agglomeration include interrelated businesses like suppliers, service providers, logistics and channel operators, customers, research organizations in the domain, training institutions and skill development agencies
(P. De Langen 2004, p.2)	Clusters are populations of inter-related businesses, associations and organizations in public and private sectors, with uniquely identifiable specialization.
(Rosenfeld 2005, p.2)	Clusters are concentrations of interrelated businesses and organizations in given geography with scale to cause externalities.
(Cortright 2006, p.8)	Clusters are groups of industries and inter-related economic actors including institutions, which are located in a defined geographical area which brings in enhanced performance due to their mutual proximity, collaborations and

	connections.

With establishing the core concept of cluster theory, Academic research approach on cluster theory is summarized in three broad themes namely;

• Constituents of clusters – arrangements and relationship with performance.

• The interconnectedness between constituents to produce growth, innovation, and competitiveness.

• Overall governance, benefits, and performance of a cluster.

As a result of geographic proximity and co-location, many of these benefits accrue, which thereby create lower input costs for firms. The Firms facilitate knowledge spillovers through agglomeration economies that enhance productivity and yield innovation. Subsequently, firms in clusters that generate these benefits will be more competitive, and regions with effective clusters will experience more significant growth (Wolman and Hincapie 2010, p.1).

For establishing the direction of the study, authors identify specific characteristics of a cluster. With enhanced performance as a cluster, the phenomenon of clustering also influences the performance of constituting firms positively (Du, Lu, and Tao 2008, p.18). Firms in clusters that generate the various benefits of being a constituent in clusters will be more competitive, and regions with effective clusters will experience growth that is more significant (Wolman and Hincapie 2010, p.1).

Clusters are populations of inter-related businesses, associations and organizations in public and private sectors, with uniquely identifiable specialization (P. W. De Langen 2002, p.2). A cluster is a population, not an entity. The cluster population consists of business units, associations, public-private organizations, and public organizations. Consequently, the internal heterogeneity of clusters should be considered. Clusters are geographically concentrated. This dimension sets clusters apart from networks. Clusters are centred on an economic specialization that can be regarded, as the 'core' of the cluster and the constituents of a cluster are business units and associations that are a part of, or relatively strongly related to, the core of the cluster.

There are various ideas of clusters, many among them include broader links, and some are focused on inter-firm relationships. Paul Krugman (1991, p.4) elaborated the concept of the new economic geography and maintained that the clusters are formed due to decisions of firms to locate in proximity to facilitate enhanced returns to scale and reduced costs of moving goods across space. Rosenfeld (2005, p.2) observed that clusters are concentrations of interrelated businesses and organizations in given geography with scale to cause externalities. Cortright (2006, p.8) defined clusters as groups of industries and inter-related economic actors including institutions, which are located in a defined geographical area which brings in enhanced performance due to their mutual proximity, collaborations and connections. Marshall (1890) explained clusters as a geographic agglomeration of economic entities formed by labor market consolidation and create the benefits of redeploying people across constituent entities and thereby facilitate knowledge spillovers. According to Michael E Porter (1998, p.2), Interrelated businesses and organizations in a domain, coupled by commonalities and complementarities in a geographical boundary are identified as clusters. This agglomeration includes interrelated businesses like suppliers, service providers, logistics and channel operators, customers, research organizations in the domain, training institutions and skill development agencies. Further, Michael Porter (2000, p.4) defined clusters as social and institutional phenomena wherein technological change, organizations, and social networks play significant roles. According to Saxenian (2010, p.6), the clusters facilitate to establish a non-market relationship within and between businesses. Hill and Brennan (2000, p.5) defined the industrial cluster as a concentration of businesses in the same industry that has close transactions with each other and with other firms in the defined geography or shares interchangeable manpower which facilitate a competitive advantage over the competitors in the industry in other geographical areas.

2.1 Cluster Development.

The development of theories on the importance of geographic concentrations of firms for organizational learning and innovation (Asheim 1996; Bengt-Ake Lundvall 2010) and economic and industrial

development (Krugman 1995; Delgado, Porter, and Stern 2016) has also been influential in stimulating interest in clusters. The views of Porter (1990, 1998, 2000) on clusters have been the most influential, especially among prominent policy-makers and opinion builders.

