INDONESIAN SHIPBUILDING INDUSTRY:

LOCAL/GLOBAL RELATIONSHIPS AND

THE GOVERNANCE OF PROJECT-BASED PRODUCTIONS

By

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ABSTRACT

Despite the importance of the shipbuilding industry to the nation's economic growth as well as to move people, goods, and services between the islands, Indonesia's maritime infrastructure had been neglected by government. In addition, the organisation of production in this project-based sector have been overlooked in the academic literature. To address this gap, this thesis explores the competitiveness and governance of the Indonesian shipbuilding industry.

A study of Indonesian shipbuilding industry was undertaken through qualitative fifty-two semi structured interviews and desk-based research to understand the source of shipyard's competitiveness. The conceptual framework integrates the concept of competitiveness and governance, and the analysis is focused on the project-based relationships occurs in three different level of: firm-level (*micro relationship*), local production network (*meso relationship*), and global production network (*macro relationship*).

The research contributes to current conceptions of the organisation of production and the competitiveness of *Project-Based Firm* (PBF). Shipyard as a *PBF* undertaking complex and various form of decision making in order to complete and deliver shipbuilding project. To remain competitive, shipyard required to strategically balance the degree of involvement of LPN and GPN depending on the nature of the contract, the shipyard's current capacity, and the type of product ordered. Taking into account the importance of firm and non-firm actors, the conceptual framework of *Project-based Production Networks* (PPN) was developed to guide the analysis.

This Ph.D thesis is dedicated to my fiancé, Joe Kibbler,

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1. CHAPTER ONE

SHIPBUILDING AND INDONESIA

1.1. THE EMERGENCE OF RESEARCH

KRI Dewaruci and KRI Bima Suci are two of the most important ships operated by the Indonesian Navy. KRI Dewaruci was built in 1952 by *HC Stulcken & Sohn, Hamburg*, Germany and her name is the Indonesian god of truth and courage. KRI Dewaruci is now used as a sail training vessel for Naval Cadets in the Indonesian Naval Academy, Surabaya. The ship also serves as a goodwill ambassador for tourism and culture representing Indonesia at international events. In 2016, KRI Bima Suci was built by *Construcciones Navales Pulino Freire,* a Spanish shipbuilding company, after a global bidding process, and replaced the KRI Dewaruci. It is interesting to note that two of the most important vessels in Indonesia were built outside the country.

More importantly, given the importance of the shipbuilding industry to Indonesia's economic growth, this thesis has two concerns:

- To explore and understand the competitiveness of the Indonesian shipbuilding industry.
- To bring together a number of debates to understand the shipbuilding production process including exploring firm-level (micro), local level (meso), and global level (macro) debates combined with the project-based literature.

Several conceptual frameworks such as Global Commodity Chains (GCC), Global Value Chains (GVC), and Global Production Networks (GPN) have emerged to explain the organisation of production and the geographic fragmentation of production tasks (Gereffi, 1994; Gereffi *et al*., 2005; Henderson *et al*., 202; Coe *et al*., 2008; Coe, 2012; Ponte and Sturgeon, 2014). However, the problem with the existing governance theory is that, first, it lacks an

overall analytical framework to study complex interactions within project-based production system, and, second, the analysis of governance is based on more linear production chains. While earlier research has highlighted project features (Brenner, 2001; Ma'ruf, Okumoto & Widjaja, 2006; Sunaryo, 2013), limited research has explored interactions between actors involved in shipbuilding projects. It is important to explore the dynamics between firm actors and non-firm institutions to understand the factors affecting decision-making processes in shipyard production networks.

The Indonesian shipbuilding industry is introduced in the next section.

1.1.1 Why project-based firm?

Traditional economic theory highlights price, product and selling effort as the key determinants of competition and the growth of firms (Koutsoyiannis, 1992). The focus then shifted to explore intangibles including quality, design and product-related services (Bryson, 2009; Bryson *et al*., 2004) and sources of inimitability. Bryson and Ronayne (2014) drawing upon Boschma and Frenken (2006) and Boschma and Martin (2010) explore the ways in which firms alter routines through trial and error, incremental changes, learning by networking, copying and imitation, recruiting employees from competitors and through mergers and acquisitions. Furthermore, studies of competitiveness have focused on the dynamics of manufacturing capabilities focusing on mass production, but there has been limited research on project-based firms. Constructing a ship is a large project involving complex interfirm networks and thus one aspect of this thesis is to explore the development of competitive advantage by Indonesian shipyards which includes multiple firms and non-firm actors working together to deliver a shipbuilding project.

Project-based organisations have been the focus of research, but the focus has been on the variety of organisational forms that integrate diverse and specialised intellectual resources and

expertise to create temporary systems for the performance of project tasks (Lundin and Sonderholm, 1995; DeFillipi and Arthur, 1998; Hobday, 2000; Lindkivist, 2004). Much of this research has focussed on project-based infrastructure or construction projects that involve the production of structures that are fixed in place. Issues such as high levels of complexity (Remmington and Pollack, 2007), the potential for significant conflicts of interest between a wide variety of public and private sector stakeholders (Alderman et al., 2005; Clegg et al., 2002) and the need to make decisions under conditions of uncertainty as well as risk (Atkinson *et al.*, 2006; Loch *et al.,* 2006) have been explored in studies of what have been labelled megaprojects. The competitiveness of project-based firms has, however, been largely ignored in the academic literature. Thus, this thesis is the first academic study to focus on exploring the geographic organisation of the Indonesian shipbuilding industry and also the first to explore the competitiveness, organisation and governance of project-based production networks (PPN).

1.1.2 Why Shipbuilding industry?

Shipbuilding is closely associated with different stakeholders including institutional actors and layers of production processes that contributes to the complexity of project delivery. Building a ship is a complex megaproject and thus it is important to explore how dispersed resources belonging to different actors are combined together within a shipbuilding project. This study explores the Indonesian shipbuilding industry focussing on identifying the contextual challenges and obstacles faced by shipyards and the ways in which the yards are connected to the local and global environment. In addition, the development of transportation infrastructure plays an important role in emerging economies (Leinbach, 1995), and, in particular, for Indonesia maritime transportation matters (Kamaluddin, 2003). Shipbuilding projects can reduce the cost of logistics. Indonesia's poor maritime infrastructure has contributed to enhancing the difficulties of moving people, goods, and services between the country's islands.

Accelerating the development of maritime transport for inter-island exchanges will enhance economic growth (Wiranta, 2003). The Indonesian government has encouraged the private sector to develop infrastructure projects including the construction of expressways, railways, and ports. The policy goal was to promote greater efficiency and to develop skills and capabilities in domestic shipyards. In this context, local was defined as shipyards that are located in Indonesia, while domestic referred to the ownership status of the shipyards. Thus, the thesis is set within the context of this policy environment and focuses on exploring how Indonesian local/domestic shipyards compete, win orders, manage projects, and develop new markets. In addition, given the diversity of institutions involved in this industry, it is important to explore the structure of this sector including the development of local production networks and their integration with global networks.

1.1.3 Why Indonesia

As a maritime nation with 17,504 officially listed islands and a long history and experience of building ships, it is important to explore the Indonesian shipbuilding industry. In addition, Indonesia is the world‘s largest archipelago located between Asia and Australia, and this geographic position has profoundly influenced the nation’s socio-economic directions, including the maritime industry. Before 2014, despite the fact that Indonesian is an archipelago, there was limited government interest in the development of the country’s maritime sector (Wicaksana, 2017). Mainland areas were the focus of long-term government development planning (Boost, 1992). From 1998 with the era of democratic *Reform* by President Gus Dur, the concept of maritime development gained popularity amongst Indonesian economists. Unexploited sea resources, neglected by government, were considered as important for economic development. In 2014, a proposal to enhance maritime-oriented development was taken seriously by Joko Widodo in his presidential campaign. He highlighted the importance

of enhancing water connectivity and the necessity of introducing a *Tol Laut* (Sea toll) programme to bridge the economic gaps between Indonesia's islands. After his inauguration as president, the working cabinet declared that the government's primary focus would be on promoting Indonesia to become a strong maritime nation. The aim was to speed up the transportation of goods and valuable commodities across the archipelago, especially to remote areas in the less developed eastern part of Indonesia (Pradhana, 2015).

The maritime industry has become a priority driver of Indonesia's economy. The government has planned to spend around 700 trillion rupiahs (USD $53 billion) to enhance maritime connectivity by 2019. This budget has been allocated to build 24 new commercial harbours, to upgrade 1,481 non-commercial ports, and to purchase operational vessels (Negara and Das, 2017). The *Department of Sea Transportation* has signed contracts with local shipbuilders that are worth USD $38.9 million to build the first eight vessels to help improve the country's ship navigation system and to enhance sea safety. These eight ships are part of the *Department of Sea Transportation's* plan to build one hundred and ninety ships between 2015 and 2017. The government would invest a total of IDR 11.8 trillion (USD $900 billion) to replace old vessels.

In addition, the government supports the industry with tax benefits and reductions in import duties. This encouraged foreign direct investment (FDI) in shipyards with investors targeting Indonesia's maritime regions, such as Batam's *Free Trade Zone* and also, Surabaya, Sulawesi and Kupang. For example, in 2014, one of the private shipyards located on Borneo Island won the contract for the construction of a unique project – the construction of a USD $21 million dredging vessel. According to the *Indonesian Marine and Offshore Industry Association* this was the first such dredger to be build outside Europe.

1.2 THE CHARACTERISTICS OF INDONESIAN SHIPBUILDING INDUSTRY

The construction of a ship involves the assembly of a complex network of firm and non-firm actors. A shipyard is embedded in a complex network of suppliers and this means that shipbuilding can make an important contribution to regional development. Coe *et al.* (2008) argue that this kind of organisational dynamics are central to driving the global economy through ". . . *new connection made by the relentless search by lead firms and their partners in establishing and reproducing production networks*". This concept of establishing these types of networks can be traced back to Powell *et al.* (1996) when they suggested that in complex and expanding industries, where the sources of knowledge are dispersed, that the role of suppliers and other stakeholders may become increasingly relevant to a firm's knowledge processes. Dicken (2007) and Dicken *et al*., (2001) noted that complexity may arise as organisational networks include two major network forms:(1) production circuits (processes of production, distribution, and consumption that are coordinated in asymmetrical interactions between a number of actors and institutions embedded in specific places and geography), and (2) geographic networks which are grounded in social structures.

In addition to firm actors (firm and suppliers), a multiplicity of actors, connections, and power relations are also involved in production networks. Therefore, research needs to pay more attention to the governance of networks via the possession of economic power and governmentality via the practice of different controls involved in production. Moreover, Coe *et al*. (2010) note that limited research has focused on exploring the connections between these two kinds of networks. As Prince and Duffy (2009) observed:

> *"...a governmentality perspective can incorporate the variety of actors who impact on a production network value chain such as state agencies, NGOs, trade union, health organisations, not just an external pressure on the system*

but as constructively involved in making the kinds of linked, productive subjects and spaces that make up the system" (p.1752).

Given Indonesia's need to improve maritime transportation, manufacturing capabilities, and to increase trade, a study of production networks and collaborations between government, port management, local private/state-owned companies, and foreign players within the Indonesian shipbuilding industry seems timely. Part of this assessment includes alterations in government policy intended to enhance the domestic shipbuilding industry, such as the *Cabotage Rules* that were implemented with *Article 8 of the Maritime Law No. 17/2008*. These have the following principles:

1. Activities relating to domestic sea transportation must be performed by an Indonesian Sea Carriage company using an Indonesian flagged vessel which is staffed by Indonesian crews
2. Non-Indonesian sea flagged vessels are prohibited from carrying passengers and/or goods between island or ports in Indonesian waters.

The law required Indonesian shipping companies with foreign shareholders to own at least one self-propelled vessel of more than 5000 gross tonnages. Furthermore, it also required companies to establish and license themselves as "Indonesian Sea Carriage Companies" and to be incorporated in Indonesia and they must observe the 49% foreign ownership limit. When the rules were first introduced, the oil and gas companies (which account for the majority of vessels used in Indonesian waters) did not consider this as a threat as they expected the rules only to apply to passenger and freight vessels. However, the Indonesian government later included oil and gas companies under this law. Although an exemption was then created to avert production losses, the *Department of Transportation* created deadlines for the Indonesian shipbuilding industry to produce platform supply vessels, anchor handling tugs, construction

vessels, and dredging vessels to be completed by 2013. This was followed by oil and gas supply vessels, offshore construction vessels, semisubmersible, deep-water drill ships, tender-assist and swamp bridge rigs by 2015. With the implementation of the *Cabotage Rules*, many Indonesian shipyards have had to 'force' their ability to construct many different types of offshore vessels and this led to a growth in demand for local expertise.

For example, the state-owned shipbuilding company, PAL, has been able to deliver a USD $29.5 million double-skin bulk carrier (DSBC), ordered by a Singaporean company which is the ninth of its kind that PAL has built for overseas buyer. It took around 12 months and 8.500 tons of steel to build this 50.000 *dead weight ton* (DWT) ship. The number of shipbuilding projects in Indonesia increased by 400% from 2013 to 2014 and were valued at USD $126 million. The focus on developing oil and gas projects would intensify demand for ships as such vessels have a high value with a relatively short work duration. This changing policy context means that it is important to explore how Indonesian shipyards have organised their production networks to deliver these projects.

Increasing orders from foreign clients reflects an increase in international confidence in Indonesia's local shipbuilder capabilities. However, due to the global nature of this industry, an assessment of the ability of Indonesian yards to build ships to global standards is important. This study explores the competitive factors as well as exploring the role played by resources like land, labour, and access to materials, knowledge and access to finance for shipbuilding, as well as compliance processes. The competitiveness of Indonesia's shipbuilding industry rests on the availability of local resources and the next section explores these in turn.

1.2.1 Access to labour

The Indonesian shipbuilding industry has taken advantage of an abundant supply of skilled and low-cost labour; labour accounts for a significant share of manufacturing costs. The labour

share of total production costs strongly depends on wage levels and the labour intensity of the production process. This labour cost advantage helps the industry to offset a productivity disadvantage combined with comparatively poor management. Although low cost labour is an advantage, international competitiveness and acquiring market shares does not depend on low cost labour alone; lower productivity and efficiency may undermine this advantage (Zakaria *et al*., 2010). With the ageing population in more advanced shipbuilding countries or regions, such as Europe, Japan, and Korea, Indonesia currently benefits from a young population. To invest more in developing highly skilled human capital implies that training has become a necessity with a focus on activities demanding higher skills combined with automation. Indonesia is aware of this weakness and aims to improve productivity by providing appropriate workforce training as well as applying more advanced technology. This element is discussed in Chapter 5.

1.2.2 Accessing Raw Materials

For a shipbuilding project, access to raw materials is vital to reduce input costs. Steel is the main raw material (the hull accounts for about 70-80% of the DWT) and the first-tier suppliers include the steel companies. Component manufacturers play an essential role in the sector's sustainability. The domestic steel industry actively supplies steel for the shipyards. PT Krakatau Posco, a joint venture between Indonesia's state-owned PT Krakatau Steel and Pohang Iron & Steel Company (POSCO), has sold at least 2.000 tons of steel plate every month to Indonesian shipyards. Shipyard relationship with suppliers and the ways in which this contributes to competitiveness will be discussed in Chapter 5.

1.2.3 Ship components

In 2014, the Indonesia government stated that it would order at least 200 ships to be completed over the next three years by local shipyards. These orders came with local content requirements

including components. The government has waved custom duties on the import of raw materials and components used in shipbuilding. Such a policy has resulted in local suppliers setting up companies only to obtain a license to import components. Secondly, Indonesian component and service shipbuilding suppliers have not developed the quality required for the production of world class vessels but there are some exceptions, but the industry relies on imported components. Nevertheless, some Indonesian automotive component producers expressed their readiness to manufacture ship components. This was encouraging as it would enhance the sourcing of local components by shipyards reducing imports. The ways in which local and imported components are sourced will be discussed in Chapter 5 and 6.

1.2.4 Government support (Research and Design Facilities)

The development of the Indonesian shipbuilding industry needs substantial investment in facilities and infrastructure, and this investment is expected to benefit other sectors. Many nations focus on developing their shipbuilding industry because it creates skilled employment, stimulates related industrial activity, and has political and military importance (Panigrahi, 2014). Not only political support but also financial support is included in these maritime policies. The cost of financing shipbuilding in Indonesia is very high as it includes bank guarantees, bank commissions, and high interest rates on industrial and working loan capital. The financing of ships differs from other industries as ships are considered to be a speculation and regarded as specialist business (Studies–ENTR, 2009). The constantly changing dynamics of the industry suggests that it is important that shipbuilders work with banks that are active across all segments of the market and which have broader capabilities including access to capital markets.

The development of a global shipbuilding market provides opportunities for countries with lower labour costs and facilities. Under these circumstances, shipyards in Indonesia are seeking

ways to improve quality, reduce costs, and increase the speed of delivery. Indonesia has received a considerable number of foreign orders in recent year. To strengthen its position in the global market, however, Indonesian shipyards have yet to catch up in terms of research and development. Unfortunately, the Indonesian shipbuilding industry is still at a preliminary stage when it comes to *in-house* design capability. Design is a major element before shipbuilding commences and it is important to explore the role design plays in shipbuilding projects.

1.3 RESEARCH QUESTIONS

Given the contribution the shipbuilding industry makes to Indonesia's economic growth and the diversity of institutions involved in the production process, an in-depth analysis of this project-based industry is essential for contributing to on-going debates on local and global production networks. In addition, this thesis will introduce project-based firms to these debates. The existing research on shipbuilding rarely discusses the forces that oppose geographical concentration such as land scarcity, congestion, and unhealthy competition between private and publicly owned shipyards. In addition, this study identified that there are three types of shipyards in Indonesia; shipyards that focus on (1) only new building, (2) both new building and maintenance/servicing, and (3) those yards that only undertake ship maintenance. Component suppliers play an important role in supporting these activities. Benito *et al*. (2003) also highlighted that companies providing services have stronger ties between themselves than with the actors involved in the manufacturing part of the maritime sector; a similar pattern exists between Indonesian shipyards and supporting industries. However, local component industries could not grow as expected because the majority of ship components are still imported. Therefore, to investigate shipbuilding activity it is appropriate to explore component supply networks.

This research aims to:

- To understand firm competitiveness in the Indonesian shipbuilding industry.
- To understand *project-based production networks* (PPN) by situating them in debates on firm-level (*micro*), regional (*meso*), global (*macro*), and project-based firms.

This study develops a firm-based analysis of Indonesian shipyards by exploring shipyards, suppliers, industry associations, classification societies, and education institutions within shipbuilding production networks. This approach enables differences to be explored between firms, as this can directly influence the capacity and evolution of practice to overcome project uncertainties. Four research questions were developed that emphasis the interconnected functions and operations of shipyards' production network:

Q1: How are shipbuilding projects organised at a firm-level (micro), and to what extent does the location of the shipyard matter for competitiveness?

This question focusses on understanding firm-specific elements that help shipyards cope with ship demands. To understand the above issue, the research question will be divided into sub-questions such as what are the strategies used by shipyards to win a shipbuilding contract? Moreover, what is the benefit of being located in the shipyard's current region or city?

Q2: What actors are involved in local production networks and at which stage of production? How do meso-level relationships impact on project-based processes?

To explore shipyards' capabilities to manage relationships with local firm and non-firm actors in their production networks and to overcome project challenges. Issues such as 'how does a shipyard combine resources, skills and the knowledge of participating actors?'; 'how do shipyards decide to develop and decide who has to be involved in the projects?' *and* 'how do

shipyards integrate dispersed capabilities (actors and resources that are dispersed within the network) to deliver a shipbuilding project?'

Q3: How do global level (macro) relationships impact on shipyard competitiveness?

To explore the inter-linkages between shipyards and non-local production networks that include various kinds of non-firm actors, government and a variety of regulatory bodies as well as accreditors. The focus is on exploring production networks in the Indonesian shipbuilding industry and to consider their implication for firm competitiveness.

Q.4 How governance is understood in the shipbuilding industry? What are the drivers behind the configuration of shipbuilding project-based production networks?

To explore this question, the different ways in which a shipbuilding project is assembled and organised will be explored considering the nature of each ship's order and three different geographies: firm-level, local level, and global level relationships.

1.4 DATA COLLECTION

To explore the geographic organisation of Indonesian shipyard production networks and the competitiveness of the yards required a research approach that examined the dynamics between institutions and the factors affecting decision-making processes involved in the configuration of shipyard production networks. The thesis draws upon a set of detailed interviews with Indonesian shipyard owners and managers and also industry representatives. Case studies of yards were created to develop an in-depth understanding of shipbuilding as a form of project-based organisation. The focus was on exploring the "how" and "why" (Yin, 2003). Thus, a key strength of this study will be derived from the data collected from multiple organisations in the industry, rather than just relying on the account of a particular firm. This will contribute to

understanding how locally embedded networks of firms interacts with global production networks to deliver competitive products and services.

1.5 STRUCTURE OF THE THESIS

Chapter 1 – The first chapter sets out the case for undertaking research on the shipbuilding industry in Indonesia. The chapter also includes an overview of the Indonesian shipbuilding industry.

Chapter 2 –Chapter two develops a theoretical approach for exploring shipyard production networks and the role they play in the development of firms. This chapter brings together a number of debates on firm-level, local and global relationships, as well as project-based firms. The key is that these different academic literatures are required to understand the shipbuilding industry. *An alternative project-based production network (PPN) approach* is proposed to support an analysis of the Indonesian shipbuilding industry.

Chapter 3 – Chapter three provides an overview of the research approach, the techniques, and methods used in the study. First, the qualitative approach is discussed and explained as to why this approach was appropriate for examining an underexplored industry. Second, primary methods of data collection are identified, namely (1) desk-based research, and (2) semi-structured interviews. Following this, the sampling strategy and access strategies are discussed. Finally, the three stages of analysis are outlined, which are: (1) transcription, (2) data grouping, and (3) coding. A discussion of methodological limitations is undertaken highlighing the particular challenges of undertaking fieldwork in a place where research studies are not yet well incorporated in business practice,

Chapter 4 – This chapter develops a project-based approach to the shipbuilding industry, by exploring the distinctive characteristics of various shipyards including size and ownership

status. Exploring differences between firms or shipyards should be appropriate for the development of this type of conceptual analysis. The chapter addresses one of the primary research questions: how does the competitiveness of shipyards vary? Does location matter? Variation in the ways in which shipyards organise the internal production of ships (firm-specific) is a particular focus, as this is critical for developing an understanding of firm specific competitiveness. The distinctive character of location is also explored, with a focus on the impact of regulation on a specific region. This highlights how shipyards, in a particular location, compete differently. The chapter concludes by highlighting the interaction between location and competitiveness.

Chapter 5 – This chapter begins by identifying the relationships between firm and non-firm actors in the Indonesian shipbuilding industry. A firm's decisions regarding the configuration of a ship's the production network reflects the requirements of a specific project. The primary focus is on understanding the ways in which firms compete and co-operate at the same time, but more importantly this chapter places the importance of local production networks within the context of the on-going debate on global production networks. The structure of the chapter explores four key processes that operate between a shipyard and other firm/non-firm actors, in the form of: (1) joint production, (2) group purchasing, (3) resource sharing, and (4) joint training. The interdependence between these actors are a particular focus, as this is important for developing an understanding of the importance of local production networks.

Chapter 6 – This chapter provides necessary insight into the relationship with firm and no-firm shipbuilding actors located beyond Indonesia. It begins with identifying the relationships with various actors, such as key oversea suppliers, global buyers, and international regulatory bodies, highlighting their impacts on shipbuilding production networks. This is followed by a discussion regarding procurement geography in various shipbuilding regions in Indonesia,

which is important for understanding the relationship between GPN and local production networks (LPN). This chapter argues that a shipyard's GPN is a combination of many locally embedded production networks (LPN).

Chapter 7 – This chapter identifies the organisation of project-based production networks, whilst highlighting variations in the nature of contract. They are namely (1) buyer-controlled production networks, (2) mutually controlled production networks, and (3) shipyard-controlled production networks, which reflect the combination between firm-level, local, and global level relationships involved in shipbuilding projects. Through identifying the nature of contracts, this chapter contributes to the governance debate, as it highlights how the power of developing *project-based production networks* (PPN) lies with the contract holder and this varies depending on the type of contract and the nature of the order.

Chapter 8 – Chapter eight concludes this thesis by highlighting its key theoretical contributions. It revisits the conceptual framework presented in Chapter 2 in the light of the subsequent research. The chapter also discusses the relevance this research has for the shipbuilding sector, for policy makers and for the academic literature. Opportunities for further research are also identified.

2. CHAPTER TWO

LOCAL/GLOBAL RELATIONSHIPS AND THE ORGANISATION OF PRODUCTION: THEORETICAL FOUNDATION

2.1. INTRODUCTION

Shipbuilding industry plays in an important role in Indonesia's economic activity. Nevertheless, little is understood about this strategic industry. The aim of this thesis is to address this gap by developing an understanding as to how shipbuilding production is organised. It focusses on three layers of relationships: within firm, between firm and its local network, and between firm and its global networks to frame the analysis of the Indonesian shipbuilding industry. This chapter is divided into three sections which highlight research gaps or limitation within the current academic understanding of the shipbuilding sector. First, the academic literature on the Indonesian, as well the shipbuilding industry elsewhere is introduced. It is important to review previous research on this sector. This is followed by a multilevel analysis of firms that explores the micro-, meso-, and macro-level approaches that have been developed to explore the geographic organisation of production. Finally, the conclusion develops the conceptual framework to support the analysis of project-*based production networks (PPN)*.

2.2. THE SHIPBUILDING INDUSTRY

Understanding the competitiveness of the shipbuilding sector has been overlooked by the academic literature. Empirical research into competitiveness of the shipbuilding industry is required to address this gap. This section reviews the literature on the shipbuilding industry focusing on previous research undertaken about shipbuilding industry in Indonesia and other maritime countries.

2.2.1. Literature Review on the global shipbuilding industry

Many studies have focused on understanding various aspects of European shipyards. It was these yards that dominates the global ship market from the 1500s. Nevertheless, the majority of European shipyards have transferred production stage to the Asia, but some yards have managed to survive by specialising

on technologically sophisticated products and production processes. In addition, some yards have been subsidized by government to ensure production remains to support defensive or public policy objectives. To name a few, Denmark, Finland, Sweden, Germany, and the Netherland were all important shipbuilding players in the first half of the twentieth century. To Id and Bruce (2018), advanced technology and design innovation played an important role in maintaining the Finnish shipbuilding industry, despite the decline of the industry in other Nordic maritime nations. During the post-war boom 1950 – 1973, shipbuilding became the leading industry in Sweden (Schon and Schubert, 2010) due to an increase production capacity, as well as an initiative to develop competitiveness through securing the supply of skilled workers. In this instance, Swedish shipyards played a vital role in increasing the skills and capabilities of the yard's workers through organising programs for systematic vocational education and training (Yokoyama and Nilsson, 2016).

Whilst in Croatia, the industry is growing due to a shift to producing special purpose vessels. Apart from having a long shipbuilding tradition, export orientation and continuous government support have helped improve the shipyards technological production processes (Stanic *et al*., 2018). Although in the past twenty years, there has been no comprehensive technological improvement to the ways in which vessels are produced in Croatia. At present, Japan, China, and South Korea dominate the market for the production of tankers and bulk-carriers. China, in particular, has won market share in these two types of vessels due to substantial government support (Midoro *et al*., 2005). Whilst South Korea has gained leadership by specialising in the production of high-value-added ships (Jiang *et al*., 2013).

Shipyards in low-cost production locations have been able to increase their market share at the expense of high-cost shipyards located in the UK, EU and U.S. There are two problems with this analysis. First, price/cost as indicator does not take differentiation strategies into account, whereas differentiation (for example in design) and the ways in which firms create ‘state of the art' value for their customer is an essential competitive advantage for *project-based firms* (PBFs). Secondly, research the competitiveness of the shipbuilding industry has largely focused on interpreting shipbuilding competitiveness based on internal factors such as cost, price, and delivery times (Hengst and Koopies, 1996; Chou and Chang, 2004; Pires and Lamb, 2008). However, this is a very narrow analysis that does not explore (Pires, 2009)

external condition, typically government policy and market conditions. It is these external factors that are behind the rapid growth of the Japanese and South Korean shipbuilding industries. Although external factors may not directly impact on the growth and survival of the shipyards, it is important to include external factors in any analysis of understand shipyard competitiveness.

2.2.2. Literature Review on the Indonesian Shipbuilding Industry

The rise of shipbuilding market provides great opportunity for shipyards to grow, however the competitiveness of shipyards in Indonesia remain underexplored. To further understand the organisation of production within a shipyard, the literature identifies and explores the different ways in which shipbuilding is organised in order to explore the source of shipyard competitiveness.

Shipyards in some Indonesian regions are considered to be core elements of the country's maritime clusters that create economic, political and social value (Sunaryo, 2013). According to the *Department of Industry*, Republic of Indonesia, there are two hundred shipyards in Indonesia with a total annual capacity of 600,000 *Gross Tonnage* (GT) for the construction of new ships and 9.5 million GT for repair work (Djafar, 2017). However, the Indonesian shipbuilding industry only accounts for 1.6% of the world market (Firmansyah, Djafar, and Muhammad, 2018). This limited capacity for shipbuilding reflects productivity problems combined with a recent history of limited orders for new ships. The number of Indonesian shipyards increased to include shipyards that only provide ship repair and maintenance services to more specialised markets (Ma'ruf, 2014). In addition, Demand for Indonesian ships is not only for the construction of merchant ships but also for working vessels and leisure boats (Haryanti, 2012). The evolution of the Indonesian shipbuilding industry has been influenced by the activities of government at the local regional, and global scales (Brenner, 2001).

Despite the nation's strategic importance, the Indonesian shipbuilding industry has been considered to be less competitive to other industrial sectors such as automotive, clothing, or consumer goods that have grown significantly over the past three decades (*Department of Industry*, 2012; Sunaryo, 2013). The co-location of supporting industries has been identified as a critical element that contributes to the competitiveness of a shipyard due to the cost of materials "*weigh more than seventy-percent of the total*

cost" (Ma'ruf, 2004, p.88). Drewry (1999) argued that the low capacity and competitiveness of Indonesian shipyards is reflected in a global market share that "accounts for less than 0.5%" (p.201). At the time of Drewry's report, Indonesia's share of the shipbuilding market reflected the activities of four state-owned shipyards supported by a few small and medium-sized shipyards with capacity to produce between 5,000 – 30,000 *Dead Weight Ton* (DWT) vessels. Only one state-owned shipyard was capable of producing up to 50,000 DWT (Schlott, 1985).

Since 2014, the goal of the industry and the Indonesian government is to create a sustainable and self-sufficient maritime industry that will support the growth of local demand for vessels to support the development of the Indonesian economy (Ma'ruf, Okumoto, & Widjaja., 2006). However, there are many problems in realising this strategy. For example, the supply locally produced components is under-developed given the recent history of limited market demand of Indonesian produced vessels combined with the absence of supportive government policy. Baldwin (2012) argued that suppliers, who had been ignored by the market, managed to survive by shifting their focus to pre- and post-production activities including product design, research and development, and after sales services. In the analytical chapters, this thesis will contribute to the literature on the Indonesian shipbuilding industry by exploring the interactions between shipyards, suppliers, and customers and the ways in which these interactions have created opportunities in Indonesia that allows local suppliers to be involved in shipbuilding production networks.

Understanding competitiveness of project-based organisation, and in particular the shipbuilding sector, has been overlooked in the academic literature and specifically in the on-going debates on global value chains or global production networks. Empirical research into the competitiveness of shipbuilding companies is required to address this gap. Working at the intersection between the fields of strategy and project organising, this thesis aims to develop an analytical framework for understand project-based firm competitiveness. In particular, by taking into account project elements – temporary, one-off, multi-actors involved – and the dynamics of the relationships, the study contributes to understanding the governance of project-based organisations.

2.3. COMPETITIVENESS AND PROJECT-BASED FIRMS

The distinct character of project-based organising has become an important condition in re-assessing the pattern of relationship between "global lead firm" and local firms. Thus, an Indonesian shipyard may be both simultaneously a 'global lead firm' as well as a local supplier. A firm can develop and co-ordinate a global production network, but also be an essential element of a more localised production network. Project-based firms create high-value customised products that are fabricated to meet the needs of a specific customer. The management of this type of project-based organisation is an exercise in combining standardization with customization. A ship contains components that are difficult to transport and that must be manufactured and customised locally and also high-value, but relatively low weight products that can be supplied from a distance. Perhaps the most important high value product is the propulsion system which is both heavy and high value.

For the shipbuilding industry it is important to explore who plays the role of project integrator as well as who has the authority to 'lead' the formation of local/global production networks. The key to fulfilling this action is by developing, dividing, and delegating tasks to multiple firms, local, regional and global, and non-firm actors. The organisation of this type of production network reflects the specification of each product and the client's strategic needs. In this analysis, a shipbuilding project involves three types of structures. First, there is the firm or what can be labelled a more micro analysis of organisation and management at the level of the firm. Second, is a regional analysis that explores the co-location of production and the development and operation or localised production systems. This is more of a meso analysis that engages with the on-going debate on clusters. Third, a focus on global relationships or the governance and development of global value chains or global production networks. We will explore these different perspectives on understanding economic activity in turn. It is worth noting that each of these reflects a major focus of research, but that comparatively few studies try to explore the interactions between these three levels of economic activity. This is unfortunate as the organisation of the Indonesian shipbuilding industry, perhaps of all manufacturing industries, is an exercise in balancing the interrelationships and interactions between micro, meso and macro processes.

2.3.1. Firm-specific approach (Understanding *Micro*)

Relationships and activities organised within a firm considered as a 'micro-level' of analysis that focusses on the internal management and organisation of a firm. Understanding how it is the firms compete requires consideration of competitive advantages, be it price-based or non-price-based factors. In the shipbuilding industry, the micro-level ways of competing are influenced by the project-based nature of the industry. Therefore, whilst price remains an important element to win projects, non-price-based advantages is vital to distinguish themselves from competitors (Bryson and Rusten, 2013).

There are numerous ways to explore firm-based competitiveness, but for the context of a project-based perspective, this study applies the resource-based view of the firm (RBV). RBV approach is appropriate to apply in this industry and it focusses on non-price advantage which are founded in the internal resources of the firms (Barney, 1991; Peteraf, 1993; Fahy, 2000). Additionally, understanding how firms compete requires measurements of price-based and non-price-based competitive advantage (Wernerfelt, 1984; Peteraf, 1993; Barney, 2001; Bryson et al., 2013; Larty et al., 2017) which enables firms to capture higher rents than their competitors. The RBV approach argues that non-price-based advantages are grounded upon internal resources which provide firms with sustainable advantages, and these cannot be purchased nor imitated by competitors (Amit and Schoemaker, 1993; Bharawadj, 2000; Ronayne, 2015).

From a project perspective a firm's effort is to 'seek a higher rent' and this is conceptually and empirically undefined due to the 'one-off' character of the industry (Short *et al*., 2010; Dimov, 2011). A project is defined as

> "*a temporary organisation to which resources are assigned to do work to deliver beneficial change*", while a temporary organisation is described as "*a unique endeavour in which human, financial, and material resources are organised in a novel way to undertake a unique scope of work, of given specification, within constraints of cost and time, to achieve beneficial change quantitative and qualitative objective*" (Turner *et al*., 2010, p.14; Turner, 2014).

