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Indonesian Shipbuilding Industry in the perspective of Collaborative Manufacturing Network (CMN)

Firmansyah, M. R[1], Djafar, W.[2]

[1]Department of Naval Architecture, Faculty of Engineering, Hasanuddin University, Makassar 90245, Indonesia,
e-mail: *mr.firmansyah@gmail.com*
[2]Department of Naval Architecture, Faculty of Engineering, Hasanuddin University, Makassar 90245, Indonesia,
e-mail: *wihdat_djafar@yahoo.com*

ABSTRACT

The Indonesian shipbuilding industry must get involved in a collaboration network in order to be survived in the global competitiveness. The competitiveness level of Indonesian shipbuilding industry is low with only about 1.6 percent of International market share. Most of the proportion is contributed by PT PAL Indonesia with its maximum 50.000 DWT of shipbuilding capacities. The reason can be identified as the Indonesian domestic shipyards are still working as a single company respectively. This fact is contradicted with the tendency of international shipbuilding industry in the current global competitiveness to do collaboration among them to increase their production capacities. Successful example of the shipyard collaboration in order to get the most of the shipbuilding international market is collaboration among shipyards in South Korea and China. Both of these countries have integrated their shipyards and hence have increased significantly their shipbuilding production capacities. Currently, they have been recognized as a shipbuilder country. This paper discuss the condition of Indonesian shipbuilding industry and the potency to get involved in a collaborative manufacturing network in order to increase its global competitiveness.

***Keywords**:* collaborative manufacturing network, shipbuilding, competitiveness

1. INTRODUCTION

Indonesian shipbuilding industry must get involved in collaboration network if they are about to be internationally competitive. In collaboration, the Indonesian shipbuilding production capacities will increase significantly as many of the Indonesian shipyards will be integrated. The idea of collaborating Indonesian shipyards has been proposed in 2004 with the establishment of Indonesia corporated consortium. The establishment of the consortium has been put into memorandum of understanding between some shipyard companies which consist of 4 BUMN shipyards (PT PAL, PT Dok dan Perkapalan Surabaya, PT Dok Perkapalan Kodha Bahari and PT Industri Kapal Indonesia) and 4 private shipyards (PT Dumas Surabaya, PT Intan Sengkunyit Palembang, PT Jasa Marina Indah Semarang and PT Inggom Shipyard Jakarta). The aim of the consortium is to increase the financial as well as management of the involved shipyards. Unfortunately, there is no follow up and clear action of this consortium. As a consequence, PT Pal must refuse a contract worth 500 million dollar in 2008 because of over capacities [1].

2. COLLABORATIVE MANUFACTURING NETWORK

Collaborative manufacturing network (CMN) is a new strategy which can be used by Indonesian shipyard as manufacturing industry to be competitive in this current global business environment. The advanced information technology development has influenced the way company to run their business. As a consequence, manufacturing company including Indonesian shipyard companies must keep updating their strategy to be competitive [2]. The trend of competitiveness nowadays is not only between companies but between collaborative networks [3]. Company must get involved in a collaborative network to be competitive as there is no single company now can be survived by only depending on themselves [4], [5], [6], [7], and [8].

In a CMN, the participants will work as a team and working together in a commitment and trust by sharing their information, activities and resources to increase their capacities and to achieve their agreed collaboration goal [9]. Basically, the concept of collaborative manufacturing network is the extension of some companies who work together in a project of fulfilling customer demand in which every participant company have their specific competency in one area or more [10]. CMN will enable Indonesia shipyard companies focusing on their own competency while at the same time they can work together and participate in a bigger system.

A. Advantages of CMN for Indonesian shipyard companies

The advantages of CMN for companies including shipyard companies have been identified by some researchers. Among them are:

- To be competitive and survived [11] and [12].
- Collaboration can help manufacturing industry to grow [13]
- Enable participants to act together in determining their plan, policy and action [14]
- Quality improvement as well as operational cost reduction [15] and [14]
- Improve participants capabilities to operate efficiently and more profitable [16] and [14]
- Create close relationship for idea sharing and problem solving [16] and [17]
- New product development [14]
- Improve product design by using all available competencies in the network
- Increase customer satisfaction [18]
- Increase their market niche in the global market [19]
- To increase the capacities, capability and skill for product development and to be a complete supplier system [8]

As most of the Indonesian shipyard companies are relatively small to compare with the International world class shipyards, it is very important for those shipyards to do

collaboration to increase their companies' competitiveness level. Collaboration will enable shipyard companies to grow by

- Facilitate networking among shipyard companies
- Business activity development
- Increasing industrial participation and
- Facilitating shipyard companies to do industrial collaboration with research centers

B. Aspects to be considered in CMN

For the successful design of CMN among Indonesian shipyard companies, some aspects need to be carefully considered. Among them are:

- Commitment which can be defined as the willingness of participants companies to work hard in a network relationship. The role of commitment in CMN [20]:
  - Main factor which influence the collaboration
  - Increasing participants behavior to work together in the network
  - Reducing conflict cost significantly
  - Increasing the involvement in making decision
- Trust among participants [21] and [22]
- Supplier selection [8]
- Information technology which can increase information sharing [23] and [10]
- Geographical area, economic condition and customer acceptance [16]
- Legal aspect [8]
- Financial aspect for helping decision making to use participants financial information in order to analyze the collaboration profit and for cost control [8]
- Participants characteristics [23]

The need for collaboration is different among participants as each individual company has their own product characteristic and market. This means that each participant can be involved in more than one collaborations network at the same time as long as they keep their commitment to the whole network strategy [8].