The competitiveness theory, Spatial Equilibrium Theory, Industrial District Theory are the major economic theories of clusters. Regional specialization, agglomeration, and industrial clusters were the critical perspectives on which Karlsen (2011) reviewed the cluster theories. However, Porter's competitiveness theory, introduced in his book, The Competitive Advantage of Nations (Porter 1990), is the most popular among the cluster theories. Porter proposed a theory of national, regional and local competitiveness. The concept of clusters influences his approach predominantly. According to Porter, a cluster is a group of firms and associated institutions, which are associated with each other. Clusters arise because of agglomeration economies as first discussed by Marshall (1890) later applied by Richardson (1972) to regional economics and by Paul Krugman (1991) to new economic geography. Cluster is a geographically proximate group in an industry. The commonalities and complementarities attach these businesses within the cluster. The formation of such cluster may include agencies like service providers, regulators, suppliers, financial services, Consultants and R&D centres besides firms that are directly involved in the business. Productivity, information exchange, access to specialized inputs and employees, utilization of complementarities across businesses, the capability to perceive and respond to innovation opportunities collectively and evolution of new business models reflects the competitiveness of clusters.   Currently, an increasing amount of research focuses on clustering as a path for gaining a competitive advantage in the business domain. Besides Porter's contribution to the concept of industry clusters, many researchers subsequently contributed substantially to cluster theory from different perspectives. An industry cluster is defined in many ways by different researchers. However, the relationships between various constituents within a cluster include several dimensions, such as the input-output linkages, the geographically proximate relation and shared R&D institutions (E. Feser and Bergman 1999). Also, Ketels (2003) noted that there are

same or similar barriers exist in the external environment irrespective of the nature of the cluster, i.e., an industry clusters or a regional cluster, and are shared by the constituents within a cluster.   Moreover, to remove such barriers, joint action is needed. Clusters are identified as an important pathway for encouraging industrial development, innovation, competitiveness, and growth. Governments and other public institutions at national and regional levels play a significant role in the performance of clusters.

Clusters are part of the economic reality, corroborating the balance of agglomeration and diffusion forces for specific economic occupations. Marshall's original observation that "firms can enjoy benefits from locating close to each other, engaged in related activities" (Marshall 1890) continues to be true. There is a likelihood of attracting more specialized suppliers and transact with them more effectively and efficiently. There could also be a skilled human resource pool which could be shared (Thompson, 2006).   Productivity, innovation, and entrepreneurship as the effect of clustering add to the prosperity of the constituents. Businesses associated with the clusters achieve higher levels of productivity (Boasson and MacPherson, 2001, p.12).   The presence of specialized suppliers and service providers, enable the constituents of a cluster to reduce the need to keep higher levels of resources. Further, as the competition for inputs drives up costs and the competition on the end market, the cluster enforces a constant focus on operational efficiency improvements and forces the constituents to adopt the best practices. The impact of enhanced competition is experienced not only by the constituent firms but by employees also. This puts the people in the organization under pressure which forces them to work longer duration in efficient and effective clusters (Rosenthal/Strange, 2008, p.5).

The cluster constituents achieve higher levels of innovation (Moreno et al., 2004, p.14). The cluster environment creates stronger pressure to innovate, provide a rich source of related ideas, and lower costs of converting ideas into new products and services. This will prompt companies to invest in enhancing innovative capabilities, causing further inspiration for innovation within the constituent firm. There is convincing evidence that the impact of clusters is particularly strong on the commercializing the knowledge for the benefit of

the cluster and the constituent firm, and not just the creation of knowledge (Sölvell, Ketels, and Lindqvist 2008, p.75). Clusters finally provide a conducive environment for the development of entrepreneurship. Also, the dependency of new companies on external assets and capabilities than incumbents is high. This leads to higher levels of new entrants in cluster environments (Guiso and Schivardi, 2007, p.3) (Ellison, Glaeser, and Kerr 2010, p.10). More importantly, new studies also indicate that survival rates (Wennberg and Lindqvist 2010, p.32) and firm growth are higher in stable clusters.

All these concepts rest on theories of agglomeration, which have primarily developed due to three empirical observations, namely, regional concentration, spatial clustering and path dependence. Regional concentration is reflected in companies' preference for specific locations despite globalization, spatial clustering is reflected in companies from the same industry tending to locate close to each other and path dependence is observed in the robustness of these formations once they have been initialized. Under these conditions, two kinds of the agglomerations have been defined, one explained by urban or scale economies and the other by location economics (Sölvell Örjan, Goran Lindqvist 2003, p.19). The agglomeration by the scale economies are established due to geographical proximity and the ones by location are developed due to the advantages generated by players from the same industry.