The primary characteristic of this type of organisation is the notion of temporariness (Lundin and Soderholm, 1995) including a time span that may slightly or significantly deviate from initial expectations (Bakker *et al*., 2016). Previous research on PBFs has explored large infrastructure project with a focus on property development or construction including the production of bridges or tunnels. The emphasis of much of this literature is on the production of products that are fixed in space. This is not the case with shipbuilding as the yards are fixed in space but not the products that they produce. Each project has to be managed by individual sets of resources. Consequently, RBV approach helps investigate the competitive advantage created by multiple intangible resources. For instance, in a shipyard, competitiveness is defined as (1) 'the ability to win and execute shipbuilding orders in an open competition" (Marwick, 1992) and "the ability to stay in the business" where costs are a crucial factor to remain competitive. Shipyards who are able to obtain greater profit margins will be more likely to maintain their profitability over the long run (Colin and Pinto, 2009).

Prior to executing the construction of a ship, a shipyard faces the challenge of winning the order as part of an open tendering process. In this process, a yard must demonstrate its ability to attract and secure shipbuilding orders as the successful deliver of projects often encourages other clients to commission vessels (Jiang *et al*., 2013). Moreover, all this ability is linked to the yard's capability to design and construct such vessels, and this depends on the yard's facilities and workforce. Nevertheless, previous studies have suggested that this type of information is difficult to obtain including information on the organisation of the shipbuilding process (Jiang *et al*., 2013; Bertram, 2003). This thesis will explore the ways in which shipyards compete through exploring pre-production and post-production activity including product design, marketing, and service.

RBV research often suggests that intangible resources are the source of competitive advantage, and these can be improved over time. Despite the significance, the RBV literature has been criticised for lack of empirical grounding (Williamson, 1999; Priem and Butler, 2000, Barreto, 2010). Secondly, it mainly focused on intangible resources with inattention to the mechanisms by which tangible and physical assets actually contributed to competitive advantage (Mosakowski and McKelvey, 1997; Peteraf and Barney, 2003; Namusonge, 2014). Particularly relevant here, as the element of input such

as land and labour play an important role in sustaining a shipbuilding business (Notteboom and Rodrigue, 2005). Conversely, the evolutionary approach provides a more "dynamic" perspective that highlights the impacts of previous decisions and firm's adaptation as a source of competitiveness (Bryson and Ronayne, 2014). The evolutionary perspective takes into account organisational routines and how these influence a firm's internal processes (Phelps and Fuller, 2016). Routines are defined as "day-to-day dealings" or "regular and predictable behavioural patterns" that a firm develops over time (Boschma and Frenken, 2006).

Combinative capabilities describe the organisational processes whereby firms synthesise knowledge resources and generate new applications from those resources (Kogut and Zander, 1992; Teece, 2007). Henderson and Cockburn (1994) similarly use the term "architectural competence". Eisenhardt and Martin (2000) consider that these new values create strategies that drive the creation and evolution of resources into new sources, and they define "dynamic capabilities" as:

> *"The firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resource – to match and even create market change. Dynamic capabilities thus are organisational; and strategic routines by which firms achieve new resource configurations as market emerge, collide, split, evolve, and die*." (p.1107)

They argue that dynamic capabilities consist of identifiable routines that are often used extensively outside RBV research. Commonality with the evolutionary approach arises as dynamic capabilities are often characterised as idiosyncratic processes that emerged from the path dependent history of individual firms (Teece *et al.*, 1997). In an evolutionary approach, for example, the concept of adaptation and adaptability is vital for the survival of a firm. Martin and Sunley (2006) pointed out various ways of adapting, namely by upgrading technologies, transplanting the production base, and targeting new markets. Simmie and Martin (2010) also stated that long-term adaptive capability could be achieved by proper utilisation of new knowledge, be it from education providers or research institutions. However, a more empirical analysis is required to explore the key factors and agents

influencing evolution in different kinds of settings (Peck and Theodore, 2007). Therefore, this research also includes the element of network which it considered valuable for firms with a limited resource base.

This thesis addresses this gap by analysing the importance of location in shipyards' competitiveness with a focus on understanding project-based organisations. By considering location, as well as by providing explanation as to how firms compete through product customisation, servitisation, and reputation, the micro analysis bridges the gap between the RBV and PBF literatures.

2.3.2. Firm and the relationship with the Local Network (Understanding *Meso*)

The term meso in this study reflects the relationship between local firms and also with non-firms' actors involved in a localised production network. To study the competitiveness of a firm, we need to first understand the context in which it operates. In this case, the focus is on shipbuilding firms as localised project-based enterprises. Project-based operations come with scope, schedule, and resource risks (Kendrick, 2015), in which firm and non-firm elements of networks are critical for the shipyards to be able to deliver the products and services required by shipowners. A production network is described as a linked set of interconnected functions and operations through which goods and services are produced and distributed (Dicken and Hassler, 1988). The nature of such networks is deeply embedded in a localised socio-political, institutional, and cultural context (Dicken and Thrift, 1992; Yeung, 1998; Dicken and Malmberg, 2001; Newman, 2016). Through the development of relationships, or a network, firms challenge traditional organisational boundaries and reconfigure wider production networks (Castell, 1996; Dicken, 1998; Brenner *et al*., 2008). In addition, the four distinctive features suggested by Coe (2001) input/output structure, geography, governance, and institutional context are relevant to exploring the competitiveness of the shipbuilding industry, as it considers the role of extra-firm networks including government agencies, consumer groups, and industry association in shaping the organisation of production networks.

Two gaps need to be addressed. First, there is an important literature on shipbuilding clusters that is focused on developed market economies such as EU/UK/US/Japan (Id and Bruce, 2018; Schon and Schubert, 2010; Yokoyama and Nilsson, 2016) and also rapidly growing emerging economies such as

China/South Korea (Midoro *et al*., 2005; Jiang *et al*., 2013). From this literature, we know that those countries provided significant government support for their maritime industries. Thus, a gap exists in understanding shipbuilding in emerging economies like Indonesia. This study addresses the gap by exploring the ways in which ship production is organised outside those regions. Secondly, the existing literature on competitiveness/strategy/governance mainly considers the role of firms located at low-cost production sites as playing a 'complementary' or 'supplier' role in global production network. Firms located in an emerging economy are often not regarded as decision-maker who configure production networks. This view has been criticised in other industries (Melo, Nickel, & Saldanha de Gama, 2009). Nevertheless, little is known about how project-based firms configure production networks.

This review begins by identifying theories that explore the location of production activity. Weber (1929) first introduced the theory of least cost location based on the analysis of many industries. He suggested that the colocation of similar activities occurred due to the cost of location and the benefits that come from shared costs (land and labour). A local agglomeration can be considered as a cluster without positioning the cluster within the wider context of regional or global value chains. The relationships between local agglomerations have tended to be under-theorised in the academic literature (Bathelt and Taylor, 2002; Giuliani, 2010; Pe'er et al., 2016). Further, the spatial distribution of raw materials and access to markets considered as important elements in understanding shipyards' competitiveness.

This study has acknowledged the growing literature on co-located firms within a cluster and the ways in which cluster debates highlight the importance of local co-operation and competition (co-opetition) between firms in particular sectors that are reliant on locally accessible inputs (Bell and Abu, 1999; Hassink, 2005; Taylor, 2010; Buckley, 2016). A cluster is a historical accumulation of many decisions made by many firms and linked institutions that provide an agglomeration with heritage. In the same way, a GVC/GPN is a series of decisions and investments that link or strategically couple firms in some way over *space* including heritage-based relationship. The co-location of firms in a cluster or local agglomeration provides a useful conceptual framework for exploring the development and evolution of the Indonesian shipbuilding industry. Staber (1996) first identified that "the essence of an industrial district is disequilibrium" as competition and co-operation occurs at the same time and often takes place

in everyday situations (Isaksen, 1999; Asheim and Isaksen, 1999; Maskell and Malmberg, 2007), whilst others recognised the importance of local governance, in the form of clustering, as making an important contribution to firm and regional competitiveness (Schmitz, 1995; Nadvi, 1997; Martin and Sunley, 2006; MacKinnon, 2011). Therefore, the difference between institutions is taken into account as a firm's competitive advantage may be created by a favourable governance system attached to some particular region (Griffiths and Zammuto, 2005; Roza *et al.*, 2011; Cano-Kollmann *et al.*, 2016). Note #5 More recent literature on location

The literature on clusters highlights the cultural, political, social and economic contributions that co-location of inputs into a production process can provide for firms, industries, and regions. To Coe and Yeung, a localised cluster is often "*an on-the-ground manifestation of the strategic coupling of global production networks*" (2015, p.198) rather than *vice versa*. Perhaps more importantly, they note in an endnote, that much of the work on economic clustering "*is limited by its preoccupation with the importance of local connections, often without empirical demonstration of that importance*" (2015, p.198). This is debatable, and a similar critique could be made of the GVC/GPN approach as it is limited by an overemphasis on global connections and a more limited understanding of regional economies and processes. Shipyards are unusual as they are more tied to place or location than many more footloose firms or industrial activities. For a shipyard, place or location of the yard provides access to water, but also to a set of supporting firm and non-firm actors. This location creates a form of path dependency that is difficult to overcome. For shipyards, geography matters in multiple ways.

The approach also addresses the emerging debates on production networks and value chains regarding the importance of relationships, including non-firm actors involved in shipbuilding projects. Whilst, the production network approach integrates the roles of state actors and governmental agencies as well as local/regional factors such as culture, networks, and infrastructure into the analysis, nevertheless, it still tends to heavily focus on the interest of global actors and interests. The roles of local firms in the organisation of production at a local and global level is underdeveloped in this debate. In the case of the Indonesian shipbuilding industry the majority of shipbuilding projects come from the domestic ship market. On the one hand, the benefit for local firms are that they are able to provide low cost ships to

the domestic market. On the other hand, local firms based in developing countries have difficulty in accessing advanced knowledge and this limits their ability to improve as well as their technological capabilities (Liu and Yang, 2013, p.448). Shipbuilding is a project-based industry and the focus of this thesis is on understanding the geographic organisation of project-based production systems. This project perspective facilitates the analysis of the dynamics of the relationships between firm/non-firm actors. In addition, project-based perspective contributes to understanding firms obtain competitiveness and the way that this is embedded in relationships with other firms and non-firms.

2.3.3.Firm relationships with the Global Networks (Understanding *Macro*)

Previous studies on collaborative networks between firms have highlighted the significance of the organisational structure of firms' production systems and their impacts on the possibility of fostering competitiveness. The Global Value Chain (GVC), Global Commodity Chains (GCC), and Global Production Network (GPN) literature have been developed as conceptual frameworks for understanding the ever evolving spatial or international division of labour (Porter, 1986; Gereffi and Kaplinksy, 2001; Gereffi *et al*., 2005; Coe *et al*., 2004; Coe *et al*., 2008). Coe *et al*. (2008, p.274) defined GPN as *"a nexus of interconnected function, operations, and transactions through which a specific product or service is produced, distributed, and consumed"*. Whilst GVC popularised by Gerrefi (1994) improved the previous GCC understanding (whereas labour and production process resulted in finished commodity) by associating it with commodity to standardised products. This approach, however, are being criticised as it excludes other more diverse production tasks (Henderson *et al*., 2002).

However, the two analytical frameworks of GVC and GPN has been central in contemporary studies that have tried to capture the ongoing dynamics of firm strategy. In 2005, Gereffi *et al*., developed a framework for exploring the governance of value chains that identified five types of governance relationships. This has been a very influential paper, and the on-going debate on global value chains has made important contributions to understanding the governance of value chains. This approach identified the interdependencies between the elements across value chains as one contribution to explaining differentiation firm and national performance. However, it has been criticised for being over

simplistic and for underestimating how governance occurs in different industries and how the structure of value chains evolves over time (Coe and Hess, 2007; Ponte and Sturgeon, 2014). In the GVC perspective, local firms tend to be regarded as only providers of low-value-added processes and consequently possess limited power within the value chain (Schmitz, 2004). Moreover, their potential and initiative to accumulate capabilities and to obtain access to global firms is often underestimated (Liu and Yang, 2013).

To address the limitation of GVC, economic geographers developed the GPN framework that included the activities of firm and non-firms' actors into the analysis and highlighting the environment in which value chains are embedded (Coe, Dicken, and Hess, 2008; Yeung, 2009; Yeung and Coe, 2015). To Dicken *et al*., (2001, 2007) the global economy emerged from the complexity of the organisational networks which constitute two major elements: (1) production dynamics (processes of production, finance, distribution, and consumption), which are organised between a number of actors and institutions embedded in specific places, as well as (2) the geographic networks that are grounded in social structures. Henderson *et al*., (2002) argued that organisational dynamics are central in driving the economy through new connections made by firms in establishing production networks.

The literature on global production networks begins with assuming the importance of the global relationship towards local firms' competitiveness without considering the ways in which GPN are strategically coupled with the local nor regional (meso) element. Coe *et al*., (2004) highlights the relationship between the firm and global network as enabling firms to achieve strategic advantage as they connect regions to complex global production systems. GPN shapes the geographically differentiated social, political, and cultural circumstances in which they exist in a "transnational space" (Levy, 2008). In addition, it considers the advantage of differentiation amongst various supplier networks to achieve economies of scale (Nohria and Ghosal, 1997). Despite differences in terminologies and the focus between researchers, the concept of a network has become to be considered as a core concept for exploring local and global economic relationships. Nevertheless, the recent GPN literature (Coe and Yeung, 2015) has significant concerns with the importance of the process of local

agglomeration and in particular with the social dimensions of clustering and meso-level processes. This is debatable and is one aspect of the geographic organisation of production that is explored in this thesis.

Although both the GVC and GPN perspectives share similar features regarding the critical role of global firms, GPN includes local assets such as production resources (land, labour, an access to capital), the domestic market, and social networks as the "holy trinity" of assets (Storper, 1997) or "triple helix" as described by Etzkowitz (2008) which considers "all relevant actors and relationships" (MacKinnon, 2012, p.227). Furthermore, geographically separated production networks that break up commodity chains across "*different yet interconnected regions*" have enabled local firms to initiate contact with foreign firms within a GPNs and in doing so increase their opportunity to catch up and upgrade (Dicken *et al*, 2001; Henderson, 2002; Gereffi and Fernandez, 2011; Liu and Yang, 2013, p.446). The GPN approach recognises the importance of informal institutions and social relationships that influence actors' economic behaviour (Adhuri et al., 2016).

The GPN literature is concerned with how particular regions are included in transnational production systems (Henderson *et al.,* 2002; Smith *et al*., 2002; Dicken *et al.,* 2001). The increasing focus on these "extra-local dynamics" has shaped the discussion about growth within regions including capital, knowledge, and labour flows (Amin, 2002; Mackinnon *et al.*, 2002; Bunnel and Coe, 2011). Coe *et al*., (2004) also stressed that focal or lead firms play an important role in governing a production network through their corporate and market power enabling them to reap economies of scale in particular activities, such as integrating R&D, sharing resources, or conducting marketing in a specific location. Sunley (2008) criticised this view by suggesting that this view of networks often "*includes just about everything and lacks analytical boundary and clarity*" (p.8). He argued that the relational approach that is a core aspect of the GPN approach should engage more with institutional and evolutionary approaches to improve their analytical capability. Bair (2008) also questions whether GPN studies have been empirically different to GCC research and challenged researchers to make progress on "*to what extent embeddedness matters and how it operates across various kinds of institutional and geographical space*" (p.358). This is to argue for an approach that combines the micro with a meso and macro approach and it is this approach that is used to conceptual ground the analysis of the Indonesian shipbuilding industry.

Given the multiplicity of actors, connections, and power relations established within production network, the approach also needs to consider the governance of networks that impact on value chains, such as state agencies, NGOs, trade unions, and health organisations. Such networks are involved in making the linkage between productive subjects and spaces that make up the system (Gibbon and Ponte, 2008; Hess, 2008). Henderson *et al.,* (2002) have argued that the connections made by firms to establish production networks are the main driving processes behind the emergence of the global economy. This includes safety and quality standards which can be enacted by a variety of institutional forms. Henson (2008) identified two different types of standard namely (1) *mandatory standards*, which set by public institutions and enforced by the buyer as a ship owner, and (2) *voluntary standards* which in the shipping and shipbuilding industry is associated with environment issues such as pollution.

The GPN literature highlights that "*where the value is created and captured*" may not be in the same place (Henderson et al., 2002; Dicken, 2004, p.15). Now, to understand the Indonesian shipbuilding industry, this study includes regulatory aspect, as to how complex interconnections and interdependencies between the wide varieties of actors influence the processes of value creation and enhancement.

However, this study refocuses the articulation of GPN by recognising how it is influenced by the contexts in which they are embedded. It is important to distinguish the connections between networks members despite their origin or location as it facilitates a more nuanced articulation of power relationships. The project-based context of the shipbuilding industry adds an important additional dimension that is absent from the existing GVC/GCC/GPN analysis. While there has been growing attention paid to understanding the development of networks or production chains, much less attention has been paid to the factors influencing the configuration of local/global relationship in production networks/chains. To address this gap, this study will further explore how local PBFs develop and govern production activity in dispersed locations including the location of global suppliers.

2.4. PROJECT-BASED FIRMS AND THE SHIPBUILDING PROJECT

Before further elaborating the previous literature on project-based firms, it is worth noting that a shipbuilding project typically involves private and public sector investment or expenditure. In this way a ship is partly considered as infrastructure, and partly classified as a capital-intensive good. This section will review the literature by exploring the scope and boundaries of shipyards as project-based firms and to identify the gaps within the existing micro, meso and macro approaches.

MICRO PBF - Unlike other capital assets or infrastructures such as buildings and other construction projects, a ship contract "*cannot be treated as capital assets*" or as security for a bank loan (Klanak, 2011, p.3). This has an important impact on the ways in which a shipyard raises capital to finance a shipbuilding project. Shipyards typically finance the construction of a contracted ship project, whilst they are also pressured to sell it "*at a price determined by the market*" (Klanak, 2011, p.2). Some shipyards finance their projects through ship financing schemes provided by "*commercial banks or export credit banks*" (OECD, 2007, p.7). After a ship is completed, depending on market conditions, a shipyard will return the bank loan despite having a guarantee of winning another ship project (Nikonova, 2009). Due to many uncertainties in PBF production activity and in the cash flow of a shipyard, a project manager must have the ability to foster and manage collaborative teams composed of diverse skills and expertise to meet the specifications required by the client (Walker, 2015). There are problems regarding the "*loss of control over cost and, in some cases, quality*" (Stanic *et al.*, 2018, p.113). In relation to the challenges within the construction phase, Mandal (2017) suggested that the wide variety and different types of inputs and skills required for each ship project makes the production process for a unique and rare, and more importantly, it is different to mass-produced. As opposed to automotive industry that can use one production line to produce thousands of units, each individual ship is a bespoke product. Furthermore, some ships are one-off projects, whilst others are part of a series of similar ships with identical specifications (often referred as sister ships). But, in this case, it is common that the production stages are constructed by more than one shipyard (Thornton and Thompson, 2011). A ship design is created by one firm and sold to many yards and thus similar ships can be produced using different configurations of production networks. This is a very different approach to the configuration of the

majority of production networks. Thus, the competitiveness of the yards is partly about location, cost and quality rather than the distinctiveness of their products defined in design terms.

MESO PBF – Now if we turn to exploring how a project-based firm organises a local production network. One challenge comes from fluctuation in the demand for ships. These circumstances call for a better and more strategic approach to managing shipbuilding projects, one that overcomes the limitations of any one shipyard's resources through utilising a local production network involving firm and non-firm actors. Research on competitiveness and the organisation of economic activity has tended to focus on exploring firms as economic actors in networks which compete for profit in the market. One focus of this debate has been to explore the ways in which firms are embedded in many different types of social and exchange relationship networks including small-scale production networks enabling them to access additional local capabilities (Spekman *et al*., 1998; Yiu and Makino, 2002; Markusen, 2017; McQuilken and Hilson, 2018) and other organisational ties which confine both horizontal and vertical relationships within and across industries. There has been no research on the strategic coupling of project-based firms in local/global production networks including no research on shipbuilding. Such research must include a focus on understanding the roles played by central and local government including industry-specific regulatory bodies in the configuration of the geographic organisation of production. These actors may directly and indirectly govern and support the development of firms with respect to providing fiscal incentives, supportive policies, as well as a business-friendly environment that can benefit firms by increasing opportunities to win projects and to access local resources (Jenkins, 2006). Some of the literature on projects has also identified that the element of informal relationships including ones that are least formal, such as personal friendships between firm owners, is essential in supporting firms in the form of personal favours should project-related issues emerged (Van Staveren and Knorringa, 2007). More importantly, the literature on project-based firms recognises the importance of network in meeting innovative needs, responding to uncertainty, coping with emerging properties, as well as responding to changing client requirements (Hobday, 2000). These elements will be discussed in this thesis to better understanding the configuration of shipbuilding networks in Indonesia.

MACRO PBF – Moreover, changes and choices in temporary settings are rarely discussed within the strategy literature nor in the literature regarding empirical research on shipbuilding project (Ageron *et al*., 2012; Basuki *et al*., 2014; Lee, Shin, and Park, 2007; Iwankowicz and Rosochaki, 2014; Kochetkov and Aliev, 2016). Previous studies identified the risks associated with shipbuilding projects that emerged internally (risks related to design changes and the production of hull construction) as well as external risks (risks of changes in legislation and the political landscape) that resulted in project delays. For example, Poulsen and Sornn-Friesse (2011) suggested, in an analysis of the Danish shipbuilding industry, that government intervention did not solve the structural problem facing the industry; instead, it only postponed the downfall of this industry. In this case, government policy did not enable the long-term survival of the shipyards located in Denmark. Conflicting view also come from within the GPN literature including the importance of global actor involved in the production networks (Coe *et al*., 2008).

However, not many papers have discussed the critical role played by shipyards in overcoming project issues by forming and choosing a particular combination of local/global production networks for each project. In the next section, a conceptual framework for project-based production networks will be developed and discussed.

2.5. *PROJECT-BASED PRODUCTION NETWORKS*: A CONCEPTUAL FRAMEWORK

Chapter 1 discussed that this study aims (1) to understand firm competitiveness in the Indonesian shipbuilding industry, as well as (2) to understand the shipbuilding production networks by bringing together a number of debates including firm-level, meso, macro, and project based literature. Thus, the conceptual framework for this research (Figure 2.1) is based on exploring the inter relationships between project-based firms, production networks (meso and macro), and governance. The framework combines firm-level concepts on project-based production networks with the governance (GCC/GVC/GPN/GPN2.0) literatures providing an integrated way of understanding the organisation of project-based products and services. The development and application of this integrated approach to the

shipbuilding industry is important for developing an understanding of a strategic sector which has been overlooked in the academic literature. Each element will now be discussed.

Research on project-based firms has received increased attention in recent years (DeFillippi and Arthur, 1998; Hobday, 2000; Lindkvist, 2004). Project-based firm defined as an organisational form that integrates diverse and specialised intellectual resources and expertise to create project tasks within a temporary system (Gann and Salter, 2000; Lundin and Soderholm, 1995; DeFillippi, 2002; Keegand and Turner, 2002), which predominantly characterised by high levels of complexity and uncertainty (Remington and Pollack, 2007). Sanderson's (2012) research coincided with an increase in the popularity, over the last 25 years, of various project forms that have been described as *megaprojects* (Flyvbjerg et al., 2003, van Marrewijk et al., 2008), *large engineering projects* (Miller and Lessard, 2000), or *service-led projects* (Alderman et al., 2005). These labels are typically applied to large-scale projects with common features that include: (1) the project delivers a substantial piece of physical infrastructure or a capital asset with a life expectancy measured in decades, and (2) the client is often a government or public sector organisation.

According to Hobday (1998), project-based organisation is developed to respond to highly customised client demands, where the project organiser closely interacts and frequently negotiates with customers to deliver innovative product designs and services. The main contractor usually forms a consortium (also described as a supply network or production network). These forms of networks are found in various industries ranging from professional services (i.e., accounting, advertising, architectural design, management consulting, and public relations) to companies involved in the delivery of complex products and systems (infrastructure, construction, and transportation). Project-based work involves layers of networks (firm level, local production network level, and global production network level) to meet clients' demand which often requires the production of high degrees of differentiated and customised products and services (Hobday, 1998). Further, Davies and Brady (2000) suggest that a complex production process involving design, fabrication and the coordination of a complex but project-focussed commodity chain. It is noteworthy that the character of a shipbuilding project places it at the intersection between infrastructure, construction, and transportation. It is worth noting that each

project is managed by a lead firm which is responsible for the distribution of a set of tasks and resources within a firm or outsourcing tasks to other firms. To date, however, research on project-based firms has not yet investigated the interaction between project-based organising and firm competitiveness with a focus on exploring the geographic organisation of production. This must include a focus on exploring the dynamics of managing a single project and also the dynamics of managing a series of projects.

The specific character of the shipbuilding industry implies that this is an interesting sector to explore to understand the organisation of customised production networks. Over the past few decades, there has been a significant shift in power in the world's shipbuilding and repairing industry. A report from the OECD (2014) identified a decline in orders from shipbuilders located in European countries and the U.S. The world has begun to see the emergence of new shipbuilding nations across the Far East and Southeast Asia that are now involved in the production of more than eighty percent of the world's shipping fleet. It is interesting to see how local production networks interact with wider more dispersed networks to address the increase in the demand for the supply of new ships and the repair of the existing fleet. To Sturgeon (2000), a key strength of an industry level approach is that "*what is observed at the local often has some direct relationship to what is seen at the national, regional, and global level*" (p.1). As proposed by Hallgren and Soderholm (2011) and Whittington (2006), a project setting provides an opportunity for a better understanding of the management of sub-organisational, organisational, and extra-organisational relationships. As one of the most labour-intensive industries, a shipyard's capabilities are focused on the management of the dynamics of relationships between stakeholders to ensure the effective delivery of a ship (Sivanandan, 1989; Sugihara, 2007). It is important to explore this element as there have been very few studies that explore the organisation of ship production as well as managing the dynamics of these relationships from the perspective of shipyards in Indonesia (Weijland, 1999; Wickham, 2005). The organisation of the projects and the competitiveness of the firms are influenced by external factors. The external actors may be firm or non-firms including strategic coupling between firms and state actors (non-firms). The forms of these relationships, including local regulatory bodies, involved in the shipbuilding project will be identified and explored in Chapter 5.

The literature on local/global networks plays an important role in understanding the geographic organisation of the Indonesian shipbuilding industry as this lens provides a framework for understanding the relationships between shipyards and other firm actors, as well exploring the role of non-firm actors in shaping shipyard's competitiveness and in the configuration of production networks. However, the study of a particular industry should not just focus on the governance of local or global production networks. But rather the research must acknowledge that, prior to developing a local and global production network, each project's contract reflects different choices and decision-making processes developed by a project management team at a particular time and in response to (1) the specific needs of clients, and (2) a shipyard's capacity at that time. Thus, different solutions to the geographic organisation of production will emerge in the same shipyard that reflect the availability of existing capacity and the nature of the ship under construction. The dynamics that come from the changing organisation of production relationships on a project-by-project basis also takes into account a set of local/global regulations attached to the product – a ship - and shipbuilding processes as a whole.

Unlike other sets of industries, shipbuilding is primarily driven by both local and global demand, as well as the relationships between the production location and other resources that come from elsewhere. Amongst all maritime industries, shipbuilding activities are probably best described as a combination of a labour-intensive industry (that tends to rely on local embeddedness) and technology (that relies on global relationships). However, like other project-based activities, the completion of tasks and the overall project-based production process is dependent on a firm's ability to access and engage in frequent interactions with multiple local/non-local firm/non-firm actors. Identifying processes involving global actors and the importance of macro-relationships will be the focus of Chapter 6.

Knox and Gibb (2001) first used the concept of macro, meso, and micro to explore the variety of approaches adopted by firms in similar industry or environments but conducting different strategies to develop production networks. The focus of research on production networks has been predominantly at the macro level with a concern with transnational production. It has been mainly concerned with the extra-local dynamics that shape growth within regions, including flows of capital, knowledge, and labour flows (Amin, 2002; MacKinnon *et al*., 2002; Bunnel and Coe, 2001). A growing interest in the

micro level reflects a concern with understanding particular practices in individual organisations such as the development of backward and forward linkages, inter-firm interdependence and specialisation (Amin, and Thrift, 1994; Javorcik, 2004; Gupta and Polonski, 2014; Huggins, 2018) has also gained popularity. A critique developed by Sturgeon (2000), however, suggested that whilst the macro level analysis helps gain initial ideas about the volume of economic activity, this scale of analysis is not enough to reveal emerging patterns within an industry, such as the connection mechanisms, power dynamics, and geographic reach. Understanding the overall competitiveness of the sector would require consideration of these three linked production networks. Currently, the study of production networks that integrates a multiscale understanding of micro, meso and macro is underexplored and there are no studies that explore these relationships in project-based organisations.

Moreover, Gereffi's (1994) earlier theorisation perhaps provides the most comprehensive definition interfirm networks. To him, an interfirm network consisted of "*sets of inter-organisational networks clustered around one commodity linking households, enterprises, and states to one another within the world economy*" (Gereffi et al., 1994, p.2). This considers the organisation of inputs, labour, transportation, distribution, and consumption. Nevertheless, it tends to under-theorise the dynamics of geographically dispersed production activity (Henderson *et al*., 2001; Bryson *et al*., 2018, p.97). This thesis will explore the shipbuilding sector but taking into account the different ways in which projects can be enacted and delivered using a different combination of different inputs based on the nature of the contract. This will be the focus of Chapter 7.

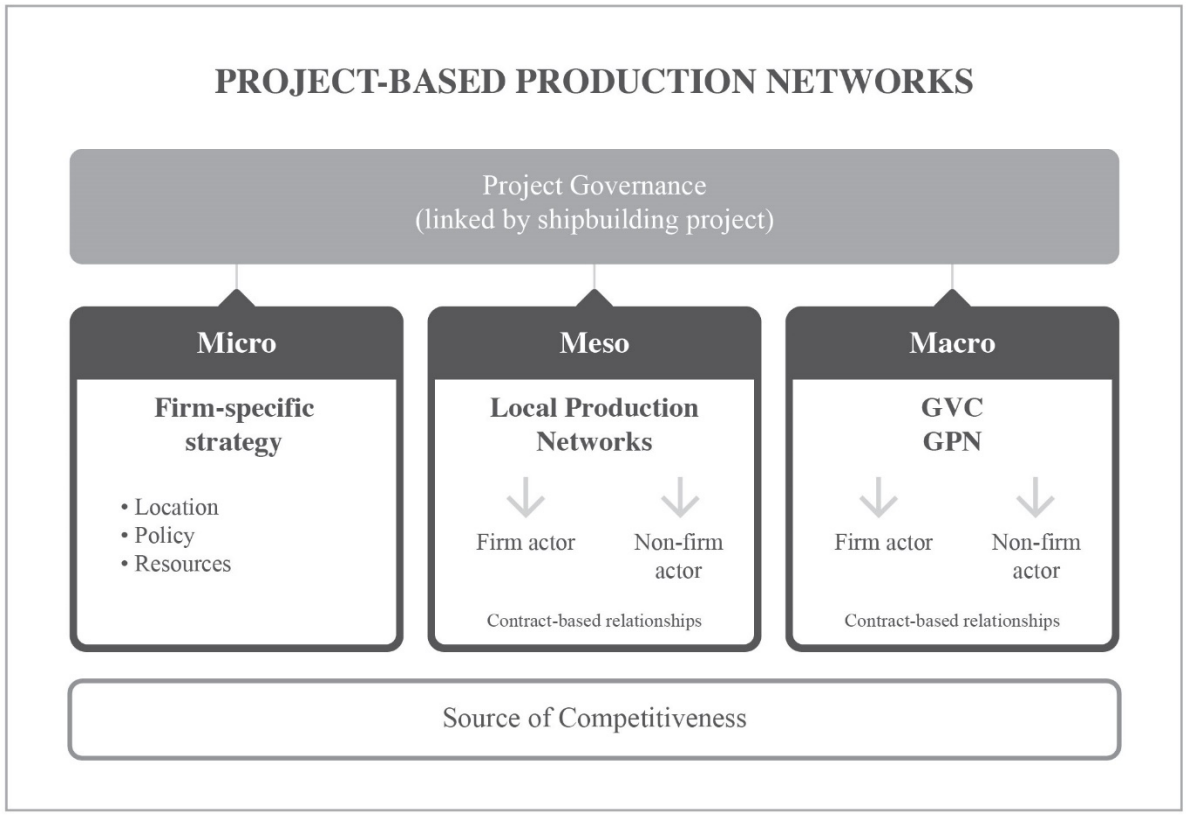

Figure 2.1 Conceptual Framework for understanding project based firm competitiveness

The overall aim of the conceptual framework is to provide a holistic understanding of the Indonesian shipbuilding industry. Such networks are important to explore, as they include distinct features related to how and when a firm blends and combines local/global production networks to address project-based issues. This study addresses this gap by providing an integrated study of micro, meso, and macro-level analysis on a project-based shipbuilding industry in Indonesia.

2.6. CONCLUSION

This chapter has highlighted the extent to which previous studies have conceptualised the uncertain character of project-based firms as though they are an obstacle to achieving competitiveness compared to more stable firms and production activities such as mass production, without due consideration of the strategic and large-scale end products that directly and indirectly impact other industry. In order, to understand the nature of project-based firms, products, and its production networks, there is a need for a more integrated approach to understanding the dynamics and governance of shipbuilding projects

including processes which are embedded in both local and global settings. Given Indonesia's need for maritime transportation, the importance of firm-state coupling and other non-firm actors must be considered within the shipbuilding industry. An understanding of how ship projects are organised amongst firm and non-firm actors will help reveal the dynamics of local/global relationships in the shipbuilding industry in Indonesia. This study will also explore the drivers behind the decision-making process leading to the organisation and coordination of a local/global production network.

This study attempts to explore how the reconciliation of a local with a global perspective allows for a more refined understanding of the dynamics of ship production and the competitiveness of shipyards. First, the chapter identified theoretical perspectives that will support the analysis of the shipbuilding industry in Indonesia and overseas. This study intends to explore a range of perspectives to provide a thorough understanding of an industry which has been underexplored in the academic literature. The research will identify the challenges facing project-based firms, whilst highlighting the ways in which tasks are developed, divided, and delegated by lead firms. The research will investigate the competitive advantages created by multiscalar actors from within the firm, external firms within the same region, external firm/non-firm located outside Indonesia. Hence, the development of an integrated micro – meso – macro perspective is essential for understanding the geographic organisation of project-based production networks.

Firm-level competitiveness is influenced by the organisation of production. For instance, the decision about whether to perform some of the project tasks internally or outsource them is one reflection of the nature of the competitiveness of a project-based firm. Competitiveness in shipyards needs to explore the ways in which shipyards winning the bidding process, dealing with day-to-day issues, or managing its routines. Additionally, the literature on local production networks takes into account differences between institutions and also considers firm competitive advantages that may be created by a favourable governance and policy system that is regionally embedded. This definition of production networks as *"an interconnected functions and operations through which goods and services are produced and distributed"* needs to include both local and global production networks, as firm-level competitiveness is influenced by external factors. Thus, the need to better understand the coupling between the local and

the global elements of a ship production process is particularly critical in the context of a project-based industry that is also heavily supported by government interventions – both locally and globally.