C. Level of collaboration

In general, there are three different levels of collaboration in CMN. Danilovic dan Winroth [8] explained those levels as 1) strategic level where the collaboration established from the beginning, 2) tactical level where the collaboration established for a shorter time, and 3) operational level where the collaboration cover more wider aspect including technical aspect of production. Further, they explained that collaboration in the strategic level must be supported by another level especially in operational level. From the participant product point of view, collaboration can be formed with participants coming from the same or different product type. For Indonesian shipyard companies which most their product have the same characteristics, the collaboration can be used to increase their companies level in order to get bigger project.

Collaboration for manufacturing companies including shipyard companies can be established in the area of planning to fulfill

customer demand, technical changes management, new product introduction, customer service management, supplier relationship management, as well as purchasing and manufacturing process [10]. Further, Johansen et.al [10] explained that the collaboration can be established in the product life cycle collaboration, inventory and customer order collaboration, engineering project collaboration, distributor and reseller collaboration, demand planning collaboration and warehouse and transportation management collaboration.

3. STEPS TO ESTABLISHED INDONESIAN SHIPYARDS CMN

In order to established successful collaboration for Indonesian shipyards, each shipyard company must prepare some aspects [8] and [25] which are explained below:

- Each shipyard must conduct an analysis to their production system
- When the analysis has been done, the collaborative network participants then do production system synchronization according to their shipyard condition.
- The formal rules of the game and collaboration guidance must be made before the collaboration begin and be approved by all parties in order to prevent misinterpretation during the implementation of collaboration
- The collaboration system must support a number of shipbuilding process such as planning for assembly sequence, design constraints, distribution and lay out process planning.

In the collaboration process, there are three important steps that need to be carefully understood and followed by the participant's shipyard companies which are:

- Exploratory step to build trust and confidence among shipyard companies.
- Development step where trust and confidence among shipyard companies are stronger which can be identified by stronger personal relationship and increasing shipyard adaptation among them.
- Stabil step where it can be achieve if the level of trust and confidence are very strong.

A. Measuring collaboration outcome and performance

Based on the some aspects which give important influence for the successful collaborative network, Sherer [23] have summarized some indicators to measure the collaboration outcome and performance as follows:

- Trust which can be measured by "the willingness of participants to share their information" [23].
- Commitment which can be measured by "the involvement of CEOs and staff in the network" and by "showing support and the willingness to do some innovation and changes to fulfill the need in the network"
- Selection which can be measured by "the ability of participants to identify, assess and

select new participants according to the agreed criteria.

- Information technology which can be measured by "the participants' expertise in information technology". This mean that the participants must be able to share data and information, communicate with each other electronically, and the participants' information system is compatible with another participant's information system.
- External environment which can be measure by "customer acceptance, geographically closeness as well as economic condition.

B. Main issues in the formation of CMN for Indonesian shipyard companies

There are some important issues have been identified by some researchers in the formation of collaborative manufacturing network for manufacturing companies.

Winroth and Danilovic [8] said that most of these issues are related with the participant relationship in the network from technical level relationship up to the strategic level. In the technical level, the relationship between manufacturing strategies with production system design among Indonesia shipyard companies in the CMN must be paid into attention. In this level, they said that manufacturing companies including shipyard companies will experience three different issues which are manufacturing integration between system integrator and their suppliers both in business level and tactical level as well as manufacturing strategy and production system synchronization among the involved shipyard companies.

Mesa [14] and Choy, Lee and Lo [6] stress the issues on the important integration of participants' information system in CMN. Busi and Bititci [26] have identified issues which is related to the successful or failure of collaboration initiative which is caused by the lack of structural and dynamic collaboration understanding.

The main issues have been addressed by Lin, Nagalingam and Lin [19]. They stressed that the determination of the best approach for keeping a good relationship among participants in the collaborative manufacturing network is the main issues. The relationship among shipyard companies must consider all production variables so that the main goal of the collaboration can be achieved.

C. Challenges in the collaboration of Indonesian shipyard companies

There are some challenges faced by the participants which must be managed for the successful collaboration among manufacturing including Indonesian shipyard companies.

Lin, Nagalingam dan Lin [19] divides the challenges into three categories which are organizational culture, data, information and knowledge sharing and legal system. Further the author explains that the biggest challenge is the organizational culture of the participants. Next are the data, information and knowledge sharing which can be said to be sensitive to a problem. For this challenge, it is important to determine the type of information to be shared

beside the format of data as well as data information. The last challenge is legal aspect of the collaboration must be made easy for participants integration.

Mesa [14] stresses the challenges in the synchronization process among manufacturing companies. The synchronization process must include design, supply and delivery. In the design aspect, customer need to be understood and that their product must be translated in the collaborative network among customer and design and production team of participants. In the supply aspect, material reliability from supplier and outside partner is important and this material reliability can only be achieved if the relationship among participants and outside partner is closed. In the delivery aspect, the product delivery punctuality is important and this can be achieved by collaboration among the involved participants including distribution, transportation, supply and production.

4. CONCLUSION

Indonesian shipbuilding industry must increase their global competitiveness level if they want to survive in the current global shipbuilding market. One way to increase their competitiveness is by getting involved in a collaborative manufacturing network. The involvement of Indonesian shipyard in a CMN is not an easy task. There are some aspects, issued and challenges that need to be addressed for the successful collaboration among them. However, the benefit of the collaboration for Indonesian shipyards is more important so that the involvement of the Indonesian shipyard in a collaborative manufacturing network must be started.

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