It is, therefore, a strategic grouping of institutions/firms in geographic proximity that leads to a positive impact on the economy of the cluster and their growth. A cluster is competitive if it can generate synergetic advantages through innovation and the efficient use of resources across company and industry borders. Competitiveness on the cluster level can be measured by looking at the market shares, the growth of value-added and the gross production of a cluster. Seaport cluster (also called port cluster) is a synthesis concept, which is the industrial cluster model applied to a port enterprises developmental pattern generated from integrated development of the port group. Haezendonck is the first scholar who uses the term "port cluster." He defines a port cluster as the set of interdependent firms engaged in port-related activities, located within the same port region and possibly with similar strategies

leading to competitive advantage and characterized by a joint competitive position vis-á-vis the environment external to the cluster (Haezendonck et al. 2000, p.6). Though there was not a standard definition precisely for the seaport cluster, the concept of a seaport cluster was evolved from the concept of an industry cluster. Based on industry cluster and the maritime industry, (Chang 2011, p.2) proposed a definition of the maritime cluster. It can be defined as a collective of businesses, research, development and innovation units and training institutions, often backed by constitutional or governmental authorities, which collaborates with the

objective of operational, process or technological innovation and of increasing the performance of the maritime industry. Major participants of the maritime industry such as marine aggregates, equipment suppliers, equipment service providers, maritime service providers, maritime maintenance agencies, shipyards, defence agencies, offshore suppliers, marina, fisheries, seaports, ship repairers and shipping agencies are included in the maritime / seaport cluster (Ianca and Batrinca 2010, p3). Further, it includes other marine sectors, including emerging knowledge-intensive businesses and services in marine science and technology (Kwak, Yoo, and Chang 2005, p11). A maritime cluster is regarded as incorporating various connected sectors. Inspired by the cluster theory of Michael Porter, researchers analyzed, the maritime cluster development under dynamic backgrounds and contexts, in various port locations. Commonly shipping, maritime services, and the shipping industry are the three segments identified by the researchers. Clusters also included facilitating associations, educational and research institutions and governmental bodies.

3. Research Methodology

The activities carried out at a port as a global logistics hub associates a large number of stakeholders. Port clusters have nineteen stakeholders or constituents, defined as all actors that can affect or are affected by the achievement of the cluster objectives (Hassan, S.S., Creazza, A., Shaw, S., & Grant, D.B. (2018, p.3).

Data had been collected by using a Likert scale of 5 to understand the impact of various factors on clusters. Questionnaire of nineteen questions has been framed to probe the impact of various factors. Sample of the same

has been attached for reference in Annex 1. The questionnaire has been sent to 312 stakeholders out of which 299 have given responses in this regard. The paper aims to identify the main factors among all the nineteen which have contributed towards clusters formation and its functioning. Hence, Principal component analysis, which is a type of factor analysis, has been used to determine the same.

3.1. Principal Component Analysis Method (PCA)

PCA is a method that helps to decrease the number of variables in research data by extracting the important one from a large data set. It decreases the dimension of research data with the goal of retaining as much information as possible. This method combines highly correlated variables together to form a smaller number of an artificial set of variables, which is called "principal components" that account for the most variance in the data.
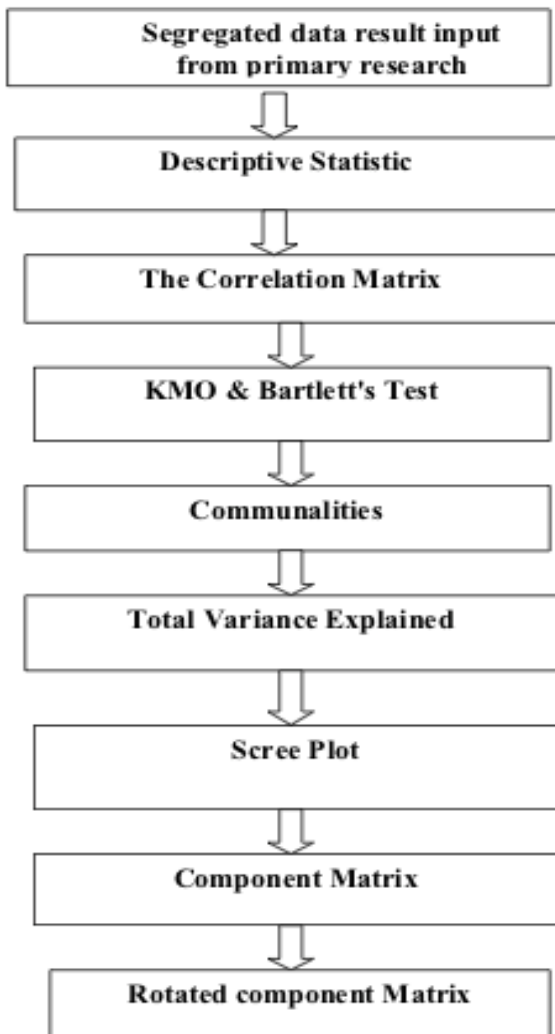
4. Analysis