To address the research gaps identified in this chapter, this thesis explores the following research questions:

1. How are projects - organised at a firm-level (macro), and does location matter?
2. What actors are involved in local production networks and at which stage of production? How is project-based organisation related to meso-level processes?
3. What are the drivers behind the configuration of shipbuilding project-based production networks with a focus on understanding the interrelationships between macro, meso and macro processes?

The conceptual framework (Figure 2.1) was applied to address these research questions. The chosen design, approach, and methods are discussed in Chapter 3.

3. CHAPTER THREE

RESEARCH DESIGN, APPROACH, AND METHODS

3.1 INTRODUCTION

Project-based production networks (PPN) in the shipbuilding industry and the ways in which *PPN* is developed and organised have been overlooked in the academic literature. To address this gap, this study explores the micro/meso/macro competitiveness and governance of project-based firms (shipyards). This chapter explores the research objectives and questions, followed by reviewing the research design, approach, and methods.

There are five sections. First, the approach to the research and the underlying assumption are explored (Bryman, 2012). Second, the justification for utilising a qualitative approach and case studies is discussed, followed by the four-stages of data collection, namely: (1) desk-based research, (2) ethical review process, (3) designing the interview questions, and (4) conducting sixty interviews. The next section discusses analysis including (1) transcription, (2) data grouping, and (3) coding. The data analysis used *Computer Assisted Qualitative Data Analysis software* (CAQDAS) to facilitate the interpretation, and NVivo 11 was also used. Finally, the chapter concludes by exploring ethical considerations, research evaluation, and a discussion of methodological limitations highlighting the particular challenges of undertaking fieldwork in an environment where academic research is not yet well incorporated in to business practice.

3.2 RESEARCH OBJECTIVES

This study adopted an in-depth and explorative research design to develop an understanding of how Indonesian shipyards compete whilst facing uncertainties (Bryman, 2012). A qualitative approach was adopted as it is appropriate for exploring unfamiliar issues and to identify differences between firms focusing on processes.

There are three questions to be addressed:

4. How are projects organised at a firm-level (macro), and does location matter?
5. What actors are involved in local production networks and at which stage of production? How are project-based organisation related to meso-level processes?
6. What are the drivers behind the configuration of shipbuilding project-based production networks with a focus on understanding the interrelationships between macro, meso, and macro processes?

These research questions were explored through the context of the shipbuilding industry, in a particular location, Indonesia. In addition, the issues were investigated from a specific point of time which was the period after President Joko Widodo announced the *Sea Toll* (sea connectivity improvement) programme in 2014 which was followed by an increase in demand for the production of domestic ships. The qualitative methods were considered appropriate to help interpret and understand this phenomenon (Willis, 2014). The approach was based on an underlying theoretical assumption that links the theory and data (Myers, 2013).

This empirical study is based on the conceptual model developed by Buckley *et al.* (1988) with the main argument being that competitiveness cannot be understood unless all relevant elements of the issue are identified and *"... useful measures have to specify the level of analysis... and encompass competitive performance, its sustainability, and the management of the competitive process*." They suggested that measures of firm' performance, potential, and the process should be examined together. Furthermore, in 1990, they proposed a set of firm-level competitiveness measures. One focus of this thesis is to understand competitive elements in the Indonesian shipbuilding (a combination of both manufacture and service) industry. In addition, Buckley *et al.,* (1990, 1992) did not specify the impact of firm size and access to resources. It is important to explore the competitive advantages of various sizes of shipyards as project-based firms.

3.3 DATA COLLECTION

Data were collected over an eight-month period (October 2015 – April 2016) through qualitative interviewing and desk-based research. Following the principles of data collection established by Eisendhardt (1989) and Yin (1989), data were obtained from multiple sources focusing on shipbuilding project-related issues, strategy, and competitive strength.

Expected challenges during the fieldwork

First, the investigation on the maritime industry has been carried out in order to understand the characteristics of the maritime sector in Indonesia and the challenges that shipyards have to deal with (desk research). To define competitiveness in Indonesian shipbuilding industry, however, integrated data about company revenue are difficult to obtain due to the shipyards in Indonesia are commonly privately or family-owned, as opposed to the public listed company. Secondly, it is also impossible to obtain revenue data from shipyards during the interview, as it is considered inappropriate to discuss this in Indonesian culture.

Further, it is useful and conclusive when views from both state-owned and private shipyards are brought into the analysis. However, the time constraint is the limitation, especially given that the majority of shipyards are located in dispersed islands. Although Indonesia is an appropriate field for the study, yet the secrecy aspect characterising the Indonesian culture makes it difficult to obtain desired information. An employer may refuse to be recorded; therefore, extensive note-taking followed by the assurance of confidentiality may mitigate this issue. Furthermore, a case study often criticised for its low ability to generalise findings as it is considered as being in one context-specific environment (De Vaus, 2001). However, this research addresses the limitation by using multiple case design, which Ryan et al. (2002) and Thomas (2011) illustrates that the purpose of case studies is not merely to generalise findings to a wider population but rather to explore an issue with in-depth and real-life context.

3.3.1 Desk Research

The first phase of data collection was desk-based research. The process involved a thorough literature review to "distinguish what has been done from what needs to be done" (Hart, 1998, p.27). The staged process is useful to provide knowledge about the previous contribution made by other scholars, as well as identifying key concepts for this research. (Table 3.1).

Table 3.1 Flow chart of the literature search

Stages	**Sources**	**Outcomes**
Mapping topic	Shipbuilding text-books	Initial mapping of the topic area, and providing a list of key authors
Searching for detailed sources	Electronic sources Conference proceedings	Identification of articles, reports, list of conference papers
Evaluating literature	Peer-reviewed journals	Identification of reviews of items

Source: Extracted and modified from Oakes (1994)

Secondary data and web-based materials facilitated the development of an overview of the industry including policy. Data were collected through documents concerning firms' activity (Webb & Weick, 1979). These documents took two forms: (1) contextual materials including structural and operational aspects of an organisation, press releases, website text, which provided secondary data (Jick, 1979) about the firms, and (2) image artefacts including paper and electronic representations of shipyard operations. This exercise identified existing data sources but also confirmed that the primary data that the project required was not already available (Gorard, 2013). More importantly, examining methods for collecting and analysing data was required to ensure that appropriate methodology was applied to address the research questions.

The production of shipbuilding in Indonesia is dispersed across islands and regions. At the beginning of the period of desk-based research, it was difficult to identify the exact numbers of shipyards in Indonesia. There are no accurate and comprehensive database was available that provided and sufficient details of Indonesian shipyards. An initial activity was the creation of such a list. A full list of shipyards by name, location and their products/services was developed by drawing upon information obtained from online platforms, newspapers, and industry reports. The types of information obtained including reposts of ship launched, the classification directory, and industry association website. However, none provided a comprehensive register for two reasons. First, privately owned shipyards tended not to be listed and not all yards were members of the industry association. Second, smaller shipyards were often not included in these sources. There are also unregistered smaller-scale shipyards (including those producing traditional wooden fishing boats) located on remote islands. It was important to develop a comprehensive list to capture variations (Bryman, 2012) in size, ownership, product/service offered, location, and strategic priorities. The difference in strategic direction reflects the variety of the ways in which shipyards manage their production activity.

Table 3.2 A list of shipyards in Indonesia by location, Year of establishment, and Ownership status

NO.	SHIPYARD	YEAR OF ESTABLISHMENT	STATUS	LOCATION	NO.	SHIPYARD	YEAR OF ESTABLISHMENT	STATUS	LOCATION
1	STD	2005	PVT	Pontianak	16	HCA	2009	PVT	Cirebon
2	GHR	2012	PVT	Cilegon	17	IKI	1998	SOE	Mak/Manado
3	DMN	1969	PVT	Global	18	AHT	2008	PVT	Batam
4	DKB	1990	SOE	Jakarta	19	CMN	2008	PVT	Samarinda
5	DMS	1973	PVT	Surabaya	20	DYE	2006	PVT	Samarinda
6	DAK	1996	PVT	Bangka	21	PTR	2005	PVT	Batam
7	CMS	2000	PVT	Cilegon	22	ADI	1996	PVT	Madura
8	DPS	1976	SOE	Surabaya	23	SSY	1976	PVT	Semarang
9	BAY	1996	PVT	Jakarta	24	JMI	1983	PVT	Semarang
10	PAL	1980	SOE	Surabaya	25	GBU	1975	PVT	Balikpapan
11	DRU	1972	PVT	Jak/Lam/Lm	26	MER	2000	PVT	Balikpapan
12	MRB	1992	PVT	Palembang	27	KUK	2005	PVT	Samarinda
13	DPL	2010	PVT	Lamongan	28	SMI	2006	PVT	Cilegon
14	KKN	1999	PVT	Jakarta	29	PRS	2006	PVT	Jakarta
15	DBN	2012	PVT	Cirebon	30	SSB	1996	PVT	Tangerang

Based on this database, it was identified that few shipyards own shipping companies. For example, nine out of thirty shipyards use the yard space to build ships for their sister company when they are not working in full capacity. Prior to the fieldwork, the original intention was to include both shipping and shipbuilding companies in the analysis of the competitiveness of the maritime industry. Therefore, access to the *Mare Forum* was negotiated – a conference that brings together Indonesia's maritime leaders including shipping companies, brokerage firms, classification societies, and regulators.

3.3.2 1st Industry Conference*: Mare Forum 2014*

In February 2015, I participated in this two-day conference that explored issues facing the Indonesian industry. The conference was attended by three to four hundred people. A key issue that was identified was that there is an imbalance between shipping and the shipbuilding industry which mostly concerns of policy imbalance. Thus, the chairman of the *Indonesian National Shipowners' Association* (INSA) noted that there had been significant growth over the past few years due to tax exemptions on the import of second-hand vessels from overseas. This policy, however, was problematic for the Indonesian shipbuilding industry as it reduced demand for new vessels. During the conference, the head of the *Indonesian Shipbuilding and Offshore Association* (IPERINDO) raised this issue and confirmed that shipbuilders have long sought tax incentives for the imported components. This is to reduce the cost of ship production to enhance the competitive position of the production of domestic ships against imported ones. This conference identified significant difference between the shipping and shipbuilding sectors that are primarily related to differences specific government policies, which led to a decision to focus the research on shipbuilding industry. Shipbuilding is a project-based activity and hence it was appropriate to focus on understanding the geographic organisation of this type of production set within a discussion of competitiveness.

The decision to focus on the Indonesian shipbuilding industry also reflected my interest in the increasing level of government support for maritime related activity that had developed since 2014 (Chapter 1). As confirmed by the chairman of IPERINDO, a new Indonesian government economic policy was unveiled on September 2015 which included tax incentives to support the growth of the domestic shipbuilding industry. Government Regulation No. 69 exempted value-added taxes on imported components for transportation industries, such as shipbuilding, trains, and aircraft (*Department of Finance,* 2015).

Therefore, (1) raw material suppliers, (2) classification societies, and (3) regulatory bodies were interviewed as they play an important role in the Indonesian shipbuilding industry. These multiple non-firm actors were also valuable for exploring complex issues, as they presented an opportunity to explore specific processes and policies. For instance, the development of the buyer-supplier relationship in a project-based setting is a highly complex process, and non-firm actors were able to provide an external perspective on the firms (Table 8.3). However, because the objective was to focus on shipbuilding companies (shipyards) that delivered and completed shipbuilding projects, the inputs from suppliers, classification societies, and other stakeholders provided an important context that increased the reliability of the findings as these sources contributed to a data triangulation process (Carter *et al., 2014*). Thus, it was important to interview representatives from many non-firm actors. Industry associations were included, as during the conference, it was clearly shown amongst industry players that they play a critical role in facilitating communication and managing the relationship between shipyards and government agents. The research facility was also included due to its role in helping businesses to access existing research facilities (Rood, 2018), be they owned by the government or, in the case of Indonesia, it was owned by the naval university. Finally, the classification society was included to provide the necessary context regarding sector regulation. For example, it was necessary to understand the complexities of the legal requirement that govern shipbuilding

projects, i.e., local content requirement and the obligation for regular ship maintenance as part of the process to renew a ship's license.

Table 3.3 Non-firm actors

NO.	NON-FIRM ACTORS	SUPPORTING ACTIVITY	INTERVIEW	LOCATION
1	Hydrodynamic Laboratory (LHI)	Research and testing facility	1	Surabaya
2	Batam Shipyard and Offshore association (BSOA)	Industry association for shipyards in Batam FTZ	2	Batam
3	Indonesia Shipbuilding and Offshore Association (IPERINDO)	Industry association for shipyards across Indonesia	4	Jakarta
4	Indonesia Shipowners Association (INSA)	Industry association for Shipping companies	3	Jakarta
5	Biro Klasifikasi Indonesia (BKI)	Classification Society (Indonesia)	1	Jakarta
6	American Bureau of Shipping (ABS)	Classification Society (International)	1	Jakarta
7	Krakatau Steel	First-tier supplier/State owned	2	Cilegon

Fieldwork was undertaken in Indonesia between October 2015 and April 2016. At the time of data collection, the topic of the growth in demand for domestically produced ships had become prominent in the national news following the *Presidential Regulation* in 2015. It was three years before this data collection, in 2012, that the *Department of Industry* had drafted a *Memorandum of Understanding* (MoU) with the *Financial and Development Supervisory Agency* (BPKP) regarding the *Local Content Requirement* (TKDN). The MoU stated that there are several basic rules to optimise the use of domestic products and to accelerate the local content requirement programmes. The issue of local content has become a predominant issue

within the shipbuilding industry – reflected by the frequency of the participants raising this issue during the interview.

3.3.3 The Sampling Strategy

As Creswell noted, in qualitative research the intent is to develop an *"in-depth exploration of the central phenomenon rather than to generalise a population"* (2005, p.203). Therefore, a purposeful sampling strategy was undertaken. It selected *"information-rich cases"* to gain insight and an in-depth understanding of the research questions (Patton, 2002, p.273). The main purpose of this strategy was to learn from people who are *"information rich"* to best explore the nature of the study (Bryman, 2012, p.418), but more importantly to address the specific interest of this research with respect to the shipyards and its competitiveness. For example, the target of the first three interviews was with the leading shipyards whose owner/president director have been actively involved in the industry association as well as with policy-makers to provide necessary insights in to the industry. This reflected the central role of the leading shipyards in the industry.

Purposive sampling is important to ensure that a maximum diversity of research participants was achieved and that the characteristics of the industry was reflected accurately to maximise internal validity (Bryman, 2012; Creswell, 1994). In total, fifty-two participants from both shipyards and stakeholders were interviewed. This sample size was considered appropriate to achieve "*informativeness, reliability, and generalisability*" with the research findings (Charles, 2000, p.319) due to the varying nature of size, ownership status, as well as the product and service offered by the shipyards reflecting the different ways in which the production is organised. Additionally, the sample includes valuable information from non-firm actors, allowing a thorough investigation to provide a depth of understanding (Denscombe, 2002). Nevertheless, the recruitment of participants was conducted in parallel with the data collection

process and only concluded when the data reached a saturation point. The data was considered to be saturated when any additional interview does not add anything new and replication occurs (Spencer, Ritchie & O'Connor, 2003). The sampling process followed by experts' recruitment.

The selection of interviewees remained an important process as it determined access to appropriate knowledge. The experts were selected to maximise access to information regarding a firm's strategic and operational decisions. As such, shipyard owners, project managers, and operational managers were targeted as these roles were considered to be responsible for strategic decision-making.

3.3.4 Participants Recruitment

The interviewees were selected based on the criteria that they would be able to contribute to addressing the research questions (Corley & Gioia, 2004) concerning firm competitiveness and production networks. Obtaining participants' viewpoints at a time when the firms were growing (many shipyards were in the middle of a facility expansion programme) ensured that the growth of the company was witnessed (DeFina & Georgakopoulou, 2008).

Consequently, considerable time was spent in developing a participant recruitment strategy (Bryman, 2012). The primary recruitment method was partly developed during the desk research process. This involved research to identify each shipyard's official contact details and emails were then sent to the companies. This method was unlikely to obtain a response (Ratislova & Ratislav, 2014); however, a briefing note and a cover letter was sent by e-mail to fifteen potential participants (ten shipyards and five suppliers) as a trial. Only two out of the fifteen firms responded to this initial approach.

By the time I left the UK to start the data collection, access had not yet been obtained to potential interviewee contacts. In October 2015, I flew to Jakarta, the capital city of Indonesia, anyway to commence in-country fieldwork.

3.3.5 The 2nd Industry Conference: *Indonesian Maritime Expo (IME 2015)*

Accessing shipyards and contacts was finally facilitated by attending a shipbuilding conference held in Jakarta and this event increased the response rate significantly.

At the beginning of October 2015, just before the data collection period, the annual *Indonesia Maritime Expo* (IME) conference was held. This is the most important maritime conference held every two years in Jakarta involving 4,000 shipowners, shipbuilders, port authority, and key players associated with the maritime and offshore industry within and beyond Indonesia. Countries such as Singapore, Japan, Korea, China and some of the European countries displayed their products and services during this event. The annual event was launched in 2013, whereas industry leaders ranging from marine equipment suppliers, marine security providers, shipyards, marine tourism, and fisheries have been exchanging business ideas and developing strategic partnership during the IME conference. The primary advantage of attending this conference, above the other recruitment methods, was that it provided valuable access to the shipyard's information, for instance, company brochures produced by the shipyards and, most importantly contact details including those of managers were accessible. Secondly, during the conference, the exhibitor profiles (including shipyards) were distributed, and thus several shipyards were targeted. This assisted with the purposeful targeting of senior shipyard representatives, who were most likely to be well informed about competitiveness and production networks. Additionally, the initial dialogue at this event was intended to introduce myself and the research project, followed by requesting an interview and to obtain agreement to contact the individual for a follow-up discussion and interview. 95% of the people I met at the conference agreed to participate, and business cards were exchanged during the conversation. This three-day event of conference and exhibition provided me with the opportunity to engage in conversations directly with shipyard representatives, which contributed to the understanding of the structure of the industry.

Consequently, many hours were also spent in exploring the profiles of the shipyards and their managers as well as in building up a relationship with them. It was then important to demonstrate an interest in the potential participants' background (education and career) in order to encourage them to contribute to the research (Burman, Batchelor & Brown, 2017). This effort resulted in a friendlier and less daunting interview experience. It also helped with knowledge development in the industry. This process of contacting and recruiting participants was subsequently conducted over a two month's period. Some are members of the shipyard association and some were not. This is useful as it presented the opportunity to explore issues around winning ship project. The varying scale of shipyards' operation has been included in the sampling, thereby allowing various challenges and opportunities across a range of shipyards to be revealed (Saunders, 2012). Another reason that the study sought to select shipyards of varying sizes was to identify differences between the yards that might have wider interest and value (Patton, 2002).

Many people were provided with business cards containing contact details including my email address. A cover letter was also sent by email (Appendix 2) to briefly describe the project. The cover letter outlined the research aims, interview participation request, and estimation of the interview process, information regarding data protection, my contact details including those of my supervisors. An interview invitation was sent by text message and also sent when a reply to an email was received. Interestingly, *a short messaging service* (SMS) had a better response rate compared to e-mails. *SMS* was an important method of communication but also helped with logistic tasks including scheduling interviews, reminding participants of the interview, as well as rapidly informing them of sudden changes in plan or if the person was running late. This is perhaps different in some other country, as texting a person whom one does not know personally may be considered as rude, unprofessional, and a breach of privacy (Shoemaker and Reese, 2013). The other technique was cold calling. Cold calling involved actually calling

people based on their mobile number shown on the business card provided during the conference or obtained from the company website. Contradictory to the finding from Longhurst (2003), this telephone method was useful as twelve respondents agreed to participate. To conclude, the relatively high response rate in cold calling (100%) was attributed to the attendance at the conference whereas the relationships with the participants had already been developed prior to the interview.

Fifty-two managers from thirty-seven institutions agreed to participate. Eight did not reply, and six were unable to participate. The reasons given for being unable to participate were: (1) they did not feel they had enough knowledge to provide information, or (2) they were outside the country during the data collection period. Whilst a non-response (8 firms) meant that they did not reply to any email and text messages without any explanation.

Forty-five interviews were conducted face-to-face, whilst the remaining were conducted over the phone.

Table 8.4 Summary of the Interview Response Rate

Technique	**Response**		
Email	7 Agree	0 Rejection	6 No response
Text message	33 Agree	6 Rejection	2 No response
Cold call	12 Agree	0 Rejection	0 No response
Total interviews	**52**	6	8

This reflects how firms normally conduct business in Indonesia, as they would prefer to be contacted or approached directly or face-to-face.

Following obtaining ethical approval from the *University's Ethics Board*, data were collected using three techniques: written and electronic documentation, face-to-face interviews, and non-

participant observation. Interviews were the primary source of data regarding differences in the practices between firms, with the observation and documentation data serving as important triangulation and supplementary sources for understanding how firms compete through products and service offerings and as a method to gain an additional perspective on key issues [Jick, 1979; Miles & Huberman, 1994; Corley & Gioia, 2004].

3.3.6 Interviews

Although the interviews were explorative, a semi-structured approach was used, and a discussion guide was prepared (Berry, 2002). This study employed semi-structured interviews at the beginning to provide background information for the data collection process. Interviews allowed insights in to how shipyards developed their production networks; an aspect that would be difficult to obtain through other methods. The interviews ranged from forty-five minutes to two hours consisting of a set of pre-arranged questions, which varied in sequence depending on the participant (Kitchin and Tate, 2000). This was due to the flow of the discussion that typically started with an informal discussion about the current events in the industry. For instance, a discussion around a ship's launch led to a discussion about 'company activity'. A discussion about imported ship components led to questions about 'suppliers'. Therefore, during the interview, it was essential to follow the flow of the discussion to get more in-depth information by following the topics that emerged after the initial introductory discussion.

The semi-structured format made it possible to follow up on interesting information and to seek clarification where necessary (Valentine, 2005). Subsequent interviews became progressively more structured and focused as themes emerged in the data. The interview discussion guide was developed to help assist the interview process. This guide was divided into: (1) questions about products, services, brief history of the company, (2) organisation of production, and (3) the regulations around the industry. These were investigated through a series of questions

which depended on the case group (shipyard, suppliers, association, etc.) or the institutions (Appendix 3). Focusing on the interviews allowed for targeted data collection in an attempt to identify patterns across firms. Interviews, supplemented by documents such as company profiles, organisational structure, and field notes were obtained to construct a thick description in inductive research (Creswell, 1994).

Forty-five (85%) face-to-face interviews were conducted. The advantage of a face-to-face interview is that it is more personal enabling a relationship to be developed with participants. This is important as it encouraged openness and trust that increased the value of the information provided by the participants. 60% of the face-to-face interviews were conducted inside the participants' offices which provided the interviewees with a relaxing environment (Valentine, 2005). This interview location also presented an opportunity to be shown the yard's facilities, which helped to enhance understanding about the challenges faced by the shipyard's operation. On eight occasions, interviews were conducted in restaurants and coffee shops, as (1) the participants were working out of office on the day, or (2) they were extremely busy and the only time available for a meeting was during the lunch break. The issue with the informal public settings was the surrounding noise which made it difficult to tape the interview.

Seven phone interviews were also conducted. The reason for this was that these shipyards were located in other cities (or islands) and a telephone interview was considered more appropriate. However, the challenges of this methods include, (1) the personal connection and trust was more difficult to develop, (2) sometimes bad phone connections occurred so that it was difficult to listen clearly to what was been said and (3) two phones were required to be used during the process (one phone to call the participant on a loudspeaker mode, and another one to record the conversation) but some information was lost with this recording process due to the bad connectivity and background noise. Nevertheless, the telephone interviews were still a valuable part of the data collection process (Oltmann, 2015).

Figure 3.1 Map of Shipyards' Participants

Before the interviews started, the research brief was presented and explained. The purpose of the research was explained, and the anonymity of the participants was ensured, followed by obtaining a signature on the consent form. Participants were asked to describe their company's main activities, challenges and opportunities faced by the firm, the supplier's selection process, training, and recruiting process, and any issues related to shipbuilding projects.

During the interviews, a relaxed tone was set. As mentioned previously, the order of questions varied from one interview to another, depending on the flow of discussion. Printed company profiles or booklets were usually requested to better understand the scope of activity in each shipyard. The reason to do this was it was not uncommon for shipyards not to have an accessible information about their products and services. Besides, not many shipyards in Indonesia have a website (less than twenty shipyards had an official website). Yet, those with websites do not always provide comprehensive information about their current activities nor regularly updating their detailed product and service offering. Typically, the content of the website only consists of the company's history and establishment. Since it was difficult to obtain basic information about the shipyards during the initial desk research, questions related

to the company's main activity, size of the company, numbers of employees, products and services offered were taken into account when developing the interview guidance and these questions were asked at the beginning of the interview.

After each interview, a snowballing technique was applied by asking participants whether he/she could recommend potential participants who had an interest in discussing the topic of interest. Snowballing proved particularly useful in accessing large firms and particularly in accessing targeted individuals who had been unresponsive to prior methods of contacts such as email, text, and call (Maramwidze-Merrison, 2016). It is interesting to point out that firms are recommending their competitors in the same industry. This was an important point that contributed to the success of snowballing as it provided a lead into the discussion regarding networks with other firms. This focus of the study suggested that sampling should begin with the shipyard's manager due to their role in firms' strategic decisions. The majority of the participants were interviewed only once, apart from the four participants (shipyard owners) who held positions in the industry association and were considered as being able to provide much more in-depth information, not only about ways in which they organise their production, but also a holistic perspective of the Indonesian shipbuilding industry.

Simultaneous notes were also taken during face-to-face and telephone interviews to ensure all important information was recorded. All interviews were digitally recorded, with permission from the participants. Although recording removed the need to take notes during the interview, notes were still taken as a backup strategy. Interviews were transcribed immediately afterwards. These taped and transcribed interviews constituted the primary source of data for this study. To mitigate against misinterpretation, responses were summarised, and double checked with participants after the interviews (Schoenberger, 1991). This process was successful all respondents responded to emails. It also provided an opportunity for additional information to

be gathered when some questions had not been completely answered during the interview (Mulhall, 2013).

In addition, care was taken in selecting the attire that was worn during the interviews and it was important to demonstrate an understanding of the research setting and also to project an image of professionalism (Valentine, 2005). For instance, professional business attire was worn if the interview was conducted in the office. However, it was important to wear appropriate clothing, safety shoes, and a helmet that would also enable safety during a site visit and around a shipbuilding production facility.

3.3.7 Additional Data Collection

Direct and non-direct observation of organisational actions was also undertaken during the company (shipyards) visits. This included witnessing four shipyard meetings with suppliers, attending formal and informal events (five ship launching and twelve association meetings) to gather insightful data with regards to shipbuilding project related issues. However, it was considered inappropriate to take notes during these observation events as it may distract the participant from discussing sensitive issues. Therefore, notes were not taken when shadowing a participant. During the interview and observational process information about the cultural and structural aspects of the shipyards was also observed. Key observation events included strategic meetings about marketing, technology, as well as celebrations around securing a ship contract.

3.3.8 Issues during the Fieldwork

In the middle of collecting data, on March 2016, I was diagnosed with a *Typhoid* which required me to be hospitalised for ten days, followed by one-week bedrest. This bacterial disease was resulted from the frequent travel to shipyards that are mostly located in rural-industrial areas

outside the capital city of Jakarta, often associated with poor sanitation and poor hygiene. In addition, the production of shipbuilding is mainly conducted outside in the open space setting, and therefore, observing shipbuilding production site required walking around in a hot weather in a highly polluted area. Moreover, reaching each shipyard required two to three-hours driving form Jakarta. Due to the demanding physical activity to conduct this fieldwork, I was fully aware of the health risk. Therefore, to mitigate this issue, effort was undertaken including proper rest between interviews. However, the issue was unavoidable. The poor air quality, combined with the demanding physical activity, and affected my body's immune system. The date collection, however, was successfully completed by May 2016.

3.4 DATA ANALYSIS

The challenge of analysing this type of data comes from, unlike statistical analysis, there being no fixed formulas or 'cookbook recipes' to guide the analysis process. Familiarity with the data and sufficient presentation of evidence is required to provide rigorous empirical interpretations (Yin, 2013). There were three stages of data analysis: (1) verbatim transcription and content analysis transcripts, in which all fifty-two interviews were transcribed using Microsoft Word (MS Word), (2) data grouping, and (3) coding. Computer-aided qualitative analysis has been criticised for the reliability of results, particularly from theorising and search function (Humble, 2012). However, the NVivo package was chosen as recommended by colleagues who had previously benefited from using this programme to assist in indexing material.

3.4.1 Transcription

Transcribing involved a considerable amount of time and was a lengthy process. To assist with the transcriptions, *Express Scribe*, a special transcription software, was utilised. The conversion process from the iPhone .m4a format to the software's WAV format was not without a challenge. Initially, all interviews were recorded using an iPhone 'Voice Memo' feature (.m4a

format) and stored. However, to comply with the university data management plan, importing all interview records to the research desktop was required. The university desktop, however, limiting the size of each file transferred. It only allowed the maximum of 750 megabytes per file and this only equates to thirty minutes of interview recording. To complicate matters, the audio file needs to be in .WAV format to be imported to the *Transcription Module* (TM). TM is the only built-in transcription software that is accessible from my personal desktop within the university's Research Office. A converter website was then used to assist in converting all interview files from .m4a into the .WAV format.

With the completed audio file exported out of iPhone as a .WAV file, it was then imported to the *Express Scribe* programme. The use of this software was beneficial as one function includes a foot pedal to assist in the transcription process. This combination of software and foot pedal reduced the transcription time by half (Burke, Jenkins, and Higham, 2010). One distinctive feature from the *Express Scribe* that helped me to efficiently complete the transcription process (compared to the previous attempt to transcribe directly from a phone's recording) was the fact that it enabled users to pause, rewind, and fast forward the recordings rapidly without taking the fingers off the keyboard whilst typing. This speed control was an important time-saving feature (DeFelice & Janesick, 2015). Finally, to ensure data security, all transcription data were stored in the university BEAR data storage service, which only accessible with my encrypted login details.

3.4.2 Data Grouping

This process was then followed to "interpret and make sense of the data" (Bird, 2005) by highlighting the responses from participants that were linked to the theme of project-based networks and competitiveness. This was identified as a data grouping.

For example, sub-groups were identified in relation to varying product/service focus (Table 8.4). As suggested by Creswell (1994), the internal validity of the research finding was maximised by exploring a variety of cases.

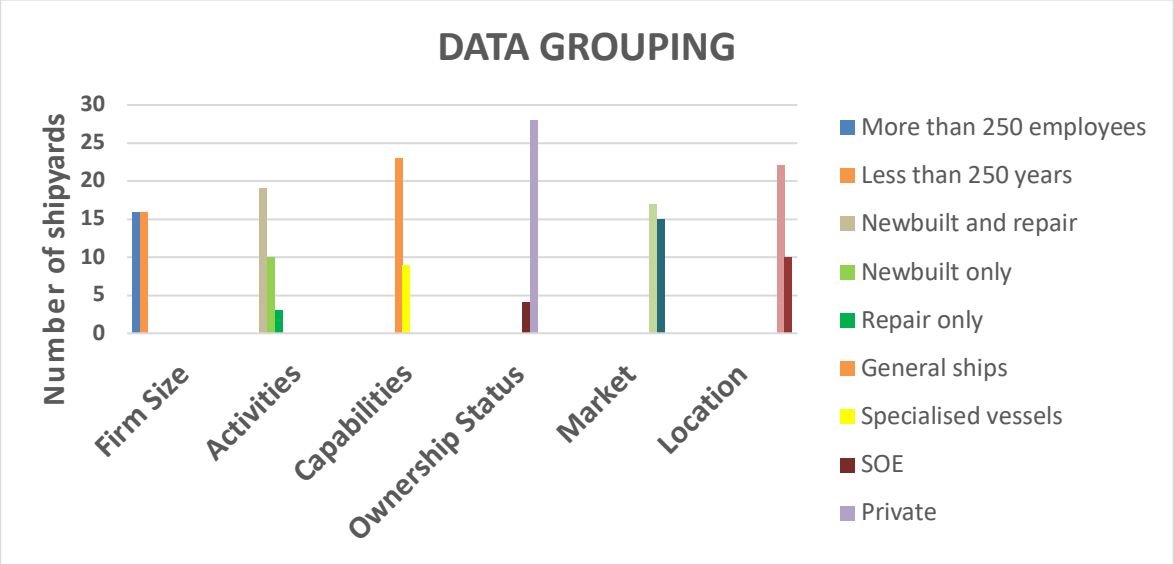

Figure 8.2 Summary of Shipyards Participants

3.4.3 Coding

Coding is defined as "*the assignment of interpretative tags to text-based on categories or themes*" relevant to research questions (Cope, 2010, p.440). The concepts derived from the information regarding differences between shipyards operations was coded to obtain background as to what comprises the competitive element of the shipyards. The purpose of the study was to investigate and 'to understand' rather than 'to quantify' (Bonoma, 1985), and therefore the focus of the analysis was to compare and contrast shipyards (Yin, 2013) through the examination of participants' comments regarding firm operation (Coviello, Ghauri, & Martin, 1998).

NVivo 10 software was used to support the analysis. NVivo was particularly useful for organising the data and to keep all files electronically available both with *Mac OX* and *Windows*

Operating System. However, the software interface was not straightforward, and it was quite difficult to become familiar with this system. Extensive self-learning, attending NVivo courses, and a webinar was required before being able to operate the software.

Participant comments around the areas of competitiveness and production networks were simultaneously highlighted, labelled, copied, and pasted from the electronic copies to the NVivo programme. During this process, various transcripts were also compared and connected to identify patterns in the data. This process was necessary to explore the similarities and differences between cases (Spencer, 2003). However, during the analysis period, issues related with language and translation were encountered, as ninety percent of the interview transcriptions were in *Bahasa Indonesia,* whilst the analysis was required to be conducted in English. When a language issue exists between the interview transcription and the analysis process, the research become cross-language qualitative study with unique challenges related to language (Edwards, 1999; Temple and Young, 2004). Thus, 'trustworthiness' of the data may decrease.

To address this methodological issue and to ensure the trustworthiness of the data, the following steps were undertaken. First, this research opted not to employ a translator to transcribe Indonesian interviews to English. This is due to the framework that was developed by the researcher, which means that the researcher is the one who is familiar with the terminology. This is important to technically and conceptually translate the communication of a concept spoken by the participants (Jandt, 2003). Therefore, if a poor translation occurs due to the words altered by other translator, there are risk that the researcher may lose the meaning. Secondly, literature suggested that changes in language that occur during the process of translation can be dealt by conducting "conceptual equivalence", which defined as the process to translate not only the literal meaning of the word into the analysis, but also how the word relates conceptually in the context (Gee, 1990). For instance, when analysed the concept of

"*production networks*" in the shipbuilding in Indonesia, participant response regarding the involvement of firm and non-firm actors within the shipbuilding project were included in the coding led to analysis. Thirdly, having sociocultural competence and significant background knowledge about the country where the study is conducted ensure the credibility and confirmability of data and findings (Squires, 2009). This is supported by the researcher ability to speak both Bahasa Indonesia and English.