From the Total Variance analysis (Table 2), and the Scree Plot (Figure 1), it is evident that four components contribute towards 56% of the total variance.
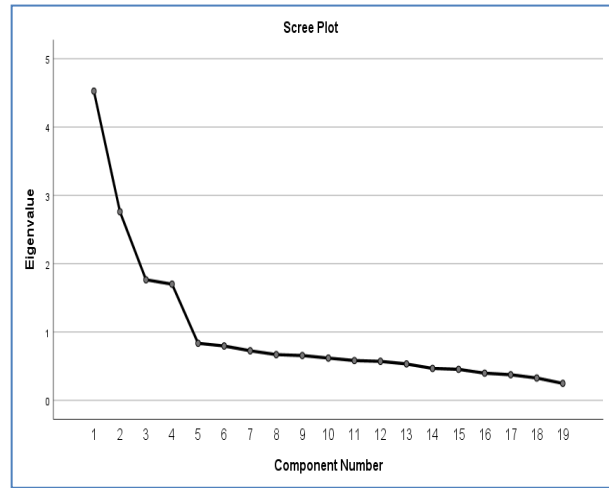

Figure 3. Scree plot for Principal component analysis

From the Scree plot, it can be seen that four components are extracted based on Eigen values.

Table 2. Correlation Matrix

Comp	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.525	23.814	23.814	4.525	23.814	23.814
2	2.760	14.526	38.340	2.760	14.526	38.340
3	1.765	9.287	47.627	1.765	9.287	47.627
4	1.700	8.948	56.576	1.700	8.948	56.576
5	.835	4.396	60.972			
6	.795	4.186	65.158			
7	.725	3.817	68.975			

Figure 2. Process flow of Principal component analysis

8	.669	3.521	72.496			
9	.656	3.451	75.947			
10	.618	3.254	79.201			
11	.582	3.062	82.263			
12	.571	3.004	85.267			
13	.533	2.803	88.071			
14	.467	2.459	90.530			
15	.454	2.388	92.917			
16	.397	2.090	95.007			
17	.375	1.971	96.979			
18	.326	1.717	98.696			
19	.248	1.304	100.000			
Extraction Method: Principal Component Analysis.						

Table 3. Total Variance

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.814
Bartlett's Test of Sphericity	Approx. Chi-Square	1778.811
	Df	171
	Sig.	.000

Table 4. KMO and Bartlett's test values

	Extraction
Q1	.494
Q2	.569
Q3	.449
Q4	.449
Q5	.493
Q6	.487
Q7	**.706**
Q8	**.685**
Q9	.570
Q10	.604
Q11	.565
Q12	.491
Q13	.581
Q14	.444
Q15	.641
Q16	**.723**
Q17	.502
Q18	**.703**
Q19	.595

From Figure 3, based on Eigen values, four components have been extracted. Using the Principal component analysis, four components have been extracted based on Eigen values. Also, to note that low Eigen values of Q4 and Q14 signify that tugs, barges, dredging and shipbuilding services do not much affect the Port clusters.

Final four components are detailed table 5.

Table 5. Extracted Components

Component #	Data Set	Components	Agents
Component 1 & 2	Q7 & Q8	Shipping Services	(Shipping Lines, Shipbrokers and Agents)
Component 3 & 4	Q16 & Q18	Primary Service Suppliers	(Terminal operators, CHA, CFS, Stevedores, Transporters, and Pilotage)

From Table 5, we can understand that based on higher

eigen values factors 7,8, 16 and 18 have been extracted. Factors 7 and 8 have been paired, which are shipping services. The factors 16 and 18 have been paired together, which are primary service suppliers. Thus, from the analysis, we derive that factors 7, 8, 16 and 18, which are shipping services and primary service suppliers play a crucial role in port clusters formation in Malaysia.

Reliability Test: Cronbach's Alpha value was found to be 0.764. This signifies that the principal component analysis is reliable.

5. Findings and Conclusion

Based on the various studies and literature, it is evident that at the existing business environment and the level of governmental interference promotes the integration of the value chain in the logistics operation in order to enhance the competitive advantage to the businesses in a seaport. We aimed at capturing the perception of port stakeholders for classifying existing port cluster constituents with homogeneous functioning and creating an impact on the functioning of the cluster. The study shows a unique maritime cluster connotation, particularly in the parts of its formation and association with the port, within it. The research analyses the impact of maritime sectors inside a cluster. The paper discussed the necessity and importance of port cluster constituents to be categorized and prioritized in order to analyse the functioning of the cluster and to study how these primary constituents stimulate productivity and competitiveness in the port business.

Based on the analyses of data as detailed above in the paper, it had been established that the Shipping Services (comprising of the shipping lines, shipbrokers and shipping agents) and Primary Service Supplies (comprising of Terminal operators, Custom House Agents, Container Freight S, Stevedores, Transporters, and Pilotage) are the two significant categorizations of components amongst the port cluster constituents as perceived by the stakeholders of the port business. It is perceived that the Shipping line, Shipbrokers, and agents are mutually complimenting drivers of a port cluster's effectiveness and contribute most in the commercial synergy of a port cluster. It is also perceived that the Primary Service suppliers collectively improve commercial viability, learning opportunities and innovation of shipping operations in a port cluster.

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Annex.1

Sl. No.	Constituents	No of Respondents from each constituent
1	Port Authority	8
2	Shipping Companies	15
3	Ship Brokers	4
4	Shipping Agents	36
5	Ship Charterers	4
6	Repair Firms/Ship Building	8
7	Dredging	2
8	Barge Operators	2
9	Terminal Operators	6
10	Custom House Agents	68
11	Container Freight Stations	28
12	Stevedores	8
13	Pilotage	4
14	Labour Contractors	12
15	Transporters	36
16	Distribution Companies	32
17	Marine Consultants	18
18	Legal Services	2
19	Banking & Financial Services	6
	Total	299

Annex. 2

Questionnaire:

Participant Profile:

Name	
Location	
Organization	
Function	

Objective:

To capture the perception of port stakeholders for classifying existing port cluster constituents with homogeneous functioning and creating an impact on the functioning of the cluster.

 Please provide your response to the following question:

1. Presence of shipbrokers and ship agents influence the efficiency of shipping operations in a port cluster directly.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

2. Port Authority can act as a leader and/or Manager for a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

3. Port Authority is the agency for policy implementation in a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

4. Port Authority should be responsible for dispute resolution in a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

5. Port Authority is the central node for integrating services in a port cluster to generate synergy.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

6. Commercial Marine transportation can be considered as the core business of a port hence port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

7. Shipping line, Shipbrokers, and agents together, contribute most in the commercial synergy of a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

8. Shipping line, Shipbrokers, and agents are mutually complimenting drivers of a port cluster's effectiveness.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

9. Presence of Shipping, shipbrokers, and agents impact the commercial viability of other stakeholders in a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

10.Tugs, Barges, Shipbuilding, Dry docks, dredging firms, railway sliding together improve the attractiveness of a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

11. Tugs, Barges, Shipbuilding, Dry docks, dredging firms, railway sliding strengthen infrastructural functioning of a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

12. Presence of Tugs, Barges, Shipbuilding, Dry docks, dredging firms, railway sliding collectively enhances the

efficiency of a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

13. Low mutual alignment in Tugs, Barges, Shipbuilding, Dry docks, dredging firms, railway sliding impact other port cluster determinants.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

14. Tugs, Barges, Shipbuilding, Dry docks, dredging firms, railway sliding are critical for the establishment of a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

15. Port cluster establishment is dependent of service suppliers.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

16. Primary Service suppliers collectively improve the commercial viability of shipping operations in a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

17. Effectiveness of the port cluster is a function of support from terminal operators, CHA, CFS, Stevedores, Transporters, Distributors, pilotage, consultants, legal services and financial services.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

18. Collective sharing of information and facilities within Primary Service Suppliers (terminal operators, CHA, CFS, Stevedores, Transporters, and pilotage) enhance learning and innovation opportunities of a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

19. Distributors, consultants, legal services and financial services are benefited from primary services of a port cluster.

Strongly Disagree	Disagree	Cannot Say	Agree	Strongly Agree

Response Coding:

Feedback	Response Code
Strongly Disagree	1
Disagree	2
Cannot Say	3
Agree	4
Strongly Agree	5