Further, a reduction process was started by simplifying and categorising the data that appeared in field notes and transcriptions. Data reduction (Miles & Huberman, 1994) or data condensation (Tesch, 1990) allowed the qualitative data to be sorted and organised in a way that enabled a section of text could be best analysed. Displaying data was the second major flow of analysis activity (Miles & Huberman, 1994). In this stage, information was organised and assembled into an immediately accessible by using the *Nodes* feature in NVivo software. *Nodes* feature was also helping the process to identify the initial concepts by grouping them into categories (open coding). The conceptual coding or first order coding was conducted using a simple descriptive phrase extracted from the languages of the participants (Van Maanen, 1979; Strauss & Corbin, 1990). Competitiveness refers to a firm's ability to compete in the markets and to grow in a sustained manner. Although this model of competitiveness encompasses a firms' set of competitive strength and value elements, in this empirical approach, the focus is on the firm from within, i.e., internal value-generation elements.

3.5 CONCLUSION

The design, approach, and methods adopted for this study were selected due to their practicality and the link between the research questions and the research design. At the same time, provided internal and external validity, and reliability of the research findings. The selection of both firm and non-firm actors as well as the diverse types of shipyards maximised the external validity

and reliability of the evidence collection process and subsequent analysis. Consequently, an in-depth qualitative approach was considered appropriate for understanding the competitiveness of the firms within an underexplored industry. The semi-structured interviews allowed for fruitful discussion to develop that increased the possibility to match reality as well as being able to explore competing explanations (internal validity). Finally, the timing of the study had a significant influence regarding the accessibility of firms and participants. The growth in the Indonesian shipbuilding industry after 2014, just a year before the data collection process commenced, increased the dynamism of the industry, with a significant increase in government funding intended to facilitate an increase in the domestic production of ships.

4. CHAPTER FOUR

INDONESIAN SHIPYARDS:

LOCATION, DIFFERENTIATION AND COMPETITIVENESS

4.1.INTRODUCTION

This chapter explores the role of location and differentiation and the competitiveness of Indonesian shipyards. This chapter takes into account the Resource-Based View (RBV) to understand firm-level competitiveness. Shipyards' internal resources are identifying that are a source of competitiveness, whilst highlighting the importance of location. This chapter propose that a balance between location and the types of specialisation plays an important role in *Project-Based Firm* (PBF) competitiveness.

This study proposes that shipyards are competing not only in terms of speed of delivery and cost, but most importantly on processes that provide some form of differentiation from competitors. This type of differentiation includes differences in design, in the services provided, and in the different ways in which they build a reputation. To be able to provide a specialised design, the ability to overcome uncertainty by routinising service/maintenance activities, and the ability to develop skills and reputation provides a shipyard with competitive advantage which enables a yard to capture higher rents and/or win contracts.

The chapter is organised into the following two sections. First, it begins by providing an overview of the structure and character of the Indonesian shipbuilding industry. Second, it explores the emergence of different shipbuilding regions in Indonesia including a discussion of differences between these

regions. A key aspect of this analysis is to explore the impact of location on shipyard operations. Finally, the chapter identify various forms of firm-specific strategy that have been developed by the shipyards.

4.1.1. Overview of the Indonesian shipbuilding industry

According to the *Indonesian Shipbuilding and Offshore Associations* (IPERINDO), there are approximately two hundred shipyards in Indonesia (Koto and Arief, 2017) which the four of them are state-owned. Only eighty of them build ships with the remainder focusing on ship repairs and services. In 1960, not very long after Indonesia claimed independence from the Netherlands, all Dutch dockyards were nationalised by the Indonesian government and became state-owned shipyards (Condro, H., 2017). *Panataran Angkatan Laut* (PAL) was first established in Surabaya, and it was intended to become Indonesia's most advanced shipyard able to build large merchant ships and to produce marine engines and supporting equipment. In addition, the three other state-owned shipyards are *Dok dan Perkapalan Kodja Bahari* (DKB), *Dok dan Perkapalan Surabaya* (DPS), and *Industri Kapal Indonesia* (IKI). State-owned shipyards predominantly focus on building ships for defence purposes. The Indonesian government has an on-going requirement to commission warships and submarines, and this demand has increased. Whilst the private shipyards are serving and supporting both the needs of the Indonesian governments as well as producing ships for the private sector including vessels for shipping and mining companies.

Figure 4.1. The Geography of Shipyards in Indonesia

These shipyards located in dispersed islands of Indonesia serves both domestic and overseas markets. The geography of the shipyards is as follows: 47% are located in Java Island, 28% in Sumatra, 13% in Kalimantan and 12% in the eastern part of Indonesia (Figure 4.1). Indonesia has a total shipbuilding capacity of 65.000 *Gross Tonnage* (GT) per year and a ship-repair capacity of 65.000 GT per year (Firmansyah *et al*., 2018). The next section discusses the characteristic of shipyard activity and the impact of the increasing demand after the establishment of the *Global Maritime Fulcrum* (GMF) policy.

The establishment of the Indonesia's *Global Maritime Fulcrum* in 2015 (Chapter 1) aimed to; facilitate multilateral relationships across the maritime sectors with a focus on facilitating maritime resource management and human resource development, maritime security, defence and law enforcement, maritime economy, maritime environment protection and management, maritime culture, and maritime diplomacy (Gindarsah & Priamarizki, 2015; Parameswaran, 2015). Between 2015 and 2017, the Ministry of Transportation has taken steps to improve inter-island logistics by declaring the *Sea Toll Strategy*. The *Sea Toll Strategy* stated that all ships procured by state-owned companies had to be built locally and the Indonesian government also committed to purchase 188 vessels (73 patrol boats, 95 passengers 1.200 GT and 2.000 GT vessels, 15 navigation vessels) from domestic shipyards with a total value of 11.8 trillion rupiahs or USD$ 875,000,000 (Logam, 2017). This initiative enhanced the demand for locally built ship. Prior to 2015, the Indonesian shipyards received a limited number of orders per year reflecting the Indonesian government's limited interest the maritime economy. In addition, shipyard clients include local and foreign private companies and governments.

Despite the optimism associated with this escalation in demand, however, many shipyards are experiencing challenges which mostly are related to technological capability. Unlike other shipbuilding nation in Asia such as Japan, South Korea, and China, technology improvement in the Indonesian shipbuilding industry was not encouraged and supported by previous government interventions. The President, Joko Widodo, on 2014 noted that a series of steps would be required to further (1) develop the workforce, (2) improve production quality and (3) ensure on time delivery to enhance the competitiveness of the Indonesian shipbuilding industry. To better illustrate the current capability, it is useful to compare delivery times with South Korea: to build a 10,000 DWT tanker takes about 18

months for an Indonesian shipyard, whereas in South Korea, a 260,000 DWT tanker can be completed under nine months. In addition to technology, another challenge is the reliance on imported ship components. This is one of the major challenges that the Indonesian's shipbuilding industry needs to overcome. One of the reasons, for the time required to build a ship in an Indonesian yard is the reliance on imported components combined with complicated import procedures for some components.

The next section explores sources of competitiveness and shipbuilding construction products.

4.2.SHIPBUILDING AS A CONSTRUCTION PROJECT

As a construction project, the major challenge constructing a ship lies in the size of the product and its complexity involving a wide variety of inputs. Therefore, the management of resources and capabilities plays an important role in a "*built to order*" industry (Masten, 1991; O'Leary, 2000; Gunaskeran & Ngai, 2005; Lawson & Holweg, 2018). Shipbuilding involves constructing a small number of finished units and assembling them into a large and discrete final product. This includes the erection of the ship in a dry dock. This production process is very different compared to the manufacture of mass/high-volume products. For instance, during the ship construction stage, the limited fabrication area often limits the shipyard's ability to hold inventories (Rose & Coenen, 2016). Therefore, shipbuilding often faces various types of uncertainty that have broader impact on the project includes overlapping design and construction activities. Each shipbuilding construction stages simultaneously involves a large number of building blocks the course of a project (Paik & Thayamballi, 2007), which often one stage cannot proceed until other stages have been completed involving other firms and operations. In addition, there are often changes to component specifications and the non-standardised nature of many ship components contributes to difficulties in budgeting and procurement (Sanderson & Cox, 2008). In principal, timing and coordinating is critical, as any interruption to a phase in the delivery of a project can resonate throughout the rest of the project. In this respect, managing shipbuilding projects involves simultaneously managing overlapping phases of several projects.

This section examines the ways in which shipyards allocate resources and manage capabilities to deliver a ship project on time, on budget and to specification. The capability to manage one-off and multiple projects is essential for project-based organisations when competing with each other. The types of activities conducted within the shipyards, as project-based organisations, requires skill sets and resources that differ from those found in more stable production organisations, in which standard mass-produced products and services are created. The skills and resources required by project-based organisations have not been fully explored in the production networks literature (Gann & Salter, 2000; Hobday, 2000; Davies & Brady, 2000). The construction of a ship involves several stages: panel construction/forming, block/section assembling, pre-outfitting, erection, outfitting, and ship launching (Figure 4.2, Figure 4.3).

Figure 4.2. Phases in the Construction of a Ship

(a) Panel construction: The process to weld plates and profiles together to form panels.

(b) Block/section assembly: The process of welding together steel plates and profiles to create ship sections.

(c) Pre-outfitting: The process of installing outfitting components in a section prior to erection.

(d) Erection: The process where it combines ship steels section together to form the ship's hull.

(f) Outfitting: The installation process of the components includes equipment, piping, ducting, and cabling.

(g) Launching: Once the hull of the ship is fully erected, the ship is then launched at the quay.

During the fieldwork, shipyards reported that the time and complexity involved in designing a ship, including design modifications from ship-owners, is one of the sources of uncertainty which often led to delays. Therefore, managing internal relationships throughout all business units is a critical part of the process of building a ship. To deliver a ship project on time and on budget, it is essential to involve ship buyers in the design process before construction commences. During this stage, design teams and engineers work very closely to create a baseline for production planning. This includes information flows between the shipyard and ship-buyer about the basic and more detailed design of the ship project. Changes concerning the content of a commercial contract mainly occurred during the design phase, whilst changes in design typically occurs much later in the production phase (Ludwig & Tholen, 2006). It is critical to identify a process of well-structured activities during this commissioning phase due to the increased technical complexity of a ship building project combined with shorter lead times.

Figure 4.3. Cranes lift sections of the vessel onto the assembly dock

Source: Photo from Shipyard PVSY03

This chapter will now explore the intangible elements of competitiveness including firm-specific specialisation and service focus. It also explores reputation building embedded in particular locations and the relationship between competitiveness.

4.2.1. Overview of Shipyard as Project-Based Firms (PBF)

Over the last several years there has been a growing interest in research on *PBF* that are found in a wide range of industries. The character of *PBF* which are able to integrate diverse resources and expertise has been explored by scholars. Those are mainly focus on (1) cultural sectors (movie production, publishing, fashion); (2) professional services (accounting, advertising, architectural design); (3) complex industrial products and systems (construction, telecommunication, infrastructure), and (4) high-technology (computer hardware, software) to meet highly customised nature of demand (DeFillipi and Arthur, 1998; Hobday, 2000; Gann and Salter, 2000; Keegan and Turner, 2002; Sydow *et al*., 2004; and Lindkvist, 2004). *PBF* organise their structures, strategies, and capabilities around the needs of an individual project (Hobday, 2000), and project delivery often cuts across firm boundaries. In the shipbuilding industry, a shipyard acts as a prime contractor coordinating all project elements including planning and monitoring the production process (Clough et al., 2000; Levering *et al.*, 2013; Kerzner & Kerzner, 2017). The planning stages also include integrating sub-contractors which supply skilled labour power and tailored components. In most shipyards, divisions are led by a *Project Management Officer* (PMO), which each PMO is then manage several projects, and each project led by a *Project Leader* (PL). The PL communicates with the PMO throughout the project to allocate labour and other resources. This is related to the starting point and deadlines which can vary between projects. Therefore, shipyard encounters resource challenges when several projects need to be delivered at the same time.

The resources and capabilities of *PBF* are an essential aspect contributing to competitiveness as the major challenges are to manage and deliver day-to-day operations. Moreover, in a project-based environment, distinct capabilities such as design and construction are required. This is due to the

majority of products and services are bespoke to meet the needs of specific customers (Keegan & Turner, 2002). The *resource-based view* (RBV) of the firm indicates that firms acquire competitiveness by implementing strategies that exploit their firm-specific competencies and by blending resources or assets (Bartlett and Ghosal, 1990; Prahalad and Hamel, 1990). Barney (1991) has first suggested the importance of rare and unique, inimitable; and non-substitutable as critical elements of firm competitiveness. These attributes play a critical role in PBF due to the provision of bespoke products and services. However, in the shipbuilding industry

Shipbuilding milestones are centred around commissioning, constructing, and testing tasks which are critical for the delivery of construction projects on time. These milestones are used as a basis to set tasks between the planning and the stage process (Meijer, Pruyn, and Klooster, 2009). There has been limited research on the operation of shipyards as *PBF* including how these firm manage their competitiveness. Nor there has been much discussion regarding how *PBF* compete through firm-specific characteristics and strategy. The next section explores differences in shipyard operations in Indonesia with a focus on the location of the yards. It identifies micro-level competitiveness to explore how shipyards as project-based firms compete through utilising firm-specific resources.

4.3.SHIPBUILDING REGIONS – DOES LOCATION MATTERS?

To explore the importance of location and the contribution this makes to a location dependent *PBF*, this section explores the development of location-based industrial policies and the evolution of the Indonesian building industry. A tax incentive programme and the establishment of export-processing zone are some of the benefits that have been given to shipbuilding companies located on Batam, Surabaya, and Cilegon. It is these policies that have contributed to development of these places as shipbuilding regions.

4.3.1. Batam (Free Trade Zone)

Batam was selected as a strategic location for shipyard mainly due to: (1) its closeness to Singapore as a supply hub and the impact that this would have on the speed of ship construction and delivery, and

(2) tax benefit to assist with competition based on price/cost. This is an example of governmental intervention attempting to promote productive investment by encouraging market interactions which otherwise would not occur (Cimoli *et al*., 2009; Pack and Saggi, 2006). In addition, this was policy-led competitiveness that was 'circumscribed' within a particular region and was also difficult to replicate in other localities (Lazzarini, 2015, p.103). A key issue was Batam's location in relation to Singapore. Shipyard representatives based in Batam noted that:

> *"Our close proximity to Singapore the suppliers' hub is very advantageous! It has made the whole process of ordering material or ship components relatively quick, and tax-free." [PVSY09 – Private shipyard located in Batam]*
>
> *"Buying ship components from Jakarta or Singapore makes no difference to us, as it is quicker and cheaper than if we are located somewhere else. Shipyards in Java, for example, will have value-added tax when purchasing components from Singapore. That is why shipyards in Java always say that Batam is not Indonesia" [PVSY20 – Private shipyard located in Batam FTZ]*
>
> *"In Batam, we can own huge land. As you know, ships need regular maintenance, as well as intermediate survey every two years. We need a bigger space"* [PVSY43 – Private shipyard located in Batam]

These three interviewees identified tax benefits, closeness to suppliers and the availability of large fabrication areas enabled them to (1) build ships more efficiently (quicker and cheaper), (2) be more flexible with the docking schedule and (3) accommodate clients from various industries. For smaller shipyards, they have managed to survive against competition from larger yards located in the capital by providing tailored services to clients with specific needs, i.e., oil drilling companies that operate around the shipyards. Government-induced investments also help to facilitate firm entry and resource deployment. It is this removal of import taxes from ship components that has enabled shipyards in Batam to win projects and compete on price. A Batam location has enabled shipyards to benefit from geographical proximity to Singapore, which is a hub for maritime suppliers. Being close to Singapore,

a global trade hub (Mayer & Guernsey, 2017), provides, at least to some extent, accessibility to connect with critical component suppliers facilitating shorter lead times.

4.3.2. Surabaya (Shipbuilding Cluster)

Another strategic location is the case of the cluster which naturally emerged in Surabaya (the island of Java). This cluster is based on the local availability of responses including local suppliers and a large pool of skilled workers that is produced by this region's high-quality education system that specialises in naval engineering. Interestingly, unlike the case of the Batam region where the shipbuilding industry is growing due to the tax incentives received from the government, the Surabaya cluster exists without the intervention from the central government. First, the cluster developed from the establishment of the PAL. This is Indonesia's leading shipyard that was nationalised by the Indonesian government after the end of the period of Dutch colonialization. The location of PAL was first determined by the Dutch, which then played a vital role in encouraging the development of a cluster of local maritime suppliers, education providers (Naval university and vocational schools to train welders), and testing facilities. This is also encouraging the growing numbers of small-medium scale of shipyards within the area and around the city of Surabaya. As suggested by cluster literature, this reflects the way in which firms developed their competitive advantage through interacting with their external environment.

On the one hand, Surabaya is surrounded by many component providers, which means that there:

> *"... the waiting time (for components) is shorter than if we are located elsewhere." [PVSY01]*

These shorter waiting times are translated into the *PBF* ability to distinguish themselves from the competitor by completing projects more rapidly. Shipyards located in Surabaya also have better access to materials (mainly steel) compared to shipyards in another region. There are at least four major steel companies, including the largest state-owned that supplies raw steel to shipyards in Surabaya. It must be noted that

"… steel work takes up to thirty percent of the construction activity. A very good thing that, here we have a few Surabaya-based steel companies. So it only takes one day to deliver our order." [PVSY09]

Speed is important for shipyards (Hale et al., 2009; Adland, Norland & Saetrevik, 2017). Therefore, the interaction and close relation that are prevalent between shipyard managers and the local shipbuilding network contributes to the development of local skills and capabilities. In this case, it mainly helps shipyards to deliver the product on time and rapidly.

The skills and capabilities in Surabaya can also be explained by its accessibility to a large pool of welders contributing to a reduction in this essential shipbuilding input. Educational is also provided for welders in this region and, thus the interviews noted that:

"We provide weld training periodically supervised by PAL, to make sure that our welders keep up with the latest techniques. At least three times a year they get a chance to refresh their knowledge." [PVSY18]

"We get access to the pool of skilled workers that lives around here. I mean we don't have to relocate them and their family from somewhere else. This is directly impacting our cash flow." [PVSY45]

"It is useful that we have good relationships with universities and vocational schools, particularly when we receive unexpected orders." [SOSY16]

Being located in Surabaya help shipyard overcome project obstacle associated with temporary aspect. Further, these interviewees highlighted that skilled workers are more accessible compared to shipyards located in other shipbuilding regions. By being located in Surabaya, shipyards are in a better position to recruit experienced engineers trained by the *Naval Engineering University* (ITS). This university is well-known for its naval architecture program. This specialisation in a maritime educational programme also includes ship design, which is critical for shipbuilding. In Surabaya, shipyards are surrounded by at least three local ship design providers that are recognised internationally, and they are NASDEC

(owned by ITS), PAL IDEA (owned by PAL), and TERAFULK. For example, NASDEC designs are recognised internationally as it has produced hundreds of ship designs for overseas shipyards (Santoso, et al., 2014).

The next competitive element that comes from a location in Surabaya is the location of the testing facility which critical to test ship models. The *Indonesian Hydrodynamic Laboratory* (LHI) has the largest towing tank in South East Asia. These three elements are unavailable in other cities in Indonesia. One of the shipyards located in Surabaya noted that:

> *"We are now facing full capacity, as there are ten projects to be completed. Three have to be done this year, and the other seven units have to be completed for next year. Managing several projects, at the same time, is not easy. However, we are located in a strategic location where we have better access to professional employees and the assessment team that works alongside us. It is supported by professional employees from Institute of Technology Sepuluh November (ITS), Bureau of Classification (BKI), the Ministry of Industry and Association (IPERINDO). Therefore, we can deliver the product on time and as per requested." [PVSY09]*

In addition, shipyard SOSY16 stated that they are regularly involved in the design of university curriculum and invited final year students to join shipbuilding projects to transfer knowledge. The necessity for routinised learning may be challenging to manage due to the one-off and non-repeating nature of a shipbuilding project (Gann and Salter, 2000; Winch, 1997; Hobday, 2000). Further, in project-based industries like construction and shipbuilding, efficiency is required to deal with the growing volume of submitted bids and the number of executed projects.

In addition, Surabaya highlights the importance of location in accessing labour for ship repair and maintenance activities. It is understood that a shipyard's strategy is constructed around the identification of markets coupled with developments in local expertise that is located around the shipyard. More importantly, both specialised and flexible resources are accessible through the naval education environment that is directed towards fulfilling the needs of the co-located shipyards. The relationship between educational providers and the shipyards mainly occurs when the shipyard needs to recruit

skilled labour. To increase the local labour, efforts are two ways. First, this includes the provision of rigorous training in welding skills required by the yards, and secondly, shipyards are also invited by the university to co-design and deliver the curriculum. This accumulated capability, and in particular knowledge, local schools and qualified human capital, have contributed to the ability of shipyards to adapt to change. The increase in shipbuilding activity in this region is a response to supply and demand in the shipbuilding industry combined with local advantages.

4.3.3. Cilegon (Bonded Zone)

Another shipbuilding region, the city of Cilegon, received special economic treatment from the Indonesian government. This so-called *Bonded Zone* benefits from a better taxation environment for the fabrication of export-oriented production. This policy provides shipyards located in this area with the ability of compete on the basis of cost. Currently, there are four *Bonded Zones* in Indonesia that reduce taxes on imported ship components. The impact of the policy to the region is that the price of the ship can be more competitive than shipyards located outside these areas. However, shipyards only receive this tax benefit if the end-product is sold to a customer located overseas. However, if the product is sold to a local client and is used within Indonesia, then import duties must be paid. Thus, some comments from the shipyards reflecting on the advantage of the Cilegon location highlight that:

> *"Located in Cilegon provided us with tax benefits such as reduced import tax, as long as we committed to export the finished products." [PVSY33]*

> *"... the next closest port after Jakarta is Sumatera Island, that's too far for the ship owners. That is why we are here with a location in between. We basically follow the demand. Now we could take up to thirty ships a month." [PVSY31]*

In addition to the advantage attached to the *Bonded Zone*, both PVSY33 and PVSY31 selected this location due to the busy ship traffic from the adjacent major post of Cilegon. The decision was based on the docking activity around where ships operate. Ship owners commonly schedule the loading and

unloading activity along with a ship's maintenance schedule. Therefore, it is more efficient for a client to conduct ship maintenance in a shipyard that is adjacent to a port.

Apart from following the demands of the ship owners (who are mainly shipping lines), supporting policies also play an essential role in the location of shipyards. By locating in a particular region in Indonesia, shipyards outperformed comparable peers located elsewhere. The concept of 'support-adjusted sustainable advantage' was introduced by Lazzarini (2015) to describe how firms achieve superior economic performance by receiving some support from government policies. In this case, the *Bonded Zone* policy, in particular, allows firms to accumulate resources and capabilities from a specific location in the Cilegon area. As service providers (ship maintenance), being located around Indonesia's busiest port provides shipyards with the ability to regularly maintain vessels operated in this area. Given this proximity with customers, shipyards are able to better calculate and schedule maintenance for their clients. Thus,

> *"The benefit of this scheduling system is not only for us (shipyard) but for the clients too. We'll prioritise them when the yard is busy, and this is resulting in less waiting (docking) time for their vessels."*

This advance scheduling system provided by the shipyard not only benefit the shipyard with repeat orders from clients, but also benefit client as being prioritised for docking.

As a complex product, ship is manufactured using an extended complex production network. In this view, Batam, Surabaya, and Cilegon regions provide favourable conditions for repair and maintenance activity, and a geographical location that supports the supply of ship services. Thus, location is a key source of competitive advantage for firms in this locality. In this case, *PBF* competitiveness supported by the strategic location (along with the specific tax benefit attached to it) and its proximity to clients. What has emerged from the analysis of PBF is that servicing strategies targeting particular locations and the relationship with clients have been widely adopted and contributed to service provision based on location.

A shipyards reputation is partly related to its location and location contributes to project delivery time. The shipyards compete on trust and location rather than price. Supporting Barney's (1991) resource-based view of the firm, the historical conditions and interactions within these particular regions leads to resource accumulation. In the case of shipbuilding, a location has become a central element that is favourable for enhancing three competitive aspects for shipbuilding companies; (1) market specialisation, (2) services, and (3) reputation including the ability to complete a project rapidly. These three intangible resources will be explored in further detail in the next section. To be successful in a project environment, not only must shipyards benefit from government support such as tax benefits and repeat orders, but there also needs to be a focus on developing the expertise required for specific products/markets including the development of service capabilities that contribute to creating and maintaining a firm's positive reputation.

4.4.INDONESIAN SHIPYARD COMPETITIVENESS

Despite the advantages and disadvantages that are related to location, this section explored how shipyards compete and distinguish themselves from competitors on the basis of firm-specific competitiveness, include: (1) product specialisation, (2) service focus, and (3) reputation.

4.4.1. Product specialisation

Introduce set of theory and gap about service in construction or shipbuilding.

First, design challenge, serving specific markets comes with specific requirements and challenges attached to the type of vessels that have been ordered, and the types of clients that been served. For example, domestic and overseas markets need to be treated differently even when they both order the same type of vessel. Thus,

> *"Currently we are building 17,500 DWT oil tankers for both Indonesia and Malaysia. Both countries required a different style and design, which encourages us to be creative and not provide them with the same design." [SOSY28]*

SOSY28 suggests that, whilst producing the same product (oil tankers), the process of planning and the length of construction varies between local and foreign clients. It includes the length of time required for the shipowner and the shipyard to negotiate the initial design, the planning of yard facilities, and the shipyard's expertise. However, a major challenge is the shipyard's ability to keep up with market demand and provide clients with a dynamic approach to engineering that keeps up with innovations in products and processes.

Secondly, apart from serving overseas markets, some shipyards focus on serving the requirements of government and this focus leads to repeat orders. To be able to do this, shipyards must comply with state regulations by using the *e-Catalogue* system for state procurement. This *e-Catalogue* system for suppliers was established in 2014 by the Indonesian government and is an online tool supporting government procurement. This mechanism (1) provides transparency with respect to the proposed budgets and the cost of any products/services purchased by the government, (2) allows fair competition between local and overseas suppliers involved in state projects involving taxpayers' money (Neupane, 2012). State enterprises cannot directly appoint companies (including suppliers) to be included in the government procurement system. There are a set of requirements that need to be followed, and the selection process must be transparent. One of the requirements is to register the company along with the list of products and services provided on the *e-Catalogue*. The public can access information from the *e-Catalogue* system including product specifications for each component and the price of every government purchase. This new process means that yards:

> *". . . cannot use the same supplier over the years only because of our history of the relationship. A good working relationship, of course, matters, but if another company has a better price and offer, then that need to take into consideration, ideally, we should be able to compare prices and product specifications. But more importantly, the purpose of using the e-Catalogue is to comply with the regulation." [SOSY26]*

Once the shipyard has passed these assessment processes, their physical facilities are checked including the firm's past compliance with the provision of contacts for the *Department of Defence*. This tendering

process is a long and complex process of approvals and sometimes requires assistance from maritime lawyers. Nevertheless, once passed the assessment, both shipyards SOSY26 and SOSY07 stated that they are likely to receive more orders from the same buyer:

> *"Our warship division is concentrated on the domestic market, which orders are mainly coming from the government to support the army and navy. They do repeat orders for fast patrol boats, missile carriers, and landing platform dock." [SOSY07]*

In addition, the bidding process to win defence orders (from overseas government project) is more complex as it typically involves a court-level legal assessment to explain and defend the proposed project. This process predominantly focuses on examining whether previously built ships performed according to the design and safety standard. One of the shipyards commented that a shipyard has to go through this court process followed by layers of assessments regarding their completed ship projects:

> *"We focus on developing specific capabilities around warships and leave the commercial ship market for private yards. As an example, we are working towards building submarines that have never been built by other Indonesian yards before." [SOSY31]*

Shipyards that meet the requirements of this tight compliance process often win consecutive tenders after they delivered the first ship on time and as per requirement. Shipyard SOSY31 have been able to specialise in producing defence and military ships and has become a working example for other yards within the industry. At the time of writing up this thesis (2017/2018), SOSY31 was manufacturing their third submarine.

4.4.2. Service-focus

The provision of services as a business model has become increasingly important as a mode of competition between firms. Despite the shipbuilding industry's unpredictability and uncertain environment, ship servicing activity has been able to contribute to the shipyards by providing a fixed

income stream providing yards with better cash flow. This section explores strategies involving the availability of production workers (mainly skilled welders) and the decision to locate a shipyard.

Shipyards used to focus on ship manufacturing. However, today they also develop strategies to compete based upon the delivery of services, i.e., ship repair and maintenance. Previous research suggested that ship maintenance was commonly conducted based on the practical knowledge of the on-ship engineer regarding on-board equipment and procedures (Lazakis *et al*., 2010). Thus, servicing was previously considered to be more of a financial burden than as a way of preserving safety and the quality of maritime transportation. Very few studies have explored the potential benefits that come from a yard focussing on strategically managing ship maintenance (Cholasuke *et al*., 2004; Alsyouf, 2007; Koehn, 2008). Some of them argue that the successful management of maintenance will lead to an increased profit, and that "*a strategic focus on maintenance management will contribute to the maximum operations of ships whilst sustaining the safe operation of ships, the crew, and the environment*" (Dindin, 2015, p.6).

Ship service and maintenance needs to be undertaken to comply with regulation set by local and international regulatory bodies such as the *International Maritime Organisation* (IMO) and the Classification Societies. IMO is intended to promote the safety of marine transportation carrying both people and cargo and the aim of ship maintenance, in this case, is to increase the quality of ships and hence safety levels. It is mainly focussed on reductions in ship emissions, avoiding or minimising oil pollution, and promoting environmentally friendly dismantling (Banda, 2016; Pallis, 2017). IMO provides guidelines and requirements for the implementation of maintenance programs for new and in-service facilities regarding risks related to personnel and the environment. Other stringent rules and regulations such as the *International Convention for the Prevention of Pollution from Ships*, the *International Regulations for Preventing Collisions at Sea* and the *International Safety Management Code* have also been put in place to sustain ship's equipment to operate in safe condition (Kiriaki, 2003; Talley *et al*., 2005; Thai & Grewal, 2006; Banawan *et al*., 2010). This means, that unlike shipbuilding activity that is volatile to demand fluctuation, the market for ship servicing is more predictable and potentially can improve firms' competitive advantage when integrated with a shipyard's business model.

In addition, shipyards have developed competencies that provide them with distinctiveness in the service-based market supported by their location. Some shipyards located in Java stated that they had developed a number of strategies including:

> *"In our company, we also have general engineering (GE) division. Why are we interested in GE? Because our yard is located close to the sea, which enables us to provide an offshore service. In addition to this, we have a massive workshop to support that type of activity."* [SOSY07]

> *"We approach customers that are located not far from Jakarta's busiest port, Tanjong Priok. As the fuel cost keeps increasing, it would be more efficient and sensible for the customer around there to dock with us." [PVSY28]*

> *"We knew that the large numbers of logistic vessels operating around the harbour will keep us busy! That is our main consideration when choosing this particular location for our yard, and we want to be close to them." [PVSY13]*

Regular maintenance includes hull maintenance, tank blasting, and re-painting. There is limited space in Jakarta for the provision of ship servicing activities. Space for fabrication is considered an intangible resource that is a key driver of competitiveness in the Indonesian shipbuilding industry. In Batam, shipyards have more space to facilitate ship maintenance in both dry and wet dock. Other locations in Central Java such as Cirebon - Tuban - Pacitan are also competing for a share of the ship repair market, and these areas are also potential sites for shipyard locations as there is a large pool of welders. Thus,

> *"Our yard is focussing on repair activity. As you can see, we have the capacity to repair four ships with a twenty-meter length. One dock can perform service within two weeks. So each facility or each space could take up to twenty-four ships each year. This is why we keep expanding our facility, and we are now able to dock ninety-ships per year." [SOSY08]*

In the case of the SOSY08 shipyard, they also have a ten-year contract with a major shipping line to provide maintenance every two years. This contract helps SOSY08 in making yearly forecasts. Besides,

service facilities are no longer limited to the graving dock. Nowadays, building a graving dock or dry dock is considered to be costlier compared to other forms of dock. It requires pumping out water from a large dock prior to building and repairing ships below their waterlines. Instead, shipyards have begun to use the rubber balloon system to roll ships during maintenance. The advantage of this method is that the shipyards can provide the service area without having to empty water out of a dock. This is a more efficient method compared to building a graving dock. The stability of the repair market is also an important contributory factor as

> *"Eighty percent of our capacity is to provide ship maintenance for our sister company (shipping line), and the remaining capacity would be for the external customer. We can't say no to the external customer, as our location is near the harbour, very busy throughout the year!" [PVSY14]*

> *"Well, put it this way, maximum profit for the new build is only fifteen to twenty percent maximum, whilst ship maintenance profit is at least fifty percent, so we need to do this to boost our cash flow." [PVSY38]*

Both PVSY14 and PVSY38 have decided to compete for a share of the repair and service market instead of engaging in the market for shipbuilding given the difference in margins. In average, more than fifty percent of Indonesian vessels are more than twenty years old. Therefore, shipowners must conduct a regular safety and assessment process including maintenance every two years to ensure the safety of the vessel. This is also part of the renewal process for ship license; the license will not be renewed without evidence of regular servicing and repair (discusses further in Chapter 5). It is shipowners' responsibility to maintain the vessel along with keeping ship maintenance record. In this light, the ship repair business model provides shipyards with stability and a regular market, as there is no downturn in the maintenance market.

Moreover, when it comes to forecasting and scheduling, shipyards can be more flexible when providing services. For instance, the validity period of a ship license is for two years, which normally shipowners contact the shipyard to reserve and request a docking slot prior to the license's expiry date. In this case,

the ability to be flexible along with the ability to simplify the renewal process of ship license provide shipyard with competitive advantage. One yard noted that:

> *"In case we have a full capacity and not having extra space, we won't reject them straight away. Instead, we will negotiate and provide them with our next availability dates." [PVSY32]*

PVSY32 confirmed that they can provide a letter of guarantee stating that the maintenance for the ship in question will be done after the expiry date. Having that letter in hand, the ship is then allowed to operate during the waiting period. In the one hand, being able to provide this extended service guarantee means that PVSY32 do not lose regular customers to other yards. The clients, on the other hand, is able to keep operating their vessel and avoid the risk incur from stopping the vessel activity led to loss of profit. Customers keep returning for these services as the yard can provide a flexible service and is able to negotiate over the renewal of a ship's license.

In previous studies of shipbuilding projects, the element of service activity is underexplored. In comparison to shipbuilding activity, ship maintenance is not yet considered as an essential income stream nor as a source of competitiveness in the academic literature. However, this thesis has highlighted the relationship between the location of a shipyard in Indonesia and the provision of services. Location makes an important contribution to the competitiveness of these yards. In principal, in Indonesia there are at least 18,000 ships that need to be repaired every two-years. Compared to shipbuilding, service-based activity provides better cash flows and profits for the shipyards. The provision of services contributes to the competitiveness of the yards and this is, in part, due to the growth and the stability of the ship maintenance market. This highlights the significant of tangible resources (land for fabrication) to the competitiveness of the Indonesian shipbuilding industry. This further the RBV debate, which argues that tangible resources are a "relatively poor source of advantage" (Fahy, 2000, p.64).

4.4.3. Reputation

The background of the owners and senior managers of the shipyards (family, professional, education) influences the ways in which shipyards compete. As proposed by Miller and Le-Breton Miller (2003), this type of competitive process comes from the shipyard strategic orientation which built upon customer relationships. Reputation plays a vital role in attracting customers to a yard. This study identified two different types of reputations: (1) reputation attached to the ownership status, which is typically inherited from previous family generations (shipbuilding and ship repairing businesses have been passed through generations), (2) reputations attached to end-products and service that is obtained through rigorous training and development.

4.4.3.1. Inherited reputations: the concept of 'Son of the region'.

This section explores the identification of elements embedded in the leaders' reputation in the shipbuilding industry and its contribution to the competitiveness of the shipyards. Family reputation is important in the shipbuilding business. In addition, the visible and influential role of the firm's leader in the association and classification shipbuilding societies, and other distinctive characteristics of the leader are highlighted as important part of a shipyard's competitiveness that is also part of a yard's. Personal friendships matter in the world of business (Yeung, 1997) and reliance on personal trust and social circles are important within family business operations.

The level of trust and business goodwill play an important role in the shipbuilding industry. Commonly, personal relationships are preferred over cost-benefit factors, but this depends on the type of contract – government or private. Thus

> *"Many of the ship-owner in this area have been a very loyal customer since when my parents ran the company. Now that it's my turn, and they still came to us whenever they need assistance with ship project. I guess it's because the son of the region, you know?" [PVSY23]*

The business transaction that is built between the local family and the local businesses is based on interpersonal relations between two families that has long history in providing similar product/service in certain region. In Borneo, where PVSY23 is located, personal relationships are embedded in mutual sentiments which are developed into an important business strategy that plays an important role in the delivery of ship services. As stated:

> *"Ship maintenance is our bread and butter. I am just glad that the customer trust us and keep coming back even though there are many new shipyards established around here" [PVSY16]*

Moreover, it is important to explore the rarely discussed element of family embeddedness and the contribution this makes to the RBV and competitiveness. It was initially noted by Rogoff and Heck (2003) that family embeddedness helps create potential benefits for business creation. In the case of shipbuilding industry, factors such as the background of the firm's leader, is likely to influence customer decisions. The customer decision can also influence by the fact that, for example, the firm owner is the third-generation shipbuilder who was born and raised in the region where the shipyard is located.

The interviews suggested that the reputation of a firm's leader enhances *PBF* ability to persuade customers to select a shipyard based on the perceived attributes of what was identified in the interviews as a 'son of the region' effect. As a result, it contributes to the discussion centred on managing competitiveness through leadership, as shipyard's leaders plays a substantive role in winning ship orders. In this case, trust is the important factor and often a key value associated with the reputation of the shipyard owner. Miller and Le Breton-Miller (2003) argued that the '*…personification of the business helps to establish a virtuous circle in which good deeds are ascribed to personal (family or staff) intentions… so, much loyalty and commitment grow*' (p.131). Thus, shipyard PVSY11 confirmed this:

> "I know few shipyards in Java (Island) that move their operation to have better access to workers or to pay cheaper rent. But I can't really think of moving somewhere else. The benefit of being the *son of the region* is that we know the surrounding. In addition, people (workers) are very loyal to us because their family have been working for our family for more than two generations now."

Shipyard PVSY11 reflects the advantage of being *son of the region* because it originated from a close relationship amongst shipyards owner. PVSY11 have a better chance to win an order with a recognised local business partner. In brief, the *son of the region* reflects the embeddedness occurs between location and trust amongst shipyards owners that are rooted in a particular region. Therefore, strategic partnership amongst shipyards co-located in a region is not uncommon (explored further in Chapter 5). For family owned shipyards, location plays a very distinctive role related to the embeddedness of the owner or family in business and other forms of relationships. For other yards, location has other advantages that are more related to the location of the yard and the ability to benefit from government policy. Thus, this chapter provides many different ways in which location matters. This includes family embeddedness, the location to ports and concentrations of clients, the availability of incentives and the availability of localised inputs including labour. It is to the availability of local labour that we now turn our attention.

4.4.3.2. *Developing a reputation through training programmes*

The dynamic and competitive environment of the shipbuilding industry encourages firms to search for sustainability in their production processes through frequent incremental changes. It means that firms are not only challenged by their market position but constantly challenged by their competitors and that talent acquisition is essential. Training and development programmes within a shipyard - in this case, technical skills, leadership skills, and management skills - are essential for attracting skilled employees. During the interviews, it was noted that respondents believed that they contributed towards a project's goals by being able to apply their knowledge and skills fully. The explanation is as follow. Competence is important because it impacts on firm reputation and thus firm level competitiveness. In addition, private shipyards frequently provide in-house training, and predominantly recruited from vocational schools (to recruit skilful and certified welders), although a small percentage of welders were hired from welding subcontractors. One of the best vocational school is the *Shipbuilding Institute of Polytechnic Surabaya* is strategically located near the PAL shipyard. The importance of this institution towards shipyards competitiveness is explored in the Chapter 5 in particular with the role to support

local production networks. In contrast, state-owned shipyards regularly recruit university graduates with specialised training in naval architecture. This is due to in Indonesia, there are at least four state-owned universities that provides advanced naval architect degrees: *Sepuluh Nopember Institute of Technology* (ITS), *University of Indonesia* (UI), *Universitas Hasanuddin* (Unhas), and *Universitas Diponegoro* (Undip). The involvement of shipyard managers in the development of modules delivered by these universities was uncommon. Table 4.1 provides a summary of ways in which training and recruiting systems are organised differently between shipyards.

Table 4.1. Recruitment and Training between Private and State Shipyards

COMPETITIVE ELEMENT	**PRIVATE SHIPYARDS**	**STATE SHIPYARDS**
Recruitment	Mainly rely on vocational schools/colleges and training centres to access certified welders	Mainly hiring graduates from naval universities, followed by an apprenticeship programme within the shipyard and 'on the job' training
Training	Workers occasionally attend external training – paid by the firm	In-house training for technical and engineering is available
Retaining workers	More flexible in hire and fire	Less flexible in firing workers. In relation to the state obligation to create job opportunities

Private shipyards are more flexible in terms of '*hiring and firing'* ships construction workers (Table 4.1). Unlike the state-owned yards who bear the responsibility to retain all workers despite not having many orders, private shipyards do not face this challenge. They can be more flexible using subcontracted workers and this is reflected in better cash flows compared to state-owned shipyards. Conversely, state shipyards are sort of 'obligated' to retain workers even during the downtime period, i.e., not having ship project. On top of that, they also obligated to include all workers (including shop

floor welders) into the official employment system attached to health benefits, pensions, and regular training. Thus, one state-owned shipyard noted that:

> *"We are currently facing an over capacity. We cannot fire them even though there is a decline in the number of projects. As a state-owned enterprise, we have an obligation to give the opportunity for young workers and fresh graduates to train and involve them in the government ship project. That's why they called us the Agent of Development." [SOSY35]*

Nevertheless, the rigorous training provided by the state-owned shipyards produces a pool of shipbuilding experts. Over the years, their skills have become a benchmark and an example for other private shipyards. The state-owned yards have a reputation for being an '*agent of development'* in the shipbuilding industry, SOSY35 comments were echoed by SOSY07, a state-owned shipyard manager in Surabaya. Two representatives from state shipyard reported that:

> *"From a technical development and engineering support, we have an apprenticeship and an in-house training programme supported by the government, and this programme run under the department of strategic industry, which includes training and certification for welders. We send our welders to help develop their skills and refresh their existing knowledge." [SOSY31]*

Also,

> *"As an industry leader, it is not uncommon that our ex-managers are hired by private shipyards from across Indonesia. I think this is a good way to standardise shipbuilding knowledge and capability for shipyards in Indonesia." [SOSY07]*

To remain competitive, the management of internal resources is required to create new products, new services, new processes, and new routes to market. Herkema (2003) and Hansen (1999) recognised this process as the development of viable products and services, which relies on a firm's ability to generate new ideas. Both argues that there is a need to generate a learning approach that accommodates the exchange of complex tacit knowledge. In the shipbuilding case, new ideas were developed around increasing the efficiency of the delivery process:

"We have received two consecutive orders, one has been delivered last year (2016) and now the second one is in the construction process, we are planning to complete it by this year. This is why our track record is very important to us." [SOSY15]

A positive reputation for delivering military defence systems on time has become shipyard SOSY15 competitive strength. In this regard, finding and targeting specific markets is considered to be one of *PBF* competitive strengths. It allows shipyards to develop knowledge and capabilities to service a particular market, and thus provides a sustainable competitive advantage. More importantly, to be an effective system integrator, shipyards are required to work closely with ship owners to exchange information and knowledge and, in this case, location plays an important role. Referring to the resource-based theory of the firm, Wernerfelt (1984) and Eisenhardt (2002) also stated that tacit knowledge contributes to firms' competitive advantage, as the complexity to generate such knowledge is hard to imitate by others, although it is not straightforward to set the right conditions that enable knowledge sharing within a company.

4.5 TOWARDS A LOCATIONAL-BASED VIEW OF THE INDONESIAN SHIPBUILDING INDUSTRY

The decision to locate shipyards in Batam, Surabaya and Cilegon was motivated by the nature of the pooled local resources combined with the influence of government policy including tax benefits. The literature on clusters has focussed on how and why clusters emerge and function (Malmberg & Maskell, 2002; Keeble & Wilkinson, 2017) but the emergence and development of shipbuilding regions in Indonesia clearly requires a more complex explanation that includes processes of clustering. But, clustering is only one part of the process. In Surabaya, while the local interactions between the shipbuilding firms and non-firm actors are strong, the proximity with other industrial cities played a significant role in the development of this shipbuilding region. Thus, the place-based nature of shipyards is also closely related to the place-based nature of demand – the proximity of client demand. Secondly, the shipbuilding industry in this region was developed with a strong historical connection with the PAL establishment, education institutions, R&D facilities and design services mainly through co-production.

This is a more conventional account of a cluster, but it is a cluster that can be traced back to the establishment of one firm. In Batam, ship production resulted from the tax incentives programme; government policy stimulated the emergence of foreign direct investment from many Singaporean shipyards and shipping companies. This government effort to establish *Free Trade Zone* in Batam was critical in attracting Singapore firms to invest in Indonesia. But, here the location of Batam relative to Singapore was critical. Thus, for shipbuilding location matters and is critical for the competitiveness of a yard. Location includes access to component providers, access to large areas of cheap land, and access to adjacent ports. The Cilegon ship region is based on the extended ship-repair market from Jakarta in response to a need for local docking services. For example, for vessels that are regularly conducting loading and unloading activity in the major adjacent port. These different backgrounds influence the emergence of different shipbuilding regions across Indonesia and are important elements that explain the importance of location in project-based organising. Location plays an important role in the ways in which shipyards located in different regions benefit from their location, but these benefits are regionally differentiated. Thus, location provides access to the market, access to a supplier hub and supporting networks, a reduction in production costs due to the tax incentives programme, and enhanced reputation.

4.6 CONCLUSION

Indonesian shipyards often outsource more specialised work to specialised subcontractors and thus are highly dependent on interdependencies with other firms during the production process. The application of the RBV to understanding some dimensions of Indonesian shipyards highlights that ship products are not rare, and that the production process is too imitable. However, the competitiveness of shipyards lies in the configuration of production networks and there are important differences in the ways in which these networks are configured between shipyards (this will be further explored in Chapter 5). The types of activities conducted within the shipyards, as project-based organisations, requires particular skills and resources that differ from those found in more stable production organisations in which standard mass-produced products and services are undertaken.

It is important to distinguish the connections between networks members despite their origin or location as it facilitates a more nuanced articulation of power relationships. The project-based context of the shipbuilding industry adds an important additional dimension that is absent from the existing RBV analysis. While there has been growing attention paid to understanding the reputation of networks, much less attention has been paid to the factors influencing the development of local relationships in project-based networks. Local-based networks considered a key element to overcome project challenge which are mainly to complete a ship on time and efficiently. The chapter also discussed the importance of reputation that contribute to competitiveness. Reputations are important in two-ways. It is embedded to firms' but also to the individual leaders that is reflected in the trust-based relationships with ship buyers.

These intangible factors contribute to the development of competitive strength of the Indonesian shipbuilding industry and, for the *Son of the region*, location provides a key source of competitiveness, in addition to differentiation in the products and services offered. The relationship between individuals (firm's leader or the shipyard's owner) and its environment provide an opportunity to understand RBV from individual behaviour and stakeholders' perspective, which firms differ in how they can benefit from each reputation. However, those depending on the *Son of the region* relations for their individual identity, and institutional legitimacy, along with those who consistently serving local markets, are more likely to be perceived as having positive reputation. The problem with this view, however, is that it retains a vision of the *Son of the region* as managing their relationships with stakeholders or relatives, instead of clients. Indeed, understanding this engagement can keep firms to stay competitive due to better access to information provided by the local networks.

This chapter draws upon the work of the RBV, however it also added important differences. For the shipyards, competitiveness comes from a combination of a firm's internal resources but also their geographic location. This is to argue that a firm has two elements to its competitiveness. First, a set of intra-firm resources and assets and, second, advantages that lie beyond the firm that are directly and indirectly related to its location. The ability to compete in a project-based industry is partly about a firm's location, and it is the location that influences the types of services and products provided by the firm. In addition, to be successful in a project environment, not only must shipyards benefit from

government support such as tax benefits and repeat orders, but there also needs to be a focus on developing the expertise required for specific products/markets including the development of service capabilities that contribute to creating and maintaining a firm's positive reputation. In the shipbuilding industry, where firms are concentrated, and power is wielded by a small number of firms, there is the need to improve co-operation and local level governance, as resources for the creation of products and services mainly come from a firm's locality.

This is to highlight the importance of developing a locational-based view of the resource-based view of the firm. The focus of this chapter has been on exploring the structure of the Indonesian shipbuilding industry, but also to examine firms. It has become apparent, that it is important to place these firms in the context of what can be termed their local as well as global production networks or local/global commodity chains. The next chapter explores the shipyards local production networks.

5. CHAPTER FIVE

LOCAL PRODUCTION NETWORKS

AND THE COMPETITIVENESS OF INDONESIAN SHIPYARDS

5.1 INTRODUCTION

In the previous chapter, the location and firm-specific advantages of Indonesian shipyards were explored to provide an understanding of their competitiveness. In the shipbuilding industry, however, the majority of projects involve co-ordinating resources owned by many different firms. These types of networks have been discussed in the literature (Malmberg and Maskell, 2002; MacKinnon *et al*., 2002; Bunell and Coe, 2001, Hitt *et al*., 2016), but they pay little attention to how local production networks, including firms or non-firms institutions, contribute to firm competitiveness and, in particular, in project-based organisations. This chapter addresses this gap by exploring the ways in which local production networks are organised in the Indonesian shipbuilding industry. This study of shipbuilding explores the relationships between shipyards and non-firm institutions focussing on local proximity as one approach to reducing risks including uncertainty and of providing support for project-based activity. The study illustrates the relationship between firms' and their interactions to complete, deliver, and compete in a highly volatile market by utilising local resources.

The structure of the chapter as follow: The concept of Local Production Network is introduced, followed by the identification of the local processes conducted by the shipyards.

5.2 THE CONCEPT OF THE LOCAL PRODUCTION NETWORKS (LPN)

Shipyards are a core industry in some regions in Indonesia, especially in the major shipbuilding cities such as Surabaya, Jakarta, Cilegon, and Batam. In these cities, shipyards are critical local

economic actors who contribute to the local economy through their participation in local production networks. The shipyards engage in resource coordinating activities as part of their embeddedness in local networks. Embeddedness in the social science is described as 'the dependence of an individual, an organisation, on a set of relationships' with other firms and activities in its external environment (Jozsa, 2017). This concept originated in the field of sociology (Polanyi, 1944; Granovetter, 1985) with the concept applied to explore linkages between the behaviours of actors and their environment. Although within business and economic studies, Johannisson *et al.* (2002) noted that there are few attempts to conceptualise the process of embeddedness and, thus, its operationalization remains underdeveloped. Kramer and Diez (2012) also reinforced this point by noting that there is still an insufficient understanding of regional embeddedness between enterprises.

Moreover, in project-based operations where each project task is presented as a temporary activity, shipyards rely upon a network of project participants from multiple firms (Windeler and Sydow, 2001). The existing literature, however, predominantly views projects as homogeneous and interchangeable without internal structures or dynamics (Miterev *et al*., 2017). In addition, they are viewed as localised practices or specific processes or devices to deliver tasks (Lundin and Soderholm, 1995). Factors such as the external characteristics of a project task, are largely under-explored even though the necessity for routinised learning is needed to manage the one-off and non-repeating nature of these projects (Gann and Salter, 2000; Winch, 1997; Hobday, 2000). Therefore, the complexity and dynamics of the project environment are important elements to be understood (Locatelli et al., 2014) before exploring appropriate governance approaches and management tools.

The benefits of these networks are highlighted when the shipbuilding industry faces changes in the external environment, such as intensified competition, new market needs, and technological changes (Salavou *et al*., 2004; Gunasekaran *et al*., 2011). In the case of Indonesia,

when the maritime industry experienced increasing demand after 2015, there was still intense competition between domestic shipyards (be it private or state-owned) to win and complete shipbuilding orders. This behaviour resulted from the scarcity of shipbuilding projects in the recent past. Nevertheless, this competition much be placed within the overall context of the industry as (1) the majority of Indonesian shipyards were small and medium-sized private yards with limited resources, and (2) they to survive they had to simultaneously compete and cooperate with rival yards. It is important to identify how firms utilise local networks to compete with shipbuilding companies located in Indonesia but also to co-operate to deliver projects. This chapter identifies and explores the interconnections between the variety of local elements that constitute local production networks in the Indonesian shipbuilding industry and the contribution they make to firm competitiveness.

The concept of localised production networks continues to play an important role in the competitiveness of firms. This concept was first proposed by Porter (1990; 2000) who claimed that the interactions that occur between a firm and other co-located firms creates forms of cluster or agglomeration generating economic advantages. The nature of these interactions commonly resulted in knowledge spillovers and innovation, specialised local labour pools, access to technology and other resources that are characterised by a certain degree of rivalry. This rivalry amongst firms within a specific location, however, enhances firm-level competitiveness, which to Asheim *et al*. (2006) supports the argument that interactions take place vertically, horizontally, and diagonally across industries.

As a project-based organisation, a shipyard is required to interact and frequently negotiate with clients, suppliers, and other stakeholders to meet the highly customised nature of demand (Hobday, 1998). Moreover, in a multi-project environment, shipyards experience two challenges. They are competing through limited internal organisational resources (Engwall and Jebrant, 2003), and also on a wider perspective, a complex political landscape can

jeopardise the implementation of a firm's management practices (Bresnen *et al*., 2004). Table 5.1 shows the various risks attached to every order received by a shipyard. These are not only business-related risks, but also includes product, labour, and regulatory risks.

Table 5.1. Shipyards and the Project Risk Environment

Form	**Nature**	**Impact on actors**
Business risk	Unpredictable demand in markets (slow growth, competition from cheaper 'off the shelf' vessels from overseas)	Loss of competitive position and volatility
Product risk	Quality and safety considerations	Lack of standardised product
Labour risk	'Hire and fire' character of labour	Welders suppliers can't guarantee commitment to a specific shipyard
Regulatory risk	Changing policies towards shipbuilding industry and overlapped regulatory bodies (both local and international)	Classification societies, International Maritime Organisation, SOLAS.

Source: Author

The risks related to the production of ships are associated fluctuations in demand and competition from overseas shipyards. In addition, another challenge is the management of a project that involves overlapping chains of interactions between different types of activities around a shipyard. More importantly the yard must ensure that each construction stage complies with quality and safety requirements. These requirements also cover labour safety

during preparation and construction but also product testing and delivery. The temporary character of project-based work also affects labour availability, as the majority of welders required for peak production are not full-time employees. This task is often subcontracted. Lastly, the regulatory risks involved with the activities of overlapping regulatory bodies such local regulatory bodies (*Department of Transportation, Department of Industry*, Indonesian Classification Bureau (BKI), port authority or *Syah Bandar*), and international regulatory bodies (*International Maritime Organisation* (IMO)) and the regulatory product of it which is the *International Convention for the Safety of Life at Sea* (SOLAS). Each has different requirements and a set of conditions that need to be fulfilled during all production phases.

In relation to this, a network perspective is used to identify the external resources owned by other firms that are required to complete a ship project on time, on budget, and to specification. Going back to Granovetter's (1985) concept of embeddedness, it is through a set of relationships with a specific environment that a firm accumulates benefits. In recent developments, to harness localised knowledge and to achieve economic benefits, firms need to establish strong links with customers, suppliers, and other organisations, as part of a more complex localised social structure (Gulati *et al.,* 2000; Gertler, 2004). The economic performance of a firm should not be disassociated from the social world in which it is locally embedded.

Moreover, proximity dynamics between a firm and other (firm and non-firm) institutions produce strategic benefits based on the ability to capture locational advantages and to enable entrepreneurs to create opportunities (Steinle and Schiele, 2008; Malecki, 2010). Other authors refer to this as 'placial' embeddedness (Korsgaard *et al.,* 2015), which suggests that different environments enable different entrepreneurial activities, depending on the context in which they occur. Knoben and Oerlemans (2012), however, examined the links that ties economic

actors together through inter-organisational relationships or 'spatial' embeddedness as different sets of external actors must be accessed by a firm.

In some industries, like construction and shipbuilding, competitiveness can be translated into improvements in efficiency and the management of a number of projects. This type of project-based operations in the shipbuilding industry has not yet been incorporated into debates on the resource-based view of the firm to explain the competitiveness of project-based organisations (Gann and Salter, 2000; Barrett and Sexton, 2006; Thiry and Deguire, 2007). Taking this as a point of departure, the chapter investigates how locally embedded network relationships assist a shipyard to rapidly and flexibly adapt to changes in the external environment and to achieve competitive advantage.

5.3 UNDERSTANDING SHIPBUILDING *LPN*

The performance of a firm is enabled by the configuration of the networks of which it is apart. On the one hand, Gulati (1995) adopts a largely external perspective suggesting that participation in networks through interfirm linkages provides better access to partner resources. On the other hand, it is a specific network structure that influences the flow of resources, capabilities, and opportunities that help participating firms achieve their strategic objectives (Arya and Lin, 2007).

In the shipbuilding sector, the major challenge for the shipyard as a project-based firm is to be able to deliver a ship project to meet the client's requirement. It is therefore, project-based production networks that complements the shipyard's internal resources by allowing access to different external institutions that own superior resources or capabilities or capacities required by the lead shipyard coordinating the delivery of a project. Existing research has yet to empirically identify production network resources in project-based environments. This study of the Indonesian shipbuilding industry highlights that network resources involve firm and non-

firm actors, and that these resources are important for the development of new products or the increasing capability to deliver a product on time (Figure 5.1).

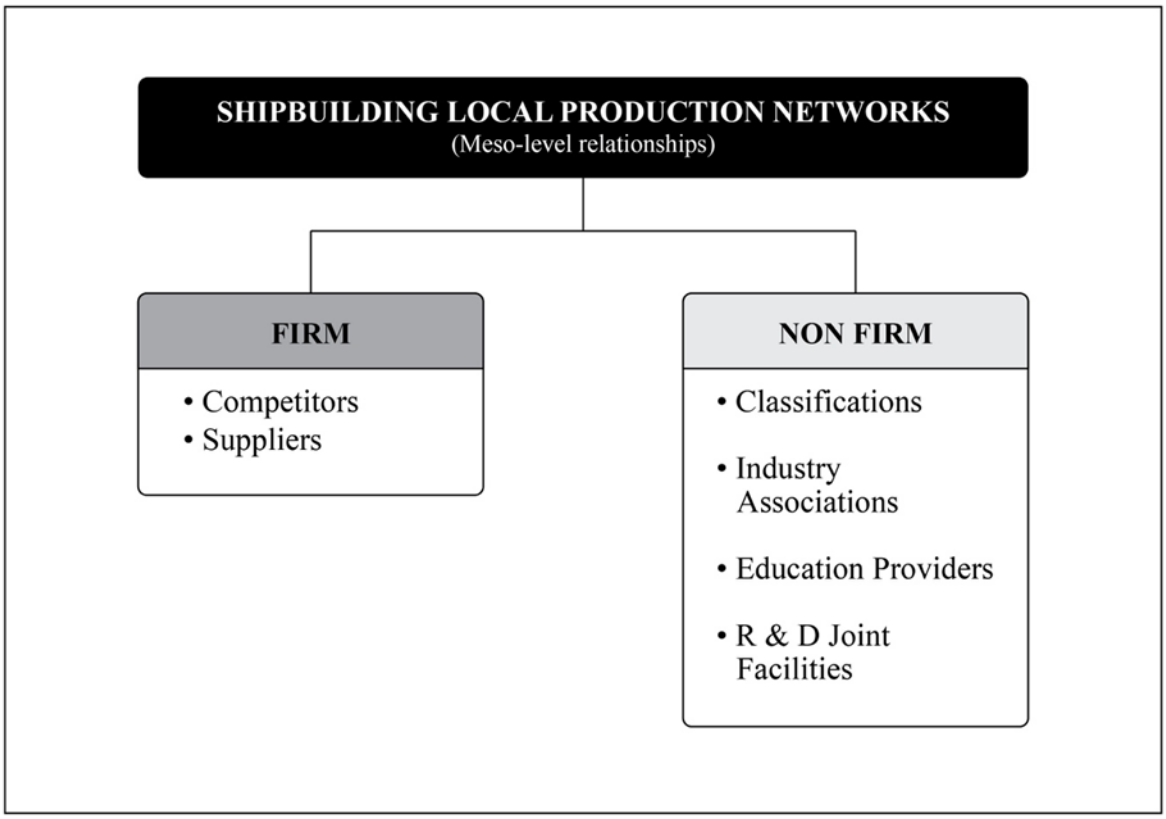

Figure 5.1 Firm and non-firm elements of shipbuilding production networks

Source: Author

Network resources complement a firm's internal resources in a way that firms are able to develop synergies with related competitors and non-competitor firms and non-firm institutions where knowledge sharing is essential (Staber, 2009). The next section examines the various forms of collaboration between shipyards and firm/non-firm actors in Indonesia.

5.4 THE ORGANISATION OF *LPN*

Network-based resources provide support for project-based organisations to adapt to market conditions. These resources are complementary to the individual and internal resources owned

by a firm. Yeung and Coe (2015) considered non-firm actors based upon their functional roles and impact on production networks. Institutions such as the state, standard-setting bodies, international organisations, certification agencies, industry associations, labour groups, and education providers play important non-firm roles to help shape production networks, and "*can have a bearing on production governance*" (Ponte and Sturgeon, 2014, p.215).

The identification of network elements and the type of combined activities that are conducted by the shipyards is shown in Figure 5.2. The interviews identified that the activities involving networks included (1) co-production, (2) resource sharing, and (3) collective purchasing (with competitor/firm actor), (4) subcontracting and training (with suppliers/firm actor), and (5) quality assurance (with classification society/non-firm actor).

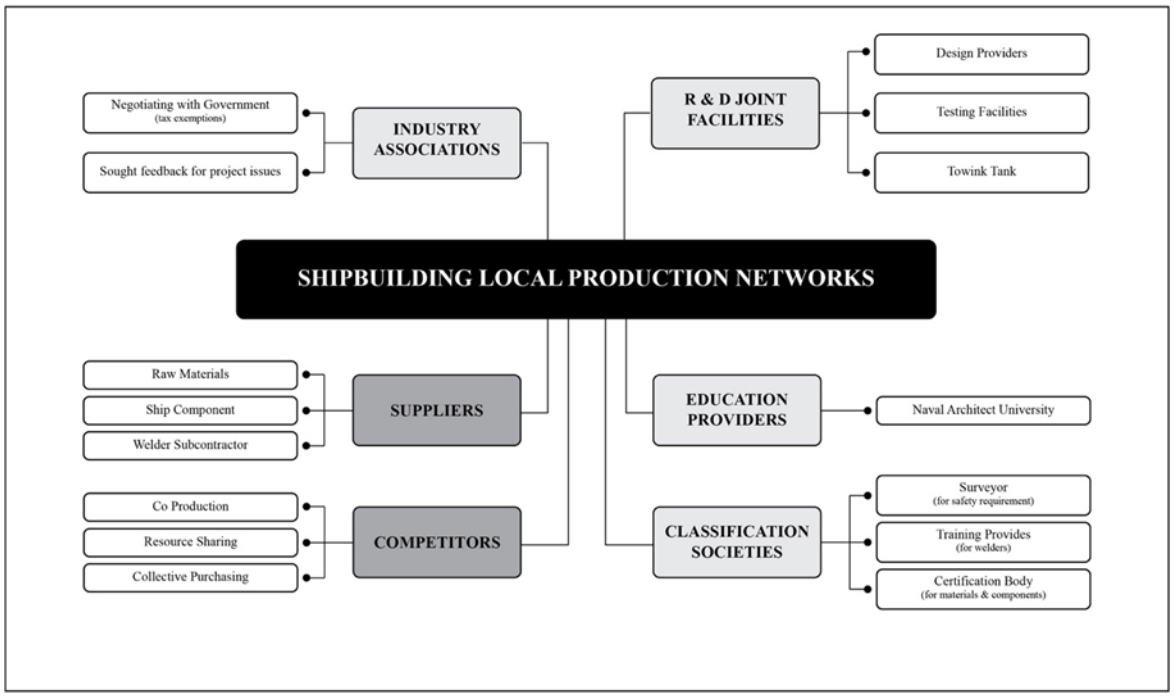

Figure 5.2 Local production network and the Indonesian shipbuilding industry

Source: Author

Figure 5.2 identifies two types of firms and four types of non-firm actors involved in shipbuilding projects. First, the non-firm actors are the R&D joint facilities located in one of the leading Indonesian shipbuilding regions, Surabaya. This includes the largest towing tank facility in South East Asia, the *Laboratory for Hydrodynamics Technology (LHI – Laboraturium Hydrodinamika Indonesia*), which was established and located within the Naval Engineering University (*ITS – Institute Tehnik Sepuluh Nopember*) complex in 1982 and is owned by the government. It has an extensive set of facilities ranging from a towing tank, a cavitation tunnel, a manoeuvring and ocean basin, and a number of workshops including a ship model workshop, a painting shop, a mechanical workshop, and model preparation shop. The facility has the expertise to conduct: (1) ship powering predictions (resistance test, propulsion test, and open water test), (2) manoeuvring (zig-zag test, tuning circle test), (3) offshore structure, and (4) numerical computation. Secondly, education providers such as *ITS*, was founded in 1957 and has a strong emphasis on scientific, engineering, and technological education and research for marine technology including naval architecture, marine engineering, and sea transportation engineering. The classification society, BKI (*Indonesian Classification Bureau*) was established in Indonesia in 1964. BKI remains the fourth largest classification agency in Asia (Abdullah et al., 2015) focussed on ships after those located in Japan, China, and Korea, and is the only national classification agency responsible for Indonesian flagged and foreign-flagged commercial vessels regularly operating in Indonesian waters. It classifies vessels based on hull construction, machinery, and electric installation, to evaluate the vessel's seaworthiness. This authority who issues the certification standard has the capacity to "*set standards*" in relation to assessing risk and safety and to "*enforce compliance*" (Scott, 2002, p.65). They are also responsible for managing the risks associated with the financial consequence should accidents occurs (Bennet, 2000; Billings, 2017).

Furthermore, the *Indonesian Shipbuilding and Offshore Association* (IPERINDO) is considered as the most important non-firm actor in the shipbuilding industry and will be explored first. As domestic and industrial associations were established in Indonesia, they began to play an important role to lobby government in an attempt to obtain economic benefits. In the shipbuilding sector, IPERINDO has played a central role in consolidating, consulting, and providing feedback to government from all shipyard members. It was established in 1960 when shipbuilding companies and ship components suppliers agreed to create an industry association to represent the combined interests of the Indonesian shipbuilding industry. Since then, IPERINDO has assisted shipyards to tackle major issues. On a large scale, IPERINDO takes a central position between shipyards and the government assisting the fragmented nature of the shipbuilding industry to consolidate their interests. For instance, in the past, the Indonesian shipbuilding industry was not the focus of government policy and merely benefited from policy initiatives. The central government was focusing on developing land and air modes of transportation. In recent years, IPERINDO had helped shipyards to negotiate tax exemptions and reductions, mainly import duties for ship components that are not yet produced or manufactured in Indonesia. This is one of the major issues facing the shipbuilding industry. Nevertheless, after the new President was elected in 2014, an initiative to develop the Indonesian maritime industry was proposed by the cabinet. Following this initiative, the proposal to reduce import tax was finally approved (Chapter 1). This chapter explores further the role of IPERINDO towards shipyard's competitive advantage.

Apart from engaging with public policy and negotiating with the government, these non-firm actors has played an important role in facilitating and forming joint production between shipyards. To Leick (2013) locally embedded relationships between firms and local institutions allows even '*micro businesses'* to compete in the marketplace (p. 79). IPERINDO encouraged new shipyards to form a consortium with more established shipyards when submitting tenders.

During the fieldwork (12 out of 30) shipyards suggested that if two or more firms cooperating to submit a bid, they are more likely to win a project.

Moreover, small and often family-run shipyards operating within a specific shipbuilding region have been sharing local resources such as land for fabrication and machinery. PVSY05, PVSY01 and PVSY33, for example, are shipyards which have developed positive reputation and are recognised by their local customers as consistently producing a product/service that corresponds to key criteria: cost, quality, and speed of delivery. It is through reputations that these shipyards attract local clients, which suggests that sharing resources contributes to increasing a firm's reputation, in winning tenders and enhances competitiveness.

In addition, IPERINDO encouraged shipyards to collaborate amongst themselves to communicate and to address project issues. The collaborations are commonly conducted around the construction stage of a ship and the interviewees highlighted the ability of inter-related firms in the shipbuilding industry to combine resources and expand their activities. The majority of shipyard respondents (80% are IPERINDO member) considered relationships with competitors, customers, suppliers, and government as important elements of their locally embedded production networks that drive competitiveness.

The next section explores the different processes shipyards are involved with that include co-located firms and non-firm actors.

5.4.1 Joint production

Competitors are the first element of a local production network and closely co-produce projects with other shipyards during the construction phase. A large number of geographically dispersed firms typically had a wide range of project issues, such as limited space for fabrication, long lead times for ship components, and limited physical resources. Many firms have collaborated with two or more local competitors on a long-term basis. The shipyards compete and cooperate

to enhance their competitive advantage. Representatives from the shipyards described the relationships between shipyards by highlighting that:

> *"We have been working together to build at least seventeen ships during the past five years. The majority of them are for the overseas market, such as Mexico, India, Nigeria, and Thailand. This intensive collaboration between us and DMN shipyard based upon their ability to produce ships efficiently, they are our preferred local partner."* [PVSY01]

> *"Our shipyard works together with PVSY08 due to their experience in building navigation ships, as we required this specific skill set. So far, we have built nine ships with them."* [PVSY09]

> "*They specialised in building aluminium-based vessels, therefore we chose them to partner when building the dredging vessel. They have the capability to build, but we own the design and we could provide after sales service based on the location of the ship operation*." [PVSY03]

> *"We had seven contracts with PAL. We built the first two vessels which are complicated superstructure. It was built, tested, commissioned, and berthing in Netherland before it was shipped to Indonesia. The others will then be modified and constructed by PAL. Seven models in total, two will be constructed in the Netherlands and the other five will be built under the supervision of PAL in Indonesia. That is how we transfer the know-how."* [PVSY44]

The above comments suggest that the relationships between firms' acts as a mechanism for co-production as well as knowledge adoption. Together as a group, shipyards address the specific problem of building complex structures, transferring construction know-how, and promoting collective ability to target overseas markets. Shipyards are aware of their limited resources and capability to deliver specific products or to target specific markets, and therefore, co-producing with competitors contribute towards winning contracts. More importantly, by combining the production, it enhances the speed of delivery and the quality of the ships. This empirical finding aligns with previous studies of network-based resources, which some authors (Dhanaraj and Parkhe, 2006) have considered are closely interlinked with a firm's competitiveness. The identification of IPERINDO as a non-firm actor brings together dispersed resources of network

members that create opportunities for resource sharing, collective purchasing, and joint production.

The source of competitiveness lies in a locally embedded collaboration mechanism and the ways in which firm-specific resources are transferred to help a partner shipyard deliver a project. This mechanism was not only found during the construction phase but also occurs during the project bidding phase in the form of joint tenders.

This shows greater network orientation for strategic collaboration in the stages of winning a project through to project completion. In an environment where tacit knowledge is paramount to a firm's competitiveness, this network plays an important role in facilitating cooperation. Shipyards that specialise in the fabrication of specialised vessels involving more advanced technology, for instance *Corvettes,* have greater advantages compared to those producing more general and standardised products such as Tankers or Tugboats. As discussed in Chapter 4, shipyards who distinguish themselves by focusing on building specialised vessels appear more competitive compared to those shipyards who only produce more general and standardised products. The example of joint production with PVSY44 helped this shipyard achieve reputation for building specialised product.

Nevertheless, there are concern raised by some of the shipyards who are unable to join the co-production. They believed that the opportunity to be involved in joint production was limited to firms located in Java, as according to them this is due to the majority of IPERINDO members have a strong presence in Java. Thus, co-location resulted in the closer relationship between these firms in Java only. They also had better access to information about upcoming projects. One firm noted that:

> *"There are many shipyards located in Borneo Island, but we're not really sharing anything here. We rarely meet and, unlike in Java, we don't discuss our issues with the competitor".* (PVSY32 - Owner of a private shipyard located in Borneo Island, also a member of IPERINDO)

From the interview, it was found that there are more than twenty shipyards located in Borneo however, only two shipyards were members of IPERINDO. Another firm stated that:

> *"I am not sure whether it's because we are non- IPERINDO member, but shipyards located outside Java Island almost never win government ship projects. You can see it all over the news, and it is always the same shipyards who won tenders'.* (PVSY22 - Operational Director of a shipyard, a non-member of the association)

These sentiments have echoed another interviewee who stated that:

> *"It was great to have a group of experienced shipyards who are passionate and willing to share their knowledge on delivering a complex project. However, it would have been better if there is an encouragement to co-produce with shipyards outside Java".* (PVSY34 - Project Manager, member of IPERINDO)

Generally, the co-production approach enables any scale of shipyards to adapt to volatile and highly competitive market conditions. However, the application of co-production has a different meaning for different scales of shipyards. In particular, for (1) small and newly established shipyards when competing to win tenders, (2) medium sized but for more established shipyards when they experience full capacity but are reluctant to refuse orders from loyal customers, (3) for large shipyards when completing ship projects for the overseas market, and the requirement for specific shipbuilding knowledge from more experienced shipyards.

5.4.2 Group purchasing

Group purchasing is typically occurring when firm faced with unprecedented challenges to control cost, to achieve significant savings, and to generate more efficient purchasing processes (Ebel *et al*., 2013; Nollet *et al.,* 2017). As the structure and objectives vary from one purchasing

group to another, various labels have been developed to describe purchasing groups, including: 'joint purchasing', 'purchasing consortiums', and 'collaborative purchasing' (Bakker *et al*., 2006; Schotanus and Telgen, 2007). Despite these different labels, the purpose of group purchasing is to benefit its member from the group's collective power. Although various elements of collective purchasing have been studied since the early 2000s, the influence of this approach on interfirm dynamics has been neglected (Schotanus and Telgen, 2007). In other industries, group purchasing is undertaken by an external firm or third-party organisation that is mostly used to negotiating contracts and for bidding (Nollet and Beaulieu, 2005). In this study of Indonesian shipbuilding, however, collective purchasing was identified as an activity that was conducted amongst shipyards without using a third-party provider.

This negotiation process in the shipbuilding industry follows a cooperative approach, as follow. Members of the group will first put a request forward regarding procurement processes needed to be made collectively by the purchasing group. They then identify a homogenous product, i.e., procuring the main engines as one of the critical components within the vessel. Once the required equipment/components are agreed (including the detailed specifications), a member of the group is identified and appointed to negotiate with the supplier. This negotiator is usually a representative from one of the more experienced shipyards. The mandates are given by group voting or sometimes by IPERINDO acting as a facilitator. Some of the main motivations for purchasing ship component collectively between shipyards are highlighted by firms as follows:

> *"The idea to collectively purchase a critical component was initially proposed by the industry association. We agree as we have the experience where our* ***bargaining position*** *was initially very* ***weak*** *if only purchase one or two units of the main engine.* ***Big suppliers are reluctant to negotiate*** *the price and the delivery time. [PVSY03]"*
>
> *"We just want to make sure that all the state vessels are using* ***standardised components*** *as it will be much* ***cheaper to maintain*** *when it comes from a single source. Another reason is to make the* ***selection***

> ***process*** *more* ***efficient and quicker*** *so that we don't have to assess each supplier for each ship project. The Department of Sea Transportation is currently building twenty ships. By making an integrated system to determine the quality of the component along with the supplier's reputation, this can be huge cost saving." [PVSY14]*

Firms sought to enhance their bargaining position through collaborative group purchasing. In this instance, both cases describe how a fragmented group of shipyards needed to consolidate their interests to address project issues concerning procuring critical components. As a result, the firms agreed to collectively submit orders for ship engines. The implementation of this strategic process leads to an improvement in the group's bargaining position compared to the engine supplier when ordering critical components. This approach works to bring together firms within the network to address the difficulty of 'lead times' and the order of a single engine. Group buying is not just about price savings but also about delivery times. This finding supports Kogut (2000) by recognising the importance of an effective coordination mechanism in managing network knowledge flows. Although this mechanism is useful in shortening lead times for components but only 25% of the interviewed shipyards engaged in the joint purchasing of critical components.

From the perspective of project-based organisations, collective purchasing is developed when shipyards are competing on speed of delivery. One of the major issues during the construction of a ship is the lead time of imported components. This can be up to six months. The shipyard respondents suggested that, even though not many savings could be generated from collective purchasing but lead times could be negotiated and reduced to three months. In an industry where speed of project delivery is an important factor, this approach has contributed to the ways in which shipyards compete with foreign and local competitors. Indonesian shipyards are not only pressured by local competition but also by global shipbuilders located across Asia in China, Japan, and Korea. These major shipbuilding countries currently dominate the global

shipbuilding market by rapidly producing vessels on a large scale. They are able to produce standardised vessels with lower costs and with rapid delivery times. The manufacture of one-off, bespoke, complex vessels plays an important role for Indonesian shipyards as they try to compete in a niche market by building specialised vessels. However, this is not a stable market. Collectively purchasing critical components contributes to speeding up production processes and project delivery for Indonesian shipyards. The delivery of bespoke products and services reflects an alteration in organisational routines which enhance shipyard survival and competitiveness. A critical organisational routine has been the development of collective purchasing. In this context, it is worth noting that the demand for engines implies that the maritime engine builders have established relationships with the larger yards. The larger yards come firm. The collective purchasing agreements allow smaller Indonesian shipyards to access engines by using size of order to compete for the attention of the engine manufacturers.

In this study, interviewees described a competitor as being part of their local production network, where a process of cooperating helps shipyards overcome some of the problems related to the purchase of critical components. Coordinating purchasing activity at the network level provides multiple benefits for participating firms. It involves the development and implementation of better practices within participating organisations during the planning stages, and it addresses problems of how to overcome late delivery of essential components from overseas suppliers. Hence, firms participating in collective buying contribute to enhancing firm-level competitiveness through a process of cooperation with competitors.

5.4.3 Resource sharing

This section explores the agreements between shipyards to share tangible (equipment, fabrication area) and intangible (reputation, consortium) resources. Resource sharing was embedded in local informal and formal partnerships involving different stages of production,

namely: project commencement, the construction phase, and after-sales service, depending on the role of extra-firm actors within each project stage.

The interviewees suggested that competitors, as firm actors, had improved their productivity by promoting the efficiency of predictive planning and scheduling. Due to the amount of work and unexpected uncertainties that caused work delays, geographical proximity between the shipyards and other co-located yards contributed to providing a solution to resource-constraints experienced by a shipyard. Coe and Yeung (2015, p.51) suggested that this type of strategy involved "*a two-way process of negotiation and accommodation between firms in the interest of creating mutually satisfactory outcomes based upon the enhancement of value capture within networks"*. This shared interest in achieving competitiveness by both a firm and its competitors is manifested in different forms of collaborations, which extend to the coordination platform for local stakeholders. Thus,

> *"We had one experience where we* ***ran behind the schedule*** *which* ***costs us a fortune****, always try to avoid* ***paying the penalty****. So, we decided to find shipyard around the city who has the spare capacity and could share to build the blocks. We managed to find one, and they handled it back to our shipyards when it is ready for the erection stage."* [PVSY08]

> *"To own a steel cutting machine is a* ***considerable investment****. Here in Cilegon, we do have a cutting facility owned by one of the shipyards, which any shipyards around here can use and* ***share the equipment****. It has been very helpful for us as we don't have to invest that massive amount of money."* [PVSY32]

> *"We were collaborating with PTR to* ***submit a tender****. At that time, our yard had full capacity, but the industry association has encouraged us to help new shipyards to win the government order. Put it this way, they have the space but not the experience to work on state vessels. Whilst we, on the other hand, had the experience but we have* ***limited physical resources****. What we did was safeguard them to win the orders."* [PVSY47]

In a shipbuilding project, managing the panel block shop is considered to be a complicated process. A panel block is a production stage involving the assembly of large plates by seam welding to create a panel block. This process entails the most substantial amount of work and involves overlapping decisions coming from production planners and supervisors (Lee *et al*., 2009). Therefore, when shipyards obtain several orders at the same time, it is common to expand the shipyard facilities and development. However, this practice involves investing considerable amounts of capital in buying equipment or expanding facilities and is considered to be inefficient and risky. Shipyards confirmed that they overcame bottlenecks in the ship construction process by managing and balancing workloads by and sharing facilities with co-located shipyards with spare capacity.

From a project perspective, firms are reluctant to invest large amounts of capital to expand due to the uncertainty of project-based work and, in particular, the uncertainty of demand. A collaborative approach not only stimulates shipyards to strategically cooperate with competitors to deliver projects but also increased their attractiveness to be selected as strategic partner for future projects. These resource sharing activities reconfigured local production networks in the Indonesian shipbuilding industry, especially for shipyards who had for years become used to '*work in a silo*'. Furthermore, shipyards participating in these sharing arrangements have become more open and willing to share physical resources and tacit knowledge with one another.

This argument aligns with Leick (2013) on how local production networks contribute to the competitiveness of firms in a mature industry. Some of the shipyard respondents, however, commented that they do not feel involved in the local network as they are not a member of the shipbuilding industry association. They felt excluded from the so-called 'growing domestic demand' to build state vessels. Some of the interviewees even stated that they always struggle on their own to deliver a project, instead of being included in cooperative relationships with

other shipyards. This sometimes means that with limited internal resources, they can focus only on building ships for the private sector or on the ship repair market. They are less exposed to process that can facilitate any upgrade in the skill base of their yards. In addition, these non-member firms considered that they don't share common values which resulted in a lack of trust regarding the benefits of localised production networks. A lack of sufficient network benefits and mistrust prevents many shipyards from using network-based resources to enhance their competitive advantage. Thus, membership of the association is critical but as is location.

Further important example of resource sharing in the shipbuilding sector, however, has yet to be explored. This involves the sharing of intangible resource, i.e., a firm's reputation. Shipyards, as project construction firms, trade on their reputations that are created based on previous performance. Constructing complex products requires the mobilisation and management of a wide range of capabilities. It is common practice for project-based firms to combine technical expertise with other firms to deliver a project (Gann and Salter, 2000). For example, the collaboration between PVSY19 (a less experiences shipyard) and PVSY47 (a more experience shipyard), led to the award of a contract to build a ship for the Indonesian government. Due to PVSY47 expertise and experience in ship design and their previous experience of buildings and delivering vessels commissioned by the government, this partnership positioned PVSY19 as a dominant actor providing expertise in ship design and in guiding through the tendering process. Although a reputation for technical expertise is often a key component in the formation of project teams (Gann and Salter, 2000), shipyards, however, also take location into consideration when selecting partners. Target partners tended to be shipyards located nearby or within the same region in order to share the construction stage (building blocks) and to share physical facilities. This location factor is particularly important in contributing to a reduction in the operating costs associated with project surveying and monitoring.

In the construction industry, partnering helps to achieve mutual benefits amongst contracting parties (Wong and Cheung, 2004). Not only does this foster a new culture in construction projects, but also contributes to the adoption of project implementation strategies that come from more established partners. In addition, collaboration between shipyards in Indonesia can also be treated as part of a trust-based agreement facilitating effective problem solving for those involved parties - clients, contractors, and consultants.

5.4.4 Joint training

Fluctuating demands and intense time pressures during the construction of a vessel are often characteristics of shipbuilding projects in a volatile environment. Previous studies have argued (Van Marrewijk *et al*., 2008; Gann and Salter, 2000) that the complexity of inter-organisational projects has increased due to the number of project partners involved and the interdependencies between them. Other forms of collaboration are also found between shipyards and suppliers; partnering with suppliers is increasingly used as a means to improve firm performance (Dubois and Gadde, 2000). In the practice of shipbuilding, however, outsourcing parts of a project to subcontractors is a common practice to resolve shorter production cycles and to deal with greater technical complexity. In addition, increased outsourcing was also driven by the need for cost reduction caused by project demand and price competition in the global shipbuilding market (Ruuska *et al*., 2013).

Subcontracting has been regarded by shipyards as an important source of competitiveness and efficiency in the shipbuilding industry. It refers to the situation where a firm is offered a subcontract by another firm to sub-assembly components, parts, or materials (Kimura, 2002; Chukwunweike *et al*., 2015). It is interesting to point out that in other industries, such as the automotive industry, subcontracting decisions usually reflect an asymmetric relationship (Kawasaki, 1998) where "*a large firm asks a small firm to conduct a commissioned work*

(producing parts, components, or finished products) under a dominant position" (p.38). On the one hand, Indonesian shipyards as project owner are often relatively small firms compared to the subcontract providers, i.e., engine makers. Ship engine makers operate globally such as MAN, Deutz, and Yanmar, are some of the supplier firms that are much larger compared to the Indonesian shipyards that are acting as the 'lead firm'. These major suppliers are not only selling components to the shipyards but offer training to enable the yards to apply and maintain the equipment.

On the other hand, some of the welder subcontractors are smaller firms compared to the shipyards. This relationship provides shipyards with the ability to enter project-based contracts with welders in which the welders provide services on a project-by-project basis. This mechanism provides shipyards with more flexibility. Thus, one shipyard noted that:

"*We are relying on **local welders** to build the steel-based work, although we closely supervised them to produce a certain degree of steel quality. **Extensive training** is much needed too, as this is not a regular commercial ship. It needs a specific knowledge and training to be able to complete this Corvette project.*" [PVSY44 – private shipyard]

This provides shipyards with flexibility in accessing human-resources and avoids a shipyard having to 'hire and fire' welders. However, this relationship is problematic as the *hiring and firing* are passed down to the welding subcontractors. Shipbuilding is a highly labour-intensive activity involving thousands of workers during a period of peck fabrication and this includes welders to marine engineers. Given the project-based nature of a ship project, it is common for shipyards to employ welding subcontractors on a temporary contract. In this case, shipyard workers (welders, fitters, and operators) receive a contract that specifies the provision of tasks during the duration of a ship fabrication project. This contract may or may not be renewed depending on the ability of the shipyards to win further ship projects. This flexibility brings advantage for the shipyard as during the downtime they are not obligated to retain all workers.

Nevertheless, this subcontract became an obstacle during peak times, as the welder's availability cannot be guaranteed when shipyard receive unexpected orders.

Subcontract relationships are not only found in the form of governing flows of raw materials, or in the form of subcontracting welders. Instead, subcontract welding companies help organise training within the industry which is also monitored by the classification society. This training often involves the use of critical equipment and maintenance. Given the importance of regulations and safety in shipbuilding and all transportation industries, welders must demonstrate their ability to perform standard operating procedures for specific tasks. For example, welds must be completed by certified welders certified to undertake specific welding procedures. The specific qualifications of certified welders are determined by the classification society (Brun and Frederick, 2017), which requires welders to perform visual examinations and non-destructive testing (NDT). Shipyards collaborate with suppliers and subcontractors to provide training and to obtain class-metered components. Thus, one interviewee noted that:

"When it comes to choosing components, we always try to consider local products first. For example, we currently need quite a few anchor windlasses, and there is only one Indonesian company who can build that, which we always order from them. However, now as ship demand is growing drastically, they couldn't handle all orders from the shipyards. So, we tried to find other manufacture with a similar product and work alongside them to develop the product that we need." [PVSY12]

This example from the shipbuilding industry suggests that project pressures such as time and long lead times from overseas suppliers encourages cooperation and networking amongst local firm actors (shipyard and supplier's company) to develop. Moreover, on the account of the common problems project-based firms share, shipyards and their suppliers are able to work together to enhance the competitiveness of each partner. They can do this through networking between companies. This again supports existing approaches to production subcontracting

(Holl, 2008; Chukwunweike *et al*., 2015) which emphasises collaboration initiatives to develop the skills-base of suppliers.

5.4.5 Quality control

Another element of the shipbuilding local production networks is the role played by the *Indonesian Classification Bureau* (BKI), which is a formal certification agency. In the area of safety assessment, BKI is a vital instrument in shipbuilding projects, as they provide guidelines and evaluations regarding the design of a ship and its construction. The guidelines from the BKI consist of an appropriate code of conduct that needs to be adopted by the shipyards to comply with safety standards, including approved ship design and services used during the project's production and completion. Shipyards must submit the design and installation planning of the upcoming project to the classification agency for approval. This can be a local or international classification agency depending on the needs and location of the client and also where the completed ship will be based. Ship construction cannot commence without the approved documentation from a classification agency. Following the assessment framework proposed by the *UK MCA* (Maritime and Coastguard Agency, or previously Marine Safety Agency), a formal safety assessment should meet the following criteria: (1) the identification of hazards, (2) the assessment of risks associated with those hazards, (3) the identification of risk management, (4) the assessment of cost-benefit options, (5) the recommendation of options that are selected. This framework was initially identified by the IMO (International Maritime Organisation) in 1993, and agreed in 1996 (Wang, 2001). Nevertheless, collisions caused by technical issue are still occurs in Indonesian waters. According to data from the *General Directorate of Sea Connectivity*, 548 ship collisions occurred from 2007 to 2010 (Government report, 2010). The interviewees acknowledged that there was much more involvement needed in regulating shipbuilding construction, as at the moment not all kinds of vessels needed to be approved by the classification society.

The importance of Classification Societies as surveyor was highlighted by the interviewees as follows:

> "*Once we won the ship project, we (shipyard and ship owner) then appointed classification* ***to assess all aspect of ship construction*** *from the material to the progress of the construction, even the ship design. For the material, all critical materials such as steel plate, ship engine, the piping system have to be* ***class-metered****. All of the material apart from the interior or any aesthetical element has to be* ***approved and certified*** *by class*." [SOSY15]

> "*It is excellent that BKI (Indonesian classification society) has initiated to create* ***standardisation for welders' competence.*** *They even established the Indonesian Welders Academy with* ***a reliable grading system****. This certification has been useful when submitting a tender, there are certain rule and requirement needs to be followed with regards to welders' competence*." [PVSY41]

BKI had come together with both government bodies (Department of Industry) as well as the industry association to provide training and marketing initiatives. BKI had undertaken key initiatives to develop joint training for shipyard welders, including subcontracted welders, which takes place every year and is located in different shipyards each year. In this case, BKI encourages the yards to provide the training from one location but open to all. Shipyard like PVSY05, PVSY01, and PVST47 are some of the shipyards that have to provide training facilities over the past three years. Joint training started amongst firms involved in the grading system to provide access for welders to training so that they could upgrade their certification.

A key challenge facing collaboration between shipyards, however, includes a lack of implementation throughout all Indonesian shipyards. A few respondents reported that shipyards outside the shipbuilding provinces and non-members of IPERINDO had no access to such training and currently are not involved in these collaborative efforts. One respondent put it:

> "Joint training programs always seem to be taking places across the big players. As it is part of central government program, they should have been reaching out to smaller yards too, be it member or non-member of the association" (PVSY14)

Another firm noted that

> "We couldn't afford to send our welders to join the training in Java, there are lots of jobs to do here" (PVSY27).

These barriers mostly apply to non-members of IPERINDO, particularly smaller shipyards located outside the main island of Java, where all government administrative planning is undertaken. The great distances between the smaller yards, that were often not -members of IPERINDO as they were located outside the shipbuilding cities, and the training providers limited welders' access and participation in initiatives intended to upgrade their skills.

Knowledge-driven adaptations, therefore, rest on both firm and non-firm collaborative partners, including the classification societies as a quality-oriented institution. Firms seek to standardise their capabilities with more established firms through cooperating closely with the classification agencies. There are moreover examples of knowledge-intensive collaboration across the shipbuilding industry such as R&D and testing facilities located in Surabaya, and the shipbuilding industry association. These local non-firm institutions are involved in intensive and long-term network relations within the shipbuilding industry and also in other supporting (steel and component) industries.

One lesson that can be learned from the operation of shipbuilding networks in Indonesia is that public policy should be targeted at this industry. Not only to offer financial assistance, but to incorporate non-industrial firms such as design providers and other R&D related facilities as part of a sub-network within the local shipbuilding production system. This type of mechanism provides a means and support to address issues of limited capacity during the completion of a

shipbuilding project. As for quality assurance, having a university-educated or internationally certified workforce increases a firm's ability to not only complete a ship construction project but also to manage the project, but also to win projects. Furthermore, the experience of the firms' leadership suggests that reputation is partly developed by employing people who had been educated at a prestigious naval university or had experience of having worked in foreign and more advanced shipyards (academic and professional). Such factors contribute to the ability of a yard to develop trust with clients and suppliers and to win projects.

5.5 CONCLUSION

Due to internal resource constraints, shipyards benefit from using network resources that contribute to project delivery, such as: on-time delivery, to budget, and as per owner requirements. It is by working together with suppliers including providers of welding services that ships can be co-produced through a process based on sharing resources with competitors, by subcontracting and by working together with supporting institutions.

The chapter explores the ways in which ship production is organised as well as the role of firm and non-firm actors towards shipyard competitiveness. More importantly, it focuses on the ways in which firms develop competitiveness through cooperation. The empirical analysis identified the relationship between firms and competitors, suppliers, and the classification society that enhances competitiveness. Joint production with competitors enabled shipyards, mainly small and medium sized yards, to compete with larger and more experienced shipyards. Forming a consortium and collaboratively submitting a tender to build a ship increases the opportunity to win a project. Collective purchasing amongst shipyards has been used to negotiate better access as well as to reduce the cost of critical components and to reduce delivery times. Resource sharing provides firms with additional flexibility when faced with

(physical) capacity constraints. In a project environment with a high level of uncertainty, the willingness to share resources becomes a critical success factor for both shipyards involved.

Another form of collaboration is between shipyard and suppliers in the area of weld training and improving supplier capability through supplier development schemes. More importantly, the supplier development scheme has been able to increase the local content required for domestic ship projects. Lastly, working alongside the classification society has benefits for both shipyard (through improving welding skills) and suppliers (through to the standardisation of ship component).

Network-based resources make a significant contribution to shipbuilding production networks. This study contributes to the growing body of literature linking local production network, resource-based approaches and firm competitiveness, by providing the *LPN* framework for understanding how firms form local strategic networks to contribute to their organisational capability. It helps firms hedge against the risks related to production bottlenecks as well as reducing project costs.

Viewed from a resource-based approach, the empirical analysis suggests that each form of local networks is generating resources that are not easily imitated or substituted as the resources are accessed locally based on various forms of local embeddedness. Some of this embeddedness has been facilitated by non-firms or extra-firms and some is in response to foreign competition. For shipbuilding firms their involvement in local production networks depends on the firm location and on the type of project. The analysis suggests that network-based resources not only take time to build, but also highlights the difficulties involved in sharing intangibles including another firm's reputation. Thus, a firm's project management systems, combined with a strong network presence, creates a set of complementary resources that are not easily matched by rival shipyards. A critical element is the location of the yard in relation to client

demand, but also the location relative to co-located resources. The analysis also informs the debate on how companies combine resources using networks to enhance individual competitiveness. It is one of the first studies to provide an empirical analysis of the shipbuilding industry and the ways in which local production networks contribute to competitiveness of Indonesian shipyards. Shipyards must respond rapidly in a volatile shipbuilding market and benefiting from engagement with a local production network plays a key role in this process. In the shipbuilding industry, the economic performance of the shipyard could not be disassociated from the social world in which it is embedded. Embeddedness between the shipyard and other actors in the local production network enabled them to combine resources, resulting in network-based competitiveness.

6. CHAPTER SIX

THE ORGANISATION OF INDONESIAN SHIP PRODUCTION:

DOMESTIC MARKET-ORIENTED PRODUCTION AND LOCAL AND GLOBAL PRODUCTION NETWORKS

6.1 INTRODUCTION

Previous studies of production networks, based on studies of various industry, have revealed the role global networks play in the development of a firm's capabilities contributing to competitive advantage. In the previous chapter, however, the analysis of the Indonesian shipbuilding industry highlighted the importance of *local production networks* (LPN). The purpose of this chapter is to develop an understanding of the shipbuilding *Global Production Networks* (GPN). Both local and global production networks are involved during the production of ships, therefore it is important to explore the ways in which they interact and contribute to the success of the shipbuilding project.

GPN is essential as it defines the relationships needed with key foreign suppliers that provide critical *hi-tech* or more technology-intensive components required to complete a ship project. LPN, such as firm-state relationships, the activities of local non-firm actors, and local suppliers however, are as important as these provide critical local inputs including a supportive business environment that includes tax incentives, financial support, and supportive policies. The Indonesian government as a non-firm actor, to some extent, has played an important role in increasing the size of the domestic ship market since 2014. It is important to point out that some of the strategies intended to consolidate local and global resources have led to different ways which shipyard are engaged with networks. Shipbuilding production networks configured to meet the precise requirements of a ship project.

In doing so, this chapter explores the inter-linkages between local and non-local production networks that includes various kinds of governmental actors, managers, and a variety of regulatory bodies and

accreditors. The focus is on exploring production networks in the Indonesian shipbuilding industry and to consider their implication for firm competitiveness.

6.2 LOCAL PRODUCTION NETWORKS AND INDONESIAN SHIPBUILDING

The growth in domestic demand was a critical condition for most Indonesian shipyards as they had to learn quickly, adapt, and manage a more efficient production process to deliver more ship projects for local clients– productivity had to be increased. Local collaborative strategies and initiatives tended to be concentrated in certain areas, such as combining both tangible (labour and land) and intangible (expertise and reputation) resources to better facilitate the production of a ship project. The existence of different types of shipyard did not narrow the scope of ship building projects; instead, the heterogeneity of yards increased Indonesian's ability to compete. Although the productivity of the majority of shipyards had been previously low, some yards were willing to 'team up' and join a consortium which included more established shipyards to win and construct vessels. This approach enabled small and medium-sized shipyards to 'size up' without further capital investment by acquiring and accessing land and recruiting more labor. Secondly, small and medium-sized yards concentrated on manufacturing diverse ship products targeting various industries instead of fabricating the type of standardized medium-sized vessels required by the Indonesian government. These products met the basic needs of newly established and smaller scale client businesses requiring leisure boats and fishing vessels. Although these locally focused shipyards took advantage of local conditions to expand their markets, they still encountered substantial technological gaps compared to the more globally orientated and larger Indonesian shipyards that had focused predominantly on exports. These more globally-orientated yards obtained technological assistance from global buyers or ship-owners. To access technical support, the shipyards developed relationships with state-owned research facilities, for example *PAL* and *LHI* within the Surabaya regions (Chapter 5).

Surabaya, Cilegon, and Jakarta as shipbuilding regions located outside the *Free Trade Zone* (FTZ) area have developed a production pattern based on domestic market-orientated production. An increase in capability occurred subsequently in the form of product diversification, improvement, and enhancement.

These yards not only competed to win tenders for ships issued by the Indonesian government, but local shipyard in this area also managed to introduce other ship models to their range to satisfy the demands of various industries including tourism and fisheries. This led to a market expansion from the production of standardised products such as patrol boats and navigation vessels to some more niche markets. The rapid growth of the shipbuilding industry was led by a small group of competitive local firms rather than dominated by the state-owned shipyards, as happened before 2014. These key firms are located in Jakarta, Cilegon, and Surabaya.

Figure 6.1 Map of Java Island

Source: Author

Shipyards were competing by proactively synthesizing these advantages to develop a strong partnership with local collaborators, as well as foreign firms, to access ship components, materials, technologies, and product licenses at different stages of the shipbuilding process. Shipyards managed to survive and compete by accessing sufficient resources by constructing or developing local production networks. Three examples of collaboration between local production network in three areas of Jakarta, Cilegon, and Surabaya will now be explored.

Two small shipyards located in Jakarta (near the Tanjung Priok port) that specialized in building 20m vessels, tended to combine their resources and capabilities around shared interests. These yards combined their resources to ‘size up' prior to trying to win contracts to fabricate larger ships. The focus was on collaboration based on sharing common purpose facilities between co-located shipyards; one shipyard may have the expertise in the area of design and project management, whilst the other in the

procurement of materials. For example, to procure standard type or ‘off the shelf' vessels can draw on previous ship projects, however, it still requires detailed and informed decisions before procuring materials. On the one hand, some large yards would have more experience to deal with procuring a wide variety of components for defense or government support vessels. Some shipyards, on the other hand, may not have the capability (the knowledge nor the experience) to construct this type of complex ship, which encourages them to integrate their procurement process with another local shipyard.

It is worth noting that ship construction requires the procurement, fabrication and assembly of many components and often more components that are required to complete an airplane. This is not to imply that the production of a ship is a more complex engineering project, but ships are more project-based orientated products compared to aircrafts as each is constructed to meet the precise needs of a client. Procuring all the components required complicates the process of delivering a ship project. Hence, ‘sizing up' with a local competitor facilitated this process and especially the procurement of critical components, for example, a ship’s engine or propulsion unit. On the other hand, project management capabilities are also critical as, unlike other industries, the processes of engineering, design, planning, procuring, and constructing occur simultaneously. In addition, a ship’s owner and the engineering team often try to improve the preliminary design by making changes once a drawing has been agreed. This may lead to an increase in production costs. A shipyard cannot work in isolation; the ability to manage change in a dynamic environment is an important requirement as this simplifies the complexity of a shipbuilding project. The different types of inputs required to construct a vessel results in the assembly of expertise and inputs from co-located firms by the lead yard. Thus, a core element of a shipyard is a process of local strategic coupling with co-located firms, and this local coupling takes many forms including sharing technical expertise through combining to bid for tenders, but also the management of coordinated procurement as part of a process that links local shipyards with global supply chains.

As for the Cilegon region, shifting to the construction of domestic and more specialised ships was a strategic decision for the shipyards located in this region. They were experiencing a decline in global market demand, but domestic demand, combined with local requirements that more suited their capabilities, enabled them to maintain their businesses and to continue to maintain their large

workforces. For instance, PVSY34 was a forerunner of this strategy and became one of the most successful shipyards to produce a *Catamaran* type of vessel. This yard then extended its activities by obtaining subcontracts from many Singaporean based shipyards. Based on the fabrication of competitive products, PVSY34 began to export ships to international markets such as Hong Kong, Timor Leste, and Australia. This eventually contributed up to 30% of the yard's production, with a total value of USD$ 300,000 per vessel. With this core specialisation, PVSY34 was able to expand their business and to establish an Indonesian-based steel structure manufacturer. This steel fabricating company is located between the shipyard and the Krakatau Steel works, the largest steel producer in Indonesia (state-owned).

The development of this *LPN* reflects a series of drivers and relationships (Figure 6.2). It is important to note that an *LPN* is one element within a GPN. For all production networks, it is important to identify the primary driver behind the creation of a particular approach to the development of an operational solution for the production of a product. Thus, for some firms their perspective is more globally orientated, and it is these firms that think global and then explore the strategic coupling of their GPN with local resources. For other firms, their perspective is more locally or regionally orientated and for these firms the local functions as a platform for determining a production network that is both locally and perhaps globally strategically coupled in some ways. Part of this coupling reflects the nature of product or client demand. Thus, ships constructed for some local clients may be predominantly locally constructed whilst those for overseas clients may involve the articulation of a global production network; the production of all ships produced in Indonesia involves a combination of local and global production networks. In the case of the Indonesian shipbuilding industry, the local is as important as the global in the production process. But, the key point is that some ships are produced using a more globally-orientated process and other ships are more locally-orientated. Nevertheless, each geography plays an important but different role in the production process.

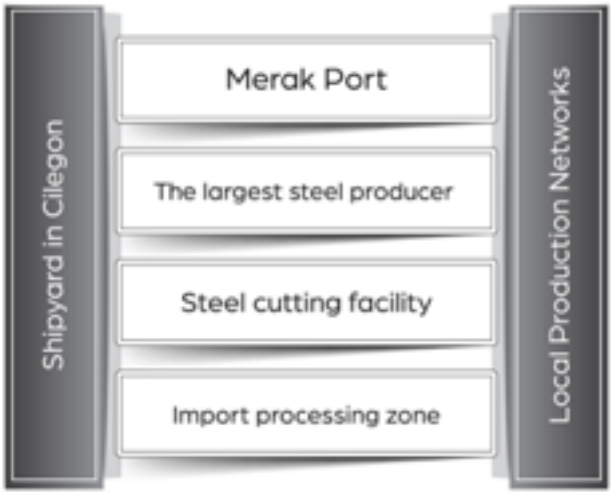

Figure 6.2 LPN in Cilegon shipbuilding region (Indonesia)

Source: Author

Infrastructure readiness has encouraged many of the local shipyards located in the Cilegon area to develop a similar trajectory to PVSY34, and currently, many of these yards serve both domestic and global buyers. This is also supported by the *Bonded Zone* status owned by Cilegon i.e., *Export Processing Zone* (Chapter 4). This has also made the city of Cilegon an integrated provider of products for the maritime industry. This thesis research has been able to map multiple local assets (tangible and intangible) used by the shipyards located on Java Island, including Cilegon. It is to an analysis of these assets that we now turn our attention. This particular mapping of the condition and configuration of assets is based on the interviews conducted with shipyards' manager located in the Cilegon area combined with observations (company visits) of both steel cutting facilities and the steel producers (interviews with PVSY31, PVSY39, PVSY41, PVSY18, PVSY10)

In Surabaya, since the 1960s, PVSY1 developed a reputation and expertise for the production of standard types of ships (passenger ferries, patrol boats, navigation vessel, rescue boats, and sets of tugs and barge) for both the domestic and foreign market. PVSY1 has now upgraded its product range through product diversification, whilst its reputation has been recognised in the maintenance or service market. Over the last two decades, PVSY1 has been rigorously upgrading its production and fabrication facilities by replacing machines and technologies as well as providing in-house management training

to employees. This particular approach was rarely followed by other Indonesian shipbuilding companies. They have also been exploring foreign 'neighboring' markets around South-East Asia, for example, the Philippines, Vietnam, and Singapore. They currently employ about 500 people in their shipyard and have been collaborating with local partners through the development of subcontracting relationships, both to access labour and the fabrication of material, product design, marketing (sometimes undertaken by third party agents), and to engage with the local classification society. The rise of shipbuilding regions outside the FTZ (Batam) area highlights the importance of distinctive sources of competitive advantage, which are not only focused on domestic market-oriented production. This has been driven by three factors: (1) the state-led initiatives to focus on domestic demand, (2) networking approaches with competitive local firms (shipyards and suppliers) clustering nearby, and (3) proximity to Indonesia's busiest port.

Cooperation between shipyards has, in some cases, been reinforced by the activities of the industry's trade association. For example, office space is provided by the industry association in Jakarta, the capital city that helps facilitate knowledge exchange between potential ship project consortiums along with other regular activities that also contributes to enhancing trust amongst local shipyards prior to agreeing to participate in a collaborative project. Shipyards' members are regularly engaged in the organisation and development of local networks as they attempt to create a system to share knowledge about the industry (such as potential government projects and talented ship architects whom they can hire) and to develop local systems that provide trade association's members with mutual advantages. However, it should be recognised that some of this valuable information may be 'owned' by the few larger yards which are experienced in winning and completing complex government projects. The decision regarding whom they share information with depends on the type of client and supplier relationship. This approach is generally adopted as the appropriate way in which a government contracting scenario with a defined 'requirement' can be won and completed. The shipyard who received the internal information needs to collaborate and to only share such information with other yards that have the skills and resources necessary to provide a solution to fulfil that 'requirement.' The formation of *LPN*, in this

case, should begin with the business requirement, or client specification, that is then translated into task delegation including, for example, joint production between shipyards.

PVSY44 regards ship design as their core competence, mainly in the area of defence vessels. Whilst PVSY1 (who started as a company offering ship repair and services in the 1960s) has developed in to an integrated shipyard that is able to build as well as service and repair ships and is strategically trying to increase its experience in the defence market. Over the years both shipyards have collaborated with one another by targeting this specific market. It is important to point out that, trust between these firms is considered as a necessary condition for effective information exchange at this stage (Hakansson *et al*., 1999). Prior to a shipbuilding project, the early stages of the design process involve frequent interactions between different actors to develop a design that lays the foundation for the construction stage (Hammervoll *et al*., 2014). During fieldwork observations, there were a number of opportunities to witness the exchange of information between shipyards, for example between PVSY44 and PVSY1 (amongst others), in a social and more informal setting. This opportunity allowed observation of the nature of the interactions and the types of communications that had developed between the senior managers of these companies. In this situation, PVSY1 received ship designs from PVSY44 (who won the ship tender) which involved the preliminary specification of core components such as the main engines and the installation of electrical systems. At this stage, the design is relatively open, i.e., both companies come together to combine prior and new knowledge resulting in the development of the conceptual model for the production of the vessel. When a larger shipyard is engaged in joint production with a smaller shipyard then the expectation is for them to be able to gather information including the client's initial requirements, to test the proposed budget against client requirements, provide suppliers' information and estimated costs, and to develop procurement specifications (interview with PVSY45). This process is reflected in the personal relationships that have developed over time through previous projects (formal setting) and in a familiar social environment (informal setting).

However, a comment made by one of the more developed shipyards implied that such collaborations would not involve joint design as 'the knowledge gap is quite significant' and therefore the design will still come from the Netherlands, whilst construction will take place in the Indonesian shipyard. Thus,

more complex ship designs are still obtained via a GPN relationship whilst the articulation of a local Indonesian-based production network is more about product realisation through discussions and negotiations regarding the sharing of operational resources, assets, and capabilities.

Collaboration with overseas and more established shipyards facilitates effective information exchange concerning operational issues. In addition, shipyards located overseas have benefitted from collaborating with Indonesian shipyards who can provide other critical inputs, such as land and labour. This perspective provides convincing evidence that, for a specific activity, concerning design and R&D, overseas firms are reluctant to collaborate and share knowledge with the Indonesian shipyards or that these yards do not have the capabilities or the reputations to co-design more complex vessels. Both parties mutually understand that each firm offers critical inputs, be it technological expertise (provided by the overseas yard) and or land and labour (provided by the Indonesian yard) and that the shipbuilding project will not be achieved without combining expertise and size. As suggested by Simatupang *et al*., (2002) this type of relationship is the basis for the development of long-term orientation towards partners, to shorten lead times, and to address the risks associated with technology and a challenging construction process.

6.3 GLOBAL PRODUCTION NETWORKS AND INDONESIAN SHIPYARDS

Over the past twenty years, GPN has emerged as the "world economy's backbone and central nervous system" (Cattaneo *et al*., 2010, p.7) for the manufacture of specific types of products. GPN are often described as organisationally fragmented, spatially dispersed and coordinated production systems (Coe and Bok, 2014) that are coordinated by transnational corporate actors known as lead firms who produce goods and services by drawing upon multiple geographical settings (Coe and Yeung, 2015). Even though global trade is a fundamental part of the exchange of intermediate goods and service, many studies focus primarily on the 'global' dimension ignoring the importance of local elements. In the case of Indonesian shipbuilding, however, the relationship between shipyards and overseas key suppliers has brought advantages and disadvantages. Indonesia's position within shipbuilding production networks involves control and coordination by individual firms, or groups of local firms, of their reliance on

overseas suppliers. Therefore, in some cases, Indonesian shipyard controls how they engage with global production by developing ways to strategically couple with shipyards located in other countries. Alternatively, foreign shipyards are developing approaches to strategically couple their activities with the Indonesian shipyard, in order to obtain critical inputs such as land and labour. It is worth noting that the same shipyard can have both strategies - from local to global and from global to local.

The shipbuilding industry is in a constant quest to develop efficient supply networks, from both local and global suppliers. This is a set of networks that exist through exchange relationships required to create products and services before they are supplied to a final customer (Cox *et al*., 2001). Cox *et al*. (2001) differentiates between manufacturing and service orientated supply chains, with the former including the linkages of three flows: material, money, and information, whilst the latter involves information and cash flows and places human competence and individual understanding of the resolution of a particular problem as the most significant element of a service supply chain. Shipbuilding practices are difficult to categorise between pure-manufacturing or pure-service products. Shipyards tend to provide their customers with a hybrid of products and services that require different types of transformation processes to occur within the same yard. Consequently, the complexity in a project-based firm lies in the presence of uncertainty in the demand for ship projects, which include the irregular patterns of inputs required for each shipbuilding project. The heterogeneity of the products implies that component and resource procurement is customized to meet the requirements of each contract. This means shipyards - as a buying organisation - are constrained by procurement flows that must be negotiated to meet pricing and delivery terms. For ship projects owned by foreign clients, shipyards can become overly dependent on overseas suppliers. This is due to particular type of components/brands that are specified by the foreign buyer, in order to comply with the assessment of the international classification where the vessel is registered. The problem is particularly severe when the products to be purchased are critical components, such as a ship's engine (Chapter 5).

For critical components, buyers have a relatively weak position when the buyers' ability to switch to an alternative is constrained (Lonsdale, 2005). However, it is worth noting that the majority of the ships being manufactured in Indonesia are ordered by local ship-buyers and are mainly intended to be

operated within the Indonesian sea. In addition, the most substantial part of the ship (the hull) is constructed using steel that is mainly produced in Indonesia.

It is important to note that every vessel produced by an Indonesian shipyard is a combination of locally and globally sourced components:

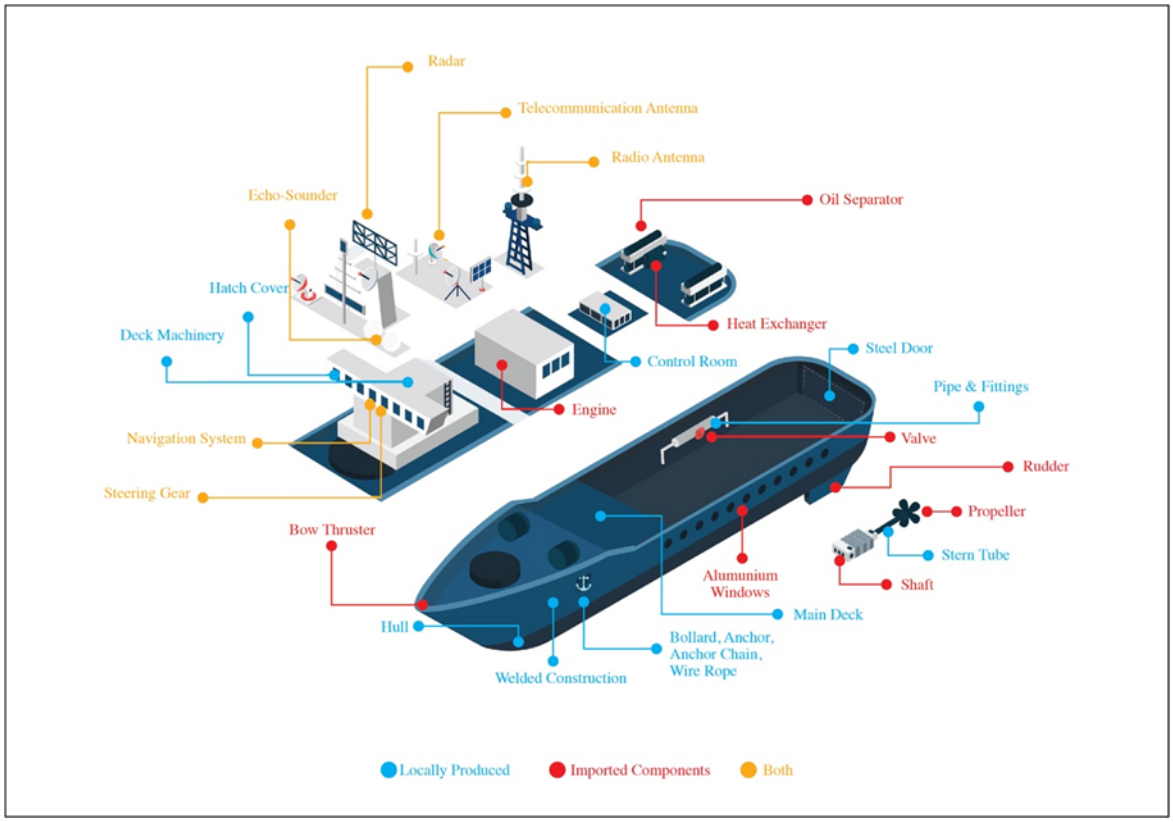

Figure 6.3 The Procurement Geographies of Ship Components

Source: Author

To explore the relationships between the shipbuilding industry and overseas key suppliers' network, this section starts by exploring the regulations and policies concerning *local content requirements* and imported components. In Indonesian shipbuilding industry, more than 50% are subsidiaries of foreign firms operating in Indonesia to supply ship components. Local content requirements is a response to the local content scheme introduced in 2009 by the *Department of Finance* that was intended (1) to increase exports, (2) to enhance local innovation capacity, (3) to create employment, and (4) to protect

local firms in the intermediate sector (Negara, 2016). In the case of the shipbuilding industry, the local content regulations were developed to promote localisation strategies to overcome the country's reliance on imported components. The *local content requirements* or regulation no. 176/PMK.011/2009 was established as *"a duty exemption for a period of up to four years on machines, goods, and materials, under the condition that at least thirty percent of the total value of equipment used was purchased locally" (Department of Finance*, 2009*).* This programme has considered unsuccessful in developing a viable local supporting supply industry for the production of some ship components. Thee (2012) illustrates several factors that have contributed to the failure of this policy, including (1) the low technological capabilities of local suppliers, (2) lack of economies of scale due to the relatively fragmented market, and (3) the scale of investment required to establish a local supplier (p.278). However, that is not the whole story. Despite some 'expected' benefits of local content, the majority of the shipyards involved in this study believed that policymakers have limited knowledge of the shipbuilding industry and lack analysis and data on the extent to which Indonesia was self-sufficient in the production of ship components. One yard's owner raised this concern:

> *'Recently I was in this meeting with the Ministry of Industry to discuss the procurement of an anchor winch from overseas, and to decide whether or not a zero-tax policy can be given to such item. They've told us (the shipbuilding association) that it will still be taxed, as Indonesia is currently producing it locally. I found out later that the only winch factory in East Java closed down last year due to the recession and lack of order' (PVSY34)*

This illustrates that there has been a concern regarding the increase in protectionism in Indonesia. More importantly, the government body itself does not always have reliable information regarding the availability of local component suppliers. As argued by Patunru and Rahardja (2015), the localisation strategy should aim to increase domestic investment by local supporting industries including the production of parts and components. However, an interview with a manager from a shipyard revealed that

'There is nothing such as 'local content.' You know what usually happens? The local supplier company bought and imported the equipment/component from the regional distributor and sold it to us here. So, it can be claimed to be 'purchased locally' which increased the local content of a product. But in fact, it still comes from overseas.'

In many cases, shipyards often procured components from a local distributor, but these are foreign components masquerading as local content as the components are imported by the distributor. However, since the shipyard bought the equipment or part from the local distributor, it was then claimed as 'local content' although the item was not produced or manufactured locally. Around 90% of the participants raised similar concerns with local content requirements; thus, foreign components may be rendered invisible to the government as they are reclassified as local content.

It is important to discuss this problem here as not only does this reveal the over-reliance on foreign key suppliers but also helpful in exploring the relationships and embeddedness of firms within the networks that support shipbuilding projects. In most cases, the majority of suppliers were located in Singapore. In this case, many firms located on Batam, including shipbuilding firms, benefited from Singapore's 'excessive growth' due to its proximity in two ways (1) close distance resulted in shorter lead times, and (2) *Free Tax Zone* (FTZ) benefits.

Figure 6.4 Batam Island and Singapore

Source: Author

Batam Island is no more than twenty miles, or an hour's ferry ride, from Singapore (Figure 6.4). It is certainly a shorter distance compared to the distance between Batam and Java Island where most of the

local suppliers are located. Until ten years ago, Indonesia's shipbuilding industry would appear to be associated with Batam Island that is home to many large private shipyards. However, the majority of these firms are foreign-owned by Singaporean based firms rather than domestic locally-owned shipyards. This is due to the status of Batam, Bintan, and Karimun that were set up as *Special Economic Zones* (SEZ) in 1971. *FTZ* is not a new concept in the economic development literature (Heng and Kee, 2009) and it often encompasses an *Export Processing Zone* (EPZ) or Free Trade Zone (FTZ). *FTZ* is an area where goods can be "*imported, warehoused, processed, fabricated, exhibited, utilised, and transshipped*" without custom processing and duties, whereas an EPZ is a non-tariff area where manufacturers can "import the goods to process, assemble, and fabricate" with the intention to export (Ng, 2011). These mechanisms allow selected manufacturing production activities located within the zone to benefit from cross-border custom clearance and trade-related taxes to boost industrial development and international trade. Since then, Batam has been targeted by Singaporean shipyards as a relocation target due to environmental restrictions in their own country. In 2015, Singapore beat Hong Kong and Japan to become Batam's largest foreign investor with a total of USD $136 million in investments (Shaw and Yeoh, 2000). Batam has a large area allocated for industrial production, low labour costs, and tax exemptions. These are the primary considerations behind the relocation of foreign shipbuilding companies to Batam. Initially, this policy was intended to facilitate the growth of local industry in Indonesia. From around 2000, however, shipbuilding activity in Batam stagnated and gradually declined after the oil crisis, apart from a small number of foreign shipyards, of which the majority were established by Singaporean-based shipbuilding companies that have off-shored production to Batam.

Apart from being the hub of suppliers to Indonesia, the position of Singapore offers two distinct points to reflect on Indonesia's shipbuilding production networks: (1) it offers close proximity between shipyards and the key supplier's subsidiary office and warehouses, if unexpected problems arise (wrong components or wrong items having been sent) that may cause delays in the delivery of a ship; (2) Singapore also has benefited by being close to Indonesia, mainly Batam Island, as it provides an opportunity to establish a Singapore-owned shipyard with major tax incentives provided by the

Indonesian government. For the latter, the entire ship's production is controlled and supervised by Singapore, whilst other resources, such as access to a relatively low-cost labour force and land for fabrication, are Indonesian advantages. On the whole, the interviews suggested that little technical collaboration has developed between local shipyards and global suppliers. The scope of potential collaboration in producing components is necessarily limited because Indonesian suppliers have little R&D experience. At this point, such adoption has not led to the development of technical partnerships in areas such as product design. The experience over time only enables them to carry out more complex ship projects compared to ship workers based in Java.

6.3.1 Challenges with Imported components

The difficulty with locally-manufactured components is that they often lack accreditation and certification and there is limited direct government support to encourage the production of local components. The production of more technologically-intensive high-value components is dominated by global players/suppliers, and their production is dominated by first-tier suppliers. Key components sourced overseas include propulsion, electrical systems, control and communication systems, auxiliary systems, military-related systems, and design. The second tier consists of lower-value-added components of which the majority are produced by small and medium-sized companies, and most of them are located in Indonesia. In addition, the majority of foreign client orders require certification or the approval of a named global classification society. This requirement must be agreed and fulfilled prior to the contract and before the shipyard starts procuring marine grade components. Quality standard certification is considered as an 'entry ticket' for supplying shipyards to build both domestic and export ships. However, to date, only a few Indonesian component producers are certified, and most only have certification for the production of low-value products. Thus, a:

> *'. . . sad story about the component industry is they don't receive enough support to promote their products and to register it to the classification [societies]. Even a product that as simple as marine cable and pumps are still imported!' (SOSY35)*

In Indonesia, supplier firms are faced with the costs of obtaining different certificates even though they are only producing comparatively low value-added materials. Thus,

> *'If we talk about the quantity of the materials, of course, the majority are locally made, but if we talk about the value, imported components have a higher value. For example, we purchased thousands of steel plates (low-value) costs us USD$ 70,000, but a ship engine (high-value) cost us USD$2 million, even though it is only one item' (PVSY34).*

The majority of imported components are high-value components, such as the main propulsion engine, gearbox, and propulsion systems:

> *'We purchased ship components domestically and overseas. However, the more technology intensive, the more we rely on imported components from suppliers overseas.' (PVSY20)*

> *'Ninety percent of navigation systems in Indonesia are still imported, such as Garmin and Furuno. They are mainly coming from either Japan or America. Well, the other ten percent are local products, but very rarely used. There is a joke between us shipyards about locally manufactured navigation system 'we set it up to take us to X, it will take us to Y' hahaha.' (PVSY47)*

Both shipyards, PVSY20 and PVSY47, confirmed that they would be more likely to use imported components compared to locally produced products when it comes to safety and navigation systems for larger ships and also to comply with the classification and accreditation system. However, for the construction of the ship's hull (which accounts for thirty to forty percent of the construction of a ship) locally produced materials are appropriate. These are mainly iron-based components and glass-based components. According to the fieldwork data, the majority of the ship engines are supplied by the Japanese company, Yanmar, which currently dominates the market for ship engines in Indonesia. Japanese suppliers are often selected based on their reputations and their willingness to come and train local shipyard managers and technicians who eventually will transfer the knowledge to yard employees. Also, by working closely with suppliers, it is expected that shipyards meet higher production and quality

standards and improve the speed of delivery that is essential to compete in the shipbuilding industry and especially for overseas orders. There are a growing number of local suppliers that supply Japanese brands such as Yanmar and Mitsubishi, and that are 'manufactured in China', for example, Cumminz and Deutz (which was initially manufactured in Germany). From the fieldwork interviews, some shipyards commented that suppliers from Europe and Japan are also more orientated towards after sales service and training. Followed by second-tier suppliers such as those located in Korea who have a similar attitude towards training, after-sales service, and knowledge transfer. Despite this effort, however, local skills are not yet fully developed. The so-called 'knowledge transfer' and 'training' are mostly focused on repairing and servicing components or equipment purchased from suppliers rather than the fabrication of components. In addition, unlike in other countries such as China and South Korea, whereas the government policy supports the growth of the shipbuilding industry, foreign suppliers have not been encouraged by the government to transfer their knowledge to the local component makers.

Furthermore, ship buyers are involved in selecting parts or components. Typically, prior to the contract signing, the client submits a list of component requirements (during the interview it was described as '*makers list'*) based on the specification and purpose of the vessel. In this stage, they usually opt for well-known global brands, due to the component certification provided by BKI considered "*not enough to guarantee the safety*". A shipyard in Batam also revealed the concern of using locally produced components is because "*it is more expensive than imported one*". This is partly caused by Indonesia's high transportation and logistics costs due to the poor connectivity between islands. Thirdly, "*a component ordered from Singapore can be obtained within a day, but it could take one to two weeks if ordered from Jakarta*" (#PVSY16). From these comments, time, cost, and quality are the main consideration in choosing ship components.

Another case of procuring ship's engine, shipowners can opt to buy a '*genuine*' MAN component (European manufacturer of large-bore diesel engines for marine propulsion systems) manufactured in Germany or a '*licensed*' MAN engine manufactured in either Korea or China - depending on the budget.

Only shafts, pumps, and propellers are currently manufactured in Indonesia. Although, due to irregular demand, some pump manufacturers no longer serve the maritime industry. Thus,

> *'As you know before 2015, we received minimum ship orders, so some of the local components manufactures can't cope with the economy of scale and has to close their production. Ebara (pump manufacturer) is one of the examples.' (PVSY39)*

> *'It is not very visible to build all the ship components locally, as it is required huge R&D. What we need is a product that is quickly available. Nowadays, we can source most of the components from China as they produced massively.' (PVSY3)*

Even though both locally produced and imported components are available, they are more likely to order from suppliers based in China, for example, as the components are normally ready for immediate dispatch. Also, most of the time, the components are cheaper as they are mass produced. Indonesian component producers are at least thirty percent more expensive compared to China. Thus, the same ship's product may have different GPN configurations. Furthermore, component specifications for advanced vessels such as submarines require different compared to the fabrication of more general vessels like ferries. As reported by the interviewees below:

> *'For the anti-submarine system, for example, we need components that are covered by special electric and magnetic wave so that it won't be detected by submarine. Also, for the steel grade, Indonesia does not produce the high-density grade, only produce marine grade steel' (PVSY38)*

> *'Indonesia is yet to produce that particular specification. Steel manufacture in Indonesia can only produce marine grade steel, i.e., 8, 9, 10, and 12 millimeters. Those are quite thick. The ones that required by the warship are maximum at 6-7 millimeters.' (PVSY41)*

The higher the grade of components, the more intensive research and development is required, and that activity is limited in Indonesia. For a specific type of vessel, such as a warship, the majority of the steel was purchased from the Netherlands. It is because warships are required to be able to travel at high-speed requiring the use of lightweight materials. This is where Indonesia's proximity to Singapore

provides benefits to the shipyards as this contributes to solving the lead time problem but has not improved the weak technical ties between global suppliers and local suppliers. The global quality standard required by the ship owners has contributed little to local supplier competence in product development.

6.3.2 The Decline of Batam *Free Trade Zone* and the implication on shipyards

From 2008, production in Batam gradually declined, and firms lost competitiveness due to the global economic downturn. At this time, oil prices declined reducing demand for offshore oil-related activities along with the need for offshore support vessels. This decline in oil production and transportation reduced demand for oil-industry related vessels. After 2008, Batam regions FTZ experienced overcapacity as the majority of trans-shipment orders were cancelled. Batam, however, still reserved a certain market culture for ship maintenance and servicing that played an important role in the shipbuilding industry. The shipbuilding industry in Batam has developed many production units manufacturing components for heavy industry in the region, including ship production. In addition, many surviving shipyards relied on a few government projects (i.e., at the time of data collection, PVSY17, for example, received orders from the Pertamina (state-owned oil company) to build two Tankers, while PVSY22 and PVSY36 received the order from the Ministry of Transportation for seven navigation vessels in total).

Coe *et al*., (2004) argued that global buyers help shape, generate, and facilitate a broad spectrum of entrepreneurial activities. In the practice of shipbuilding projects, it is common for shipyards to acquire technology by forming alliances with more technically capable shipyards located in more advanced countries such as Germany and Netherlands (firm-to-firm relationship). However, in the case of the Indonesian shipbuilding industry this type of alliance includes local firms (joint production with competitor shipyards, supply transfer of technology) as well as with non-firm institution (classification society and industry association). To some degree, these firm and non-firm actors provide structures and platforms between shipyards and ship-buyers. The ship-buyer's specification can be successfully carried out when the shipyard can effectively source and procure the detailed technical specification

from suppliers as well as comply with the classification society. While collaboration between firms is essential, the shipyard also needs considerable inputs from non-firm stakeholders. This presents opportunities to ensure that a project will meet the requirements specified by the classification societies and insurance companies including 'sea-worthiness'. Therefore, it should be emphasised that another form of embeddedness is also found between firms as well as between firm and non-firm actors (Figure 6.5).

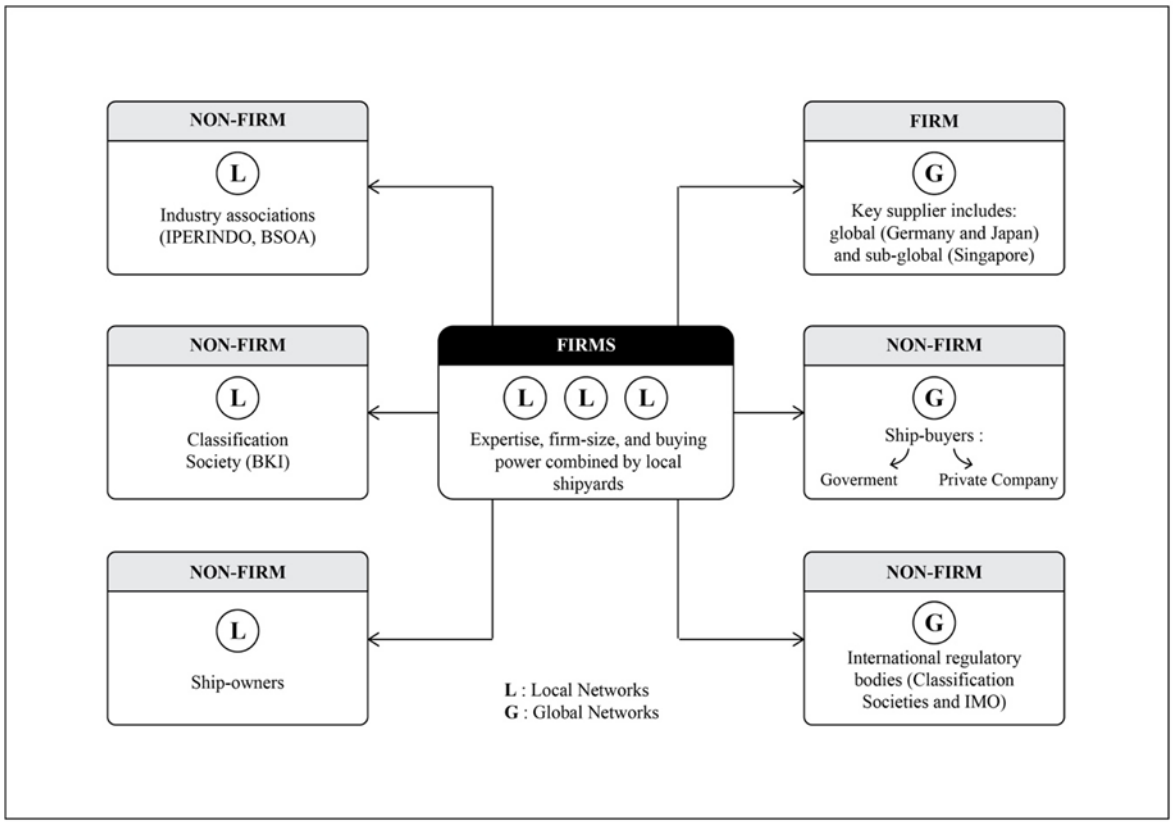

Figure 6.5 Interlinkages between LPN and GPN in the Indonesian shipbuilding industry

Source: Author

When collaborating (joint production), shipyards act as an integrator or as a subcontractor. Thus, a yard can be involved in developing and coordinating a GPN including strategic coupling with firms located outside Indonesia but may also be coupled into a GPN led by a foreign firm. The latter occurs when, for example, longer established Indonesian shipyards form a consortium with one or two smaller and relatively new shipyards; the smaller yard participants might, for example, supply ship blocks to the

main shipyards. Two examples of Indonesian shipyards and their production networks will now be discussed through the application of a production networks conceptual lens.

The first yard was started in 1960 when Indonesia's PAL developed a technical co-operation agreement with Japan (Mitsui) and Germany (Lurssen and Meyer Werft shipyard). These companies were chosen to enable the Indonesian yard to learn how (1) to undertake Bulk Carrier construction, (2) to adopt management knowledge, and (3) to learn to efficiently build fast patrol boats intended to meet an increase in demand from Indonesia's Directorate of Water Police. As a result, PAL was able to design and build this type of ship by mixing raw materials from various locations such as high-tensile steel for building down-deck and aluminium alloys for building the main deck, which with relatively light raw materials required for a vessel to reach a speed of 22 knots.

The more recent case of collaboration with foreign shipyard is PAL and PVSY44 (owned by a firm based in the Netherlands). The way PVSY44 organises their co-production with domestic yards is as follows: instead of building their subsidiary yard in a low-cost country, they will search for a reputable Indonesian shipyard who has the capacity to undertake the construction and to enter in to a subcontract relationship. PVSY1 is one of their preferred local partners due to the firm's reputation for on-time delivery and quality. This resulted in an intense collaboration to build and export foreign-owned vessels over the past five years. Comments from both shipyards confirm this point:

> *'If you would like to be able to produce this ship, I can show you how to build it, we can do the design process together, and you can keep the knowledge, and whenever you want to build the same type of vessels just pay me the royalty.' (PVSY44)*

> *'We have received orders, built together, and exported seventeen vessels to India, Nigeria, and Mexico with PVSY44.' (PVSY1)*

This is an example of the strategic coupling of a GPN with a focus on accessing the low-cost base of Indonesia's shipbuilding industry. Another example of overseas collaboration is found between SOSY7 and PVSY44. Both shipyards had an agreement to build seven Corvettes, of which the first two warships were built, tested, commissioned and berthed in the Netherlands and will then be towed to Indonesia.

The remaining five units will be modified and constructed by SOSY07 in Indonesia. As reported by the SOSY07 below:

> *'This is the first Corvette to be operated in Indonesia, and that is how we transfer the know-how about efficiency and capability. We want to be self-sustaining to build any weapons that will be needed to protect the country.' (SOSY07)*

SOSY07 is designed to be the centre of the strategic maritime industry by the Indonesian government, which is to date, the only shipyard that is capable of building complex naval crafts such as a 105 meters' length Corvette or Frigate. Apart from joint production and the transfer of technology with PVSY44, SOSY07 has also started joint production with Korean's Daewoo Shipyard (DSME) to build submarines. Indonesia's Navy has stated that it needs fifteen submarines, and the initial agreement is to build the first two units in Korea, followed by building the remainder in Indonesia under DSME's supervision. PVSY44 sent twenty engineers to work on the third Corvette project in Indonesia. They are divided into working on and supervising steel-based works, propulsion, and electrical systems, including the electronic system in the main operating room. This LPN driven project allows PVSY44 to be involved in Computer-Aided Design (CAD) visualisation, managing and updating programme, planning information including risk, safety, and environmental information. Thus, the Indonesian government is using procurement as a tool to enhance the development of the local shipbuilding industry and to encourage the development of local capabilities and capacity.

This experience and knowledge provide PVSY44 with advantages and is transferable to accommodate the continuation of the Indonesian submarine programme. According to PVSY44, this is a part of a knowledge transfer strategy for the buyer and is designed to ensure that repairs can be undertaken to warships locally in Indonesia. Thus:

> *'Imagine if something happens in the middle of the operation in the sea, who's going to handle that? We are not coming back just to do the repair.' (PVSY44)*

The overseas collaboration between both shipyards has resulted in an increase in SOSY07 ability to build *Deepwater Construction Vessels* (DCV) and *Over Hatch Bulk Carriers* (OHBC). These two

products have repeatedly been ordered and are in high demand by foreign clients. The technology transferred by the Netherland shipyards was not owned by them; it was copied from Swedish shipyards which are more advanced in ship design and technology. Whilst the knowledge of managing a ship's project efficiently is copied from Korea's Daewoo shipyard as they have successfully developed a self-sustaining industry (Andritsos and Prez-Prat, 2000). Another more recent example is the application of knowledge to build similar vessels, in this case, a naval combat system, obtained by working with the Dutch firm DSNS and South Korean's DSME. Through the construction of a *Guided Missile Frigate* (PKR – Perusak Kawal Rudal), and three submarine units, PAL has been encouraged by Navy buyers to develop its yard facilities and human resources to build better warships.

It is critical to point out that this type of technology transfer did not end at PAL. In many cases, PAL will then share the accumulated knowledge with other private yards located in the same region by engaging in joint production with them. Thus, the learning cascades down between local shipyards that are strategically coupled in some ways. In this case, the development of LPN is driven by the local shipowners, and it is reflected by the LPN configuration. For instance, two shipyards located in Surabaya (PVSY01 and PVSY08) confirmed that during the ship project collaboration, PAL acted as the primary contractor to build the ship (undertaking final assembly and bloc erection) while the sub-contractors' yards built the block assembly and delivered it to the main yard. These two phases of production processes are carried out at separate plants which separate the block assembly activity from the ship's erection. This scenario usually occurred when the main shipyard was working to capacity or had insufficient capacity. This form of embeddedness in a local shipbuilding network reflects an adaptation strategy based on localised strategic coupling and relationship management to acquire critical resources and to win orders. Thus,

> *'I am delighted that Mr. X is willing to give us the opportunity to build the section blocks for the government's ship order. I mean, it is difficult to get the first order as we are a relatively new shipyard. Yes, I have had 20 years' experience working in PAL, but to manage my own shipyard, you also need someone who trusts you enough to give the first order, then you build*

your reputation when you deliver the product as requested. In Indonesia, people trust the good words of mouth' [PVSY08]

This example of collaboration between firms suggests that trustworthiness amongst local production networks is regarded as effective when competing for orders as well as gaining experiential knowledge and also in any knowledge spill-overs from local partners benefiting from learning from foreign-based collaborators.

To Yeung (2000) and Coe *et al.,* (2008) competitiveness is achieved through an active process of information sharing and internalising knowledge between a company and its external actors. Coe and Yeung's reconceptualisation of GPN in GPN 2.0 provides a useful perspective for understanding production network and, especially shipyard relationships with their suppliers (Coe and Yeung, 2015). The GPN 2.0 framework addresses explicitly the limitation of GPN 1.0 by suggesting a more precise direction to better understand the relationship between the market environment and four actor-specific strategies adopted by lead firms and their suppliers. In GPN, the roles of actors and their 'strategic coupling' with firms and suppliers are central to any account of firm performance. It conceptualises the various types of network configurations that result in value creation, enhancement, retention and further economic impact in other areas. Nevertheless, GPN is an analysis that emphasises the global over the local. In the shipbuilding industry in Indonesia, local embeddedness is a critical mechanism that drives shipyards to engage with global networks (Figure 6.6). Thus, the GPN is flipped on its head as one core driver comes from the local and it is this form of embeddedness that facilitates the relationships with global players. It is important to appreciate that there are different models of GPN/LPN at work here between the different shipyards. Therefore, the design and development of LPN or GPN reflect the heterogeneity of the shipyards. Some are locally orientated but engage with foreign firms through the management of procurement relationships and some Indonesia's shipyards have been partly incorporated into the GPN of foreign-based shipyards:

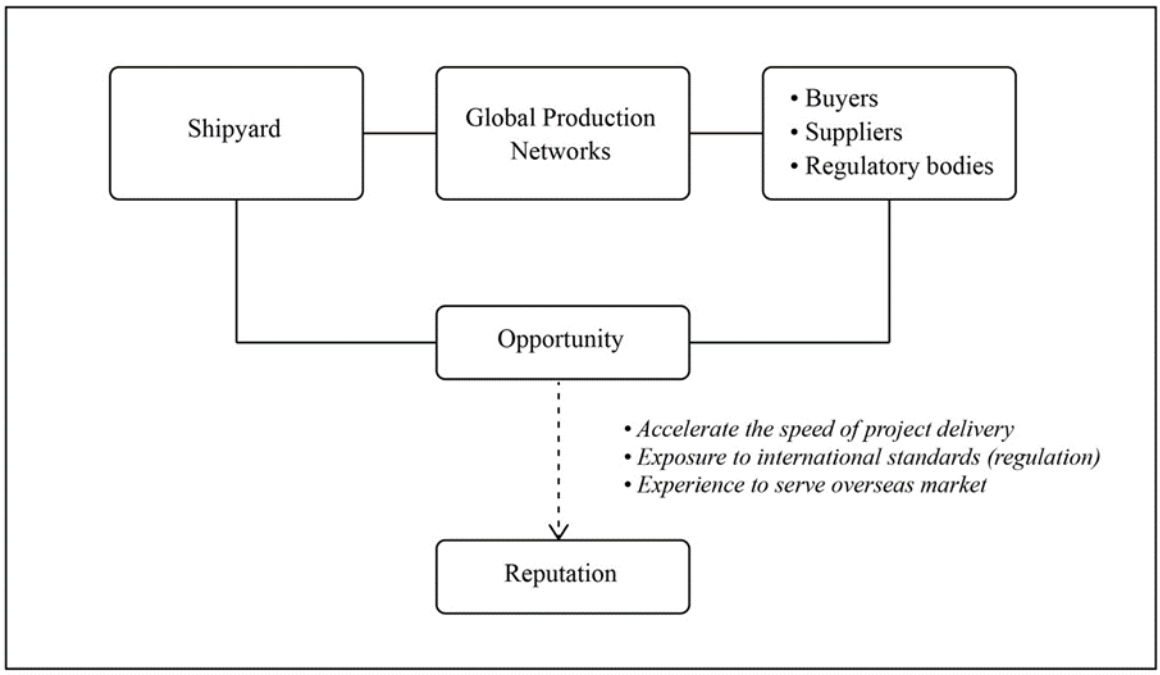

Figure 6.6 Embeddedness in the Indonesian shipbuilding industry

Source: Author

Figure 6.6 illustrates the relationship between shipyards in Indonesia with their overseas partners, which is broken down into ship buyers, key suppliers (firm), and regulatory bodies (non-firm). In the context of Indonesian shipbuilding the industry relies mainly on overseas suppliers as they provide critical components for shipbuilding projects. This mechanism of securing critical materials from overseas is mainly achieved by collaborating with local networks. The use of informal meetings not only allowed PVSY03 to generate the possibility of obtaining ship orders but also permitted regular contact with key suppliers located in Jakarta to secure materials. There is another form of geography here as:

> *'It is impossible to buy a part for shipbuilding online or through a website. Most of the time we need to see the product first before we can make the purchasing decision. For example, we usually use Yanmar for the ship engine; then we must visit their factory in Japan to have a clear image how many they actually produce versus how many they can allocate to us, it's not something you can buy online.' [PVSY34]*

The PVSY34 comment above may also mean that the engine maker itself is less likely to supply a small batch of components to a new and unfamiliar foreign customer. In most cases, shipyards form a group purchasing scheme to negotiate the purchase of a ship's engine and propulsion system (Chapter 5). These local networks, involved in group purchasing and buying parts from overseas, can develop a stronger position for those participating in them compared to those who are excluding or not participating:

> *'70% of our ship components are coming from overseas suppliers. The remaining 10% are from agents and representatives located in Jakarta and Surabaya. But still most of the products are imported too, it doesn't mean that 10% are manufactured locally'. [PVSY02].*

Group purchasing is not only a money-saving mechanism for the shipyards, but it was also a method to ensure orders were prioritised by large supplier companies. Shipyards place orders collectively, and the order is then organised and arranged within local networks. The system allows the placing of orders with, for example, the *Yanmar* factory in Japan, but also could be redirected to their subsidiary/representative office in Singapore. The regional business network with Singapore can offer shipyards and the buying group a wider range of ready-to-ship components. This is due to the existence of a large pool of factories and subsidiaries in a single location. Furthermore, a production network dispersed over several countries also offers a significant advantage for shipyards as different approaches can be adopted for component procurement. It is also worth noting that the configuration of global production networks in the Indonesian shipbuilding industry includes shipyards that are locally embedded as well as being incorporated into GPN.

The key issue here is that shipbuilding involves the construction of large project-based products and this type of production has not been explored in the GPN literature. These are large, complex, and customised products that require different levels of functionality that can either be (1) driven by the local buyer and executed purely by configuring a local production network, (2) driven by the local buyer and executed by configuring both local and global production networks, (3) driven by the global buyer and executed by a global shipyard who then subcontracts elements of the project to an Indonesian

shipyard (primarily motivated by land and labour costs). Whilst, Coe and Yeung (2004) suggest that the strategic coupling of GPN ultimately drives regional development through processes of value creation, enhancement, and capture. Nevertheless, this thesis has shown that in the Indonesian shipbuilding industry network configurations are, in some cases, driven by global production networks and global firms, but more often they are driven by local production networks and the activities of local shipyards supported by non-firm actors. In part, the importance of the local in shipbuilding reflects the product and, in part, the local is important in Indonesia as one response to policy that is intended to support the growth of this industry.

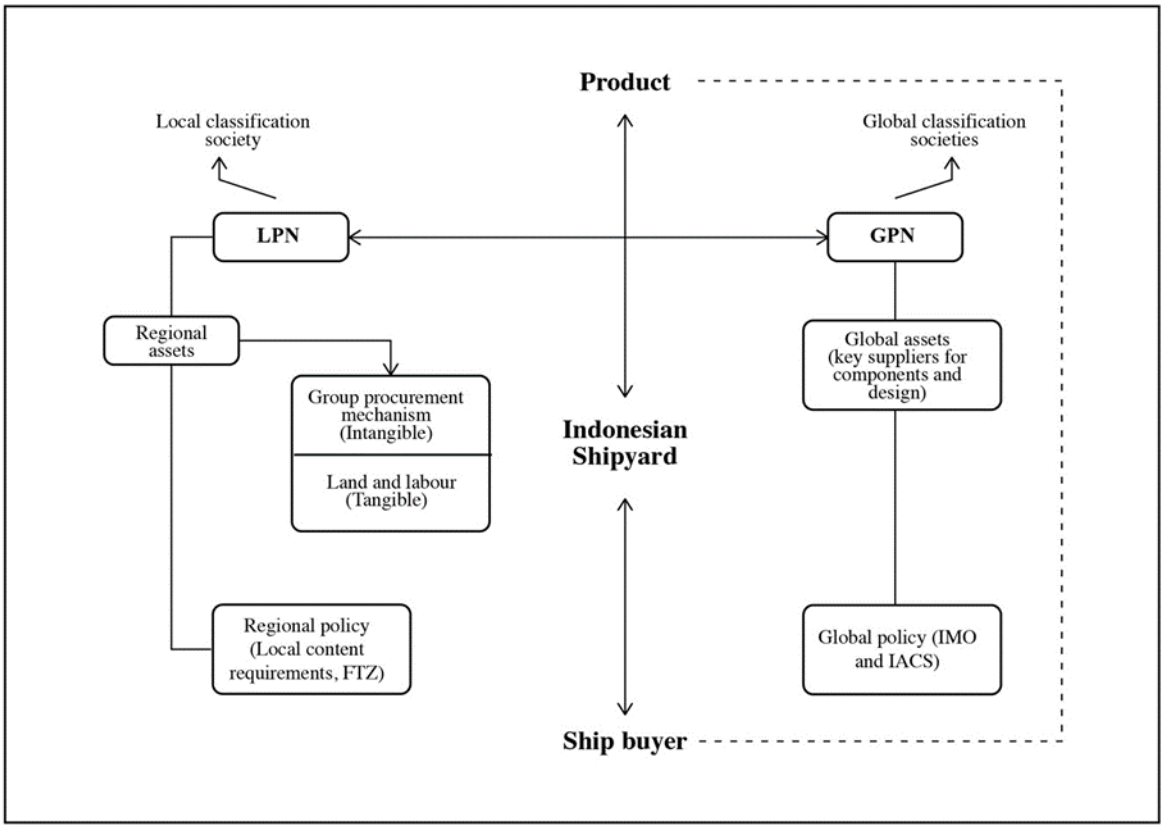

Figure 6.7 LPN/GPN framework for analysing the Indonesian shipbuilding industry

Source: Author

The diagram reflects the ways in which shipyard configures the interactions between different geographies. In most cases it involves both LPN and GPN. In addition, it is important to bring this argument together by developing a conceptual framework for understanding the configuration of the

production networks involved in the Indonesian shipbuilding industry (Figure 6.7). This analytical framework starts with the premise that once a shipyard receives an order, that they break the task down to include inputs from other local shipyards. This allows the shipyard to decide between procuring the component locally or from overseas, depending on the type of the ship ordered. Therefore, the configuration of production networks can be more of locally orientated or globally orientated. The heterogeneity of product and buyer provides many ways of sourcing components, including a process by which the components are specified by the shipyard, or alternatively by the client (through providing a *makers list* that specifies named suppliers). Foreign suppliers can then be selected from suppliers located in the UK, US, EU as well as Japan, China and Korea. This decision is commonly based on the budget and the where the ship will be registered.

The growth of the Indonesian shipbuilding industry over the past five years –is, in part, a result of the changing direction of state policy toward the maritime industry. Despite this growth, however, firms are facing challenges in relation to ship design, insurance, and accreditation. Even though the construction phase of the ship is completed locally, Indonesia still lacks the capability to design ships and to produce critical components locally. The majority of a ship's design is produced off-site and mainly organised from outside Indonesia. There are three local design providers located in the shipbuilding cluster of Surabaya city. However, international ship buyers often purchase previously built or '*approved design'* from the world's leading designers such as Singapore's *Seatech* and Norwegian's *Wartsilla*. Approved designs include specifications such as type, deadweight, type of propulsion, and speed. Nevertheless, a ship is built to meet the need of a specific client and function and there are always variations made to a standard ship design platform.

In many cases, the design requirements of the vessel are governed by the required functionality of the vessel (Hammervoll *et al*., 2014). They are tailored to specifications set by ship buyers, and this results in the production of customised products. The process of designing a customised vessel involves complex interactions between buyers, shipyards, designers, and component suppliers. In most cases, the designer and the shipyards will have a history of working together on previous projects. Interestingly, personal relationships and previous history are regarded as essential aspects of the design process as

both parties are familiar with the process of facilitating cooperation to develop a customised product. It is considered as "*the necessity to exchange knowledge and information to reach areas of specific competence*" (De Propris, 2008, p.88). This trust mechanism, however, only benefits shipyards that collaborate within LPN. Trust is built upon experience, which co-location between firms plays an important role in facilitating this relationship. In particular, in a project-based industry.

6.4 CONCLUSION

This chapter has highlighted the role local production networks play in the global production networks that are evolving to create Indonesian ships. This reflects a complex interplay between local and non-local firms and assets. There are three sets of relationships here. First, shipbuilding that reflects a strategy that is controlled by local shipyards as they develop initiatives that couple their activities with those of firms located beyond Indonesia. Second, a process by which non-Indonesian based shipyards access the assets owned or controlled by Indonesian yards. Third, a process by which Indonesian shipyards configure local networks that enables them to act as lead firms in the configuration of shipbuilding production networks.

The framework developed in this chapter highlights the dynamics of the 'strategic coupling' that occurs within and between LPN and GPN as they are organised or configured by Indonesian shipyards and the various firm and non-firm actors across different spatial scales. The key argument here is that the configuration of these production networks depends on the product (commercial, defence) that has been ordered by a client (government, non-government, domestic, overseas). This chapter has explored the geographic organisation of the Indonesian shipbuilding industry with a focus on exploring more locally orientated or globally orientated production networks. The case of the shipbuilding industry highlights that both LPN and GPN are critical for the development of the shipyards. A shipyard's GPN, in this case, considered as a combination of many locally embedded networks. Thus, we have Indonesian based yards, and then a group of non-Indonesian based yards and the coupling between these is a GPN, but this coupling also involves the configuration of local production networks.

The implication for policymakers and practitioners comes from understanding the embeddedness of local and global production networks and the complex interdependencies between them. Differences in the capabilities of more locally-orientated or globally-orientated firms influences Indonesia's ability to sustain the growth of the shipbuilding industry. A key issue is the on-going need to encourage the development and manufacture of more complex higher-value components. On the one hand, the exposure and interaction of firms to foreign networks contributes to promoting and leveraging the resources and capabilities of Indonesian shipyards. On the other hand, it is important that policymakers promote local collaborations with domestic buyers and between shipyards and their suppliers. This would result in the development of practices that would encourage knowledge and expertise sharing that would enhance regional competitiveness. Policy has played an important role in reconfiguring the local geography of the Indonesian shipbuilding industry but with some perverse outcomes. Thus, interventions intended to develop local yards have encouraged foreign direct investment. Nevertheless, the key point is that geography continues to matter for understanding the location of economic activity. Thus, the core Indonesian shipbuilding cluster reflects a longer-term accumulation of firms, assets and reputations including the development of a trade association. Nevertheless, there are local infrastructure issues that still need to be solved. Thus, the difficulty of transporting components within Indonesia places some yards at a disadvantage compared to foreign competitors. Thus, distance needs to be measured not geographically but in transportation times. Shipyards that are co-located within a cluster are advantaged but there are difficulties in transporting components between some of the Indonesian maritime clusters.

Further research is required to understand the configuration of LPN and GPN by more project-oriented firms. Shipbuilding is a complex process that is partly regulated by the classification societies and insurance companies. These non-firm actors play an important role in shaping the local and global configuration of the shipbuilding industry. The nature of bespoke and one-off products in the shipbuilding industry also extend the understanding of GPN, which currently are based on the production of mass and standardised products. Also, location matters for PBF. In some region, a local firm is able to configure a local/global production network and is able to outcompete a more globally-

orientated competitor. This process must be understood on a project-by-project basis and thus one can argue that dynamics are central to this process; every product and project is different and requires decisions to be made regarding the configurations of the production network required to produce the ship.

CHAPTER 7

PROJECT-BASED PRODUCTION NETWORKS AND THE INDONESIAN SHIPBUILDING INDUSTRY

7.1 INTRODUCTION

In the previous chapters, the focus was on exploring ways in which shipbuilding projects are organised. Shipbuilding project is a combination of firm-based processes (Chapter 4) with LPN (chapter 5) and global production networks (Chapter 6). The production of a ship built upon a set of decisions made by *Project-Based Firm* (PBF) involving the organisation of production in different layers of geography. Part of the decisions making process involves ways in which various tangible and intangible elements provided by other firm and non-firm actors. In addition, shipowners also play an important role in shaping shipbuilding project-based production networks (PPN*)* depending on the type of the ship ordered and the location where ship operates. This *PPN* reflect the organisation of firm and non-firm actors and the ways in which they compete and cooperate within a region. The development of *PPN* often led by the shipbuilding project *contract holder* who lead the project and act as the *primary integrator* of the production processes. In this view, they coordinate activities by allocating resources and delegating tasks (one or more production phases) to other firm (s) involved in the fabrication of a vessel. By exploring the ways in which shipbuilding project is organised, this thesis extends the understanding of current governance literature to include the project-based forms of organisation.

Ship construction is based on the production of a customised unit. To explore this, this chapter discusses the different ways in which shipbuilding projects are assembled and organised by taking into account the three different geographies: firm-level, local-level, and global-level

relationships. There are many different types of decisions made in a shipbuilding project, ranging from those concerning the location of construction, the supply of labour, a dispersed network of component suppliers, certification, as well as many different regulations applied by the vessel's place of operation. Some of these decisions are concerned with the availability of critical components and simultaneous certification processes that have a significant impact in shaping the relationships between a shipyard, firm and non-firm actors within a region, and in almost all cases it involves a set of processes beyond Indonesia. Within each *PPN*, firms share resources, facilities, knowledge, technical compatibility, and reputations to ensure the delivery of a ship project.

This chapter develops a framework for exploring *PPN* by exploring various ways in which the project-based activity (shipbuilding) is organised in the Indonesia. Next section discusses the predecessor of the inter-firm network literature. Following this, the conceptual elements of *PPN* and the application of this approach is outlined. In the discussion, a stylised example of a shipbuilding production networks is presented along with the policy implications.

7.2 THE GOVERNANCE OF PRODUCTION NETWORK IN THE PROJECT-BASED INDUSTRY

In the shipbuilding industry, different decisions are made involving different scales of activity in different geographic scales: firms-, local-, and global. These are the critical elements to consider when organising a shipbuilding production network due to the complexity of shipbuilding projects, includes: (1) the size of the product which unusual from other industrial mass-produced products, (2) the variation on the type of ships (from those that are a few meters to those that are hundreds of meters long) which have different operational characteristics attached to it. First, the majority of the ships produced and used in Indonesia range from small river boats with lengths of up to three-metres to ocean-going vessels that could reach 300 m

long, (3) each ship's project requires a wide variety of materials and equipment combined with different quantities of labour and expertise, and (4) the nature of the fittings and fixtures depends on the type, size, and the purpose of the vessel and this impacts on the amount of labour time required for fabrication. Therefore, the concept of *PPN* is developed to understand the governance of shipbuilding projects involving these different degrees of decision-making processes.

Despite the importance, the governance of project-based production networks has not yet been explored in the existing literature around firm-specific competitiveness, local production network, as well as global production networks. As discussed in Chapter 2, Many of the netchain literatures (GCC/GVC/GPN) has predominantly focussed on understanding the production of a large-scale production activity (mass production), such as the manufacture of footwear (Schmitz and Knorringa, 2000), the horticulture industry (Dolan and Humphrey, 2000) and the apparel and electronics industries (Gereffi *et al*., 2005). The literature, however, has not yet explore the governance issues and the dynamics of project-based firms (PBF) nor develop an understanding about the geographic organisation of PBF.

On one level, Gereffi's approach to governance is in accord with *PPN* developed in this chapter to explain the coordination of inter-firm and extra-firm relationships involved in the shipbuilding project. On another level, this chapter extend the understanding by introducing a framework to explore the governance structure by taking into account the dynamics of *PBF* into account. This includes understanding the organisation of *PPN* from the perspective of the shipbuilding industry. In so doing, this chapter identifies the ways in which shipbuilding firms organise and assemble their project-based production systems, as well as the importance non-firm actors. Ship is designed, constructed, and delivered using a variety of customised inputs from a different combination of actors. One implication of this is the highly differentiated ways

in which shipbuilding production networks are organised, and the ways that this is influenced, in part, by the nature of each order and ship-buyer market segmentation (private, public, freighter, leisure etc).

Before characterising the organisation of shipbuilding production projects including exploring the influences on their organisation, the analysis must first explore why the existing account of the governance of value chains is problematic when applied to the shipbuilding sector. Gereffi (1994) provides one of the most comprehensive definition of inter-organisational networks when he notes that:

> *"Sets of inter-organisational networks clustered around one commodity, linking households, enterprises, and states to one another within the world economy. These networks are situationally specific, socially constructed, and locally integrated, underscoring the social embeddedness of economic organisation… Specific processes or segments within a commodity chain can be represented as boxes or nodes, linked together in networks. Each successive node within a commodity chain involves the acquisition and/or organisation of inputs (e.g., raw materials or semi-finished products), labour power (and its provisioning), transportation, distribution (via markets or transfers) and consumption".* (Gereffi *et al*., 1994, p.2)

This describes governance structures that concentrate on the relationship between inputs and outputs, and despite it highlighting the evolutionary nature of the spatial division of labour as "*production process changed, products are redesigned, demand is transformed, and factor inputs altered",* it tends to under-theorise the dynamics of geographically dispersed production activity (Henderson *et al*., 2001; Bryson *et al*., 2018, p.97). This study of shipbuilding, however, develop an understanding of project-based production networks by taking into account a series of different ways in which projects can be delivered and are enacted using different

combinations of inputs. Thus, this dynamic process and the configuration of these networks reflects the needs of each project-based product, in this case is every ship built by a yard. This type of project-based organising ensures that change and dynamics are central to understanding the geography of project-based production systems.

In this study, shipyard is defined as a system integrator that is responsible for developing and governing the relationship with firm and non-firm actors, based on their ability to contribute to technical and legal requirements to deliver the ship project to the buyer's requirements. This chapter explores further ways in which shipyard organise, construct, decide, divide and differentiate between firm-level, local level and global level processes. These many element of choices in ship construction build upon the needs of clients which are specified by the contract. The contract holder, to some extent, can also be the shipyard, depending on the type and the purpose of the vessel. This chapter identifies six highly differentiated pathways in organising the shipbuilding PPN (Figure 7.1).

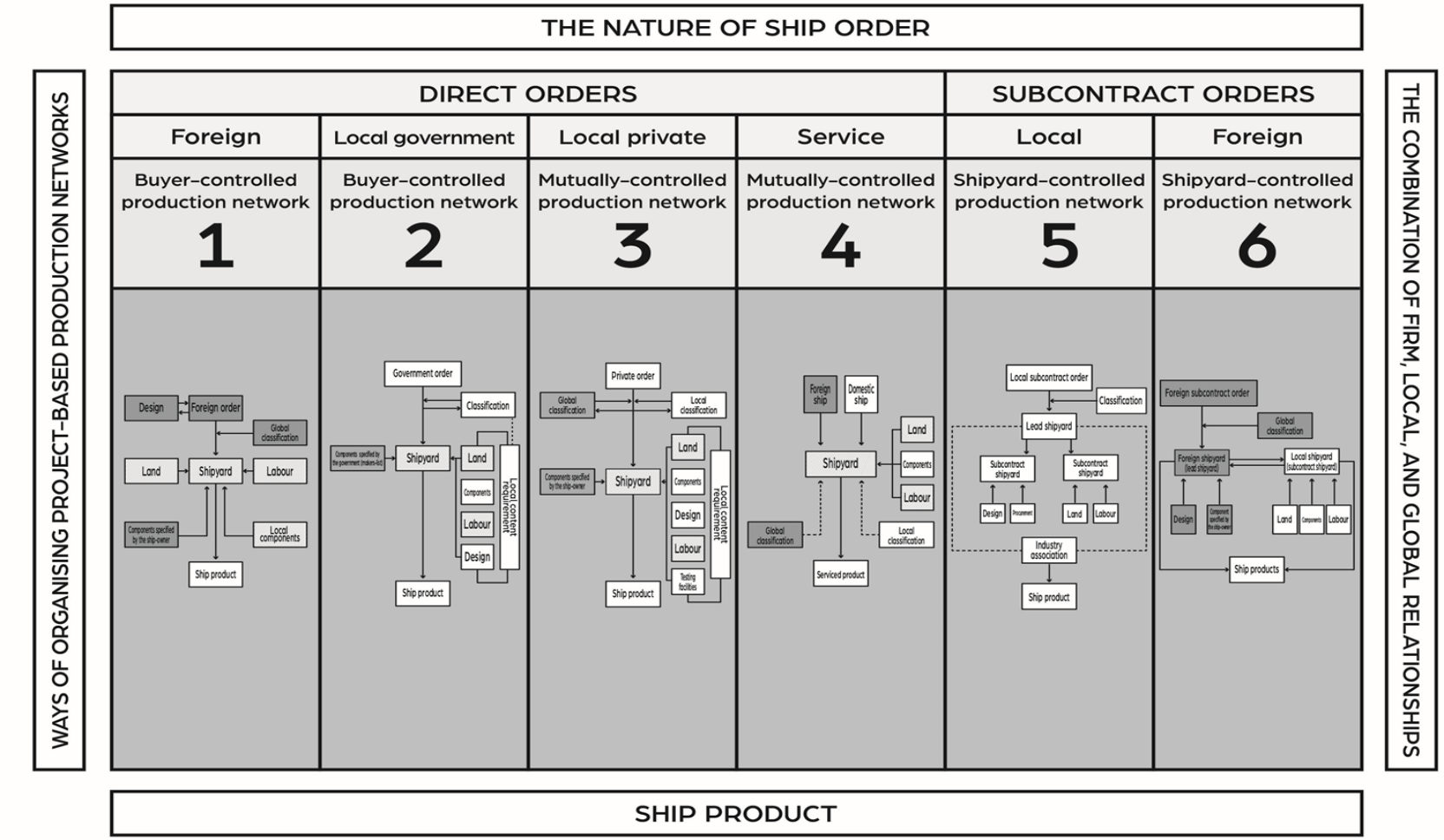

Figure 7.1 Six types of *PPN* in Indonesian shipbuilding industry

To begin the analysis, the issue with the current GVC governance framework is discussed. Previous GVC mainly focused on the production of mass-produced consumer products, which are fundamentally different to the organisation of shipbuilding's project-based activity. Different ship projects can be enacted using different combinations of inputs. This provides a notion of dynamics and a series of choices, as each shipbuilding project involves different combinations of firm/local/global processes. These differences reflect the nature of the order which characterised by the purpose of the vessel. Therefore, organising each shipbuilding project vary from one another. For instance, the process of selecting supplier depends on requirement set by the buyer (if it is a buyer-controlled order), however shipyard allows to choose suppliers (when it is shipyard-controlled order). The types of decision-making that occurs during the project also links the *ship contract* which govern the organisation of ship production, which can be a locally-orientated or more globally-orientated types of PPN. This thesis proposes the PPN governance model to extend the understanding of the current governance by exploring ways in which the shipbuilding project is governed involving different level of: firm internal, local production, and global production networks.

7.3 THE DYNAMICS OF SHIPBUILDING PROJECTS

The relationship between firm and non-firm actors enhances the delivery of shipbuilding projects including contributing to the ways in which knowledge is shared and absorbed between firms to stimulate capability. In addition, the role of supporting institutions also contributes to complement the required elements of a shipbuilding project, such as the certification process. Ship certificate is provided by the *Classification Society* depending where the ship is registered. In this case, *Classification Society* help contribute to the quality of the end-product by providing guidance and assessment. Without the relationship with non-firm actors, the development and the capabilities to deliver shipbuilding projects would then be constrained.

Production networks are essential for generating value, knowledge, and experience from both local and global relationships and in transforming these interactions in to a production process that leads to the completion of a commercial product. Six different types of PPN: (1) Foreign shipbuilding order, (2) Local government shipbuilding order, (3) Local private shipbuilding order, (4) Ship servicing order, (5) Local-lead subcontract shipbuilding order, and (6) Global-lead subcontract shipbuilding order are explored to provide an understanding of the governance of project in the shipbuilding sector.

7.3.1 Foreign Shipbuilding Order [PPN 1]

The organisation of the production networks for the construction of a ship that has been ordered by a foreign buyer will be first discussed. A foreign order often seen as the most complex project requirements, as it involves both local and global rules of the game. A foreign order requires similar activities involving global processes compared to many local orders (Figure 7.1). The key insight from organising the non-firm actors involved in a shipbuilding project is also to decide who coordinates and controls the production system. For example, international *Classification Society* plays an important role in assessing and determining the type of components applied in a vessel.

In this chapter, this type of project-based organising will be regarded as a buyer-controlled mechanism for two reasons. First, the shipowner specifies the location of the classification agency based on where the ship is going to operate, secondly, the classification society will then set regulations regarding the specification needed to be installed prior to a ship being awarded a ship's certificate. The latter then governs the selection of suppliers. For example, the case of a project completed by shipyard SOSY7 and PVSY44. Because the vessel will be operated at a certain speed, it requires a specific density of steel and aluminium. This limits the options of supplier into ones that has the ability to produce the grade of metal required to

produce the hull. In addition, foreign clients tend to specify the components that can only be sourced from global component suppliers and certification. Another example is the shipbuilding order came from Malaysia's military that can better illustrates the geographic organisation of a foreign ship order. During the interview, SOSY30 confirmed that Malaysia had signed a shipbuilding contract with them to build a *Multirole Support Ship* (MRSS) or a type of warship 163 meters long. This order was received via a *direct appointment* process rather than a *bidding process*. The reason for this direct appointment mechanism was due to shipyard's positive reputation (the importance of PBF reputation was discussed in Chapter 4) based on the successfully delivery of two *Strategic Sealift Vessels* (SSV) that previously had been ordered by the Philippines. Although, Malaysia's MRSS would be slightly larger than the SSV (which was only 123 metres), it would have similar features. The features include (1) three helipad, (2) the facility to carry two *Landing Craft Utility* (LCU) units, and (3) the facility to carry various military tankers and *Amphibious Assault Vehicle* (AAV). The contract value for these two units was approximately 1,1 trillion Indonesian Rupiah or equals to USD $76 million. In this project, SOSY30 was the prime contractor who responsible for providing the preliminary designs for the hull construction, outfitting, furnishing (the steel used during these stages are sourced locally), and post-production activity including maintenance and repair.

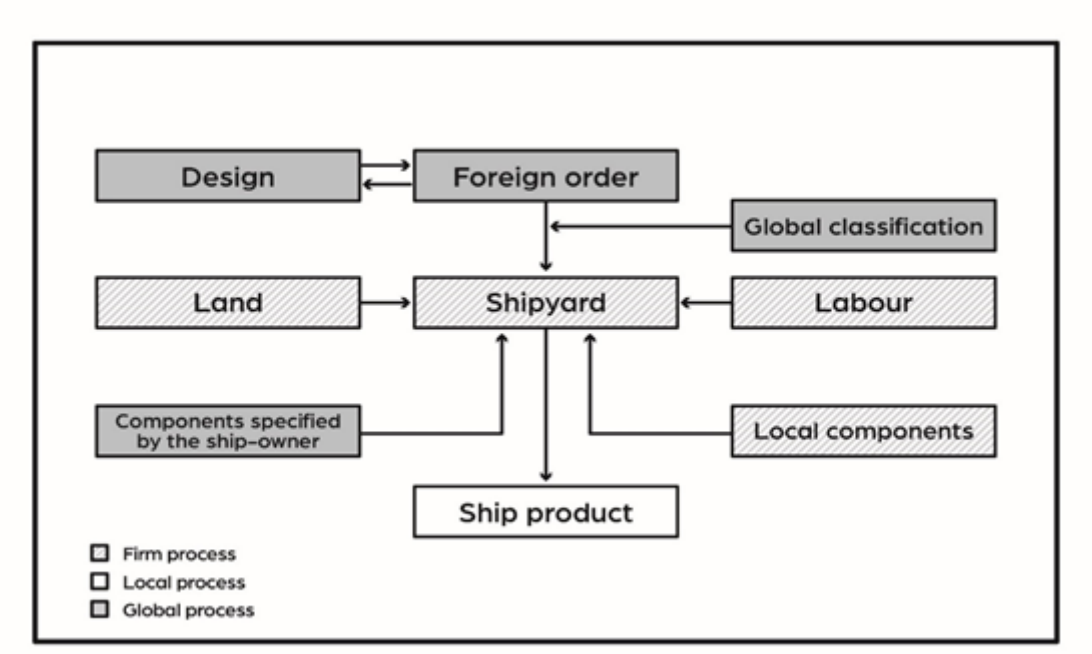

Figure 7.2 The Governance of Foreign Shipbuilding order

Furthermore, the combination of various professionals and sub-contractors involved in this project formed a project management team. This team reflected the strong maritime cluster located in Surabaya, where the shipyard SOSY30 is located. This region has far-reaching historical shipbuilding traditions in Indonesia, which become a competitive element for the shipyards located in this region (Chapter 4 and 5). The MRSS project includes approximately fifty companies and employed almost 1000. More importantly, the project was organised internally. As discussed in Chapter 4, shipyards located in this area benefit from abundant supply of competent labour and technological experts. Many public sector organisations such as research facilities and academic training operating in this area contributes to increasing the workforce capabilities by regularly provides joint training in maritime-related fields. All the advantages offered by a comprehensive network of suppliers, sub-contractors, and highly qualified maritime expertise contributes to the attractiveness of this regions for domestic and foreign ship buyers.

Furthermore, the construction of the *SSV* project was initially conducted based on bilateral co-operation between the Indonesia and the Philippines to strengthen the relationship. SOSY30 has been focusing on the *SSV* market since 2011, and this exposure has provided SOSY30 with greater market expansion outside the domestic market. It also enabled SOSY30 to promote the specialised shipbuilding skills to other neighbouring countries. The enhanced reputation contributes to firm's competitiveness as it allows shipyard to increase their participation in global ship transactions. Further, the strategy to focus on product specialisation plays a critical role in attracting new market. For instance, the government of Senegal had been a loyal customer of SOSY30, but only for ship maintenance. After witnessing the successful delivery of Philippines's SSV and Malaysia's MRSS, the President of Senegal placed his interest to buy military vehicles and vessels for their coastal border surveillance. The PPN of foreign-order highlight the importance of trust and product specialisation. Unlike previous overseas orders, the Senegal government requested a full-design including technical specifications to be provided by SOSY30. This highlights the increasing capabilities of shipyards is transformed after each project.

7.3.2 Local Government Order [PPN 2]

To organise and complete the construction of a ship ordered by government requires shipyard l to assign a lead project manager who is responsible for forming an integrated project delivery team. This governance structure includes non-firm actors such as the Classification Society. The client, in this case the government, is regarded non-firm actor who monitors the construction progress. In doing so, the government shipowner usually decides on component suppliers that can provide the required components by providing a '*makers list*.' As discussed in Chapter 4, a 'makers list' is typically agreed before a bidding process takes place and will be conducted through *e-Catalogue* system. Although components are sourced from overseas, the

decision on particular items is made by a local actor. As discussed in Chapter 5, the importance of local decision-making in the sourcing of components is related to the nature of compliance required by the state. One aspect of this is the growth in demand for Indonesian ships that predominantly are produced domestically.

The degree of *resource sharing* to accommodate these orders varies depending on the type of ship ordered. Firm actors contribute to providing tangible resources (land and labour), but also intangible resources (such as expertise on design capability or project management capabilities). The governance structure of the 'ship project consortium' typically consists of the shipowner, shipyard (that are following the local content requirements), and local suppliers.

In addition to these firm actors, non-firm actor such as the local classification plays critical role in overseeing the construction process and the project's timeline. The involvement of a local classification society (*BKI)*, as opposed to a foreign classification agency, is encouraged by the Indonesian government, due to the reason (1) to fulfil the local content requirement, and (2) to increase the participation of the local shipbuilding networks in these projects. The compliance process with BKI highlights a specific characteristic of the state-order, which require the shipyard to maximise the level of *local content* for a domestic ship. The local content requirement specifies that it should be the minimum of seventy percent. Therefore, it is the responsibility of the shipyard to divide and allocated tasks between the local and global suppliers (Figure 7.3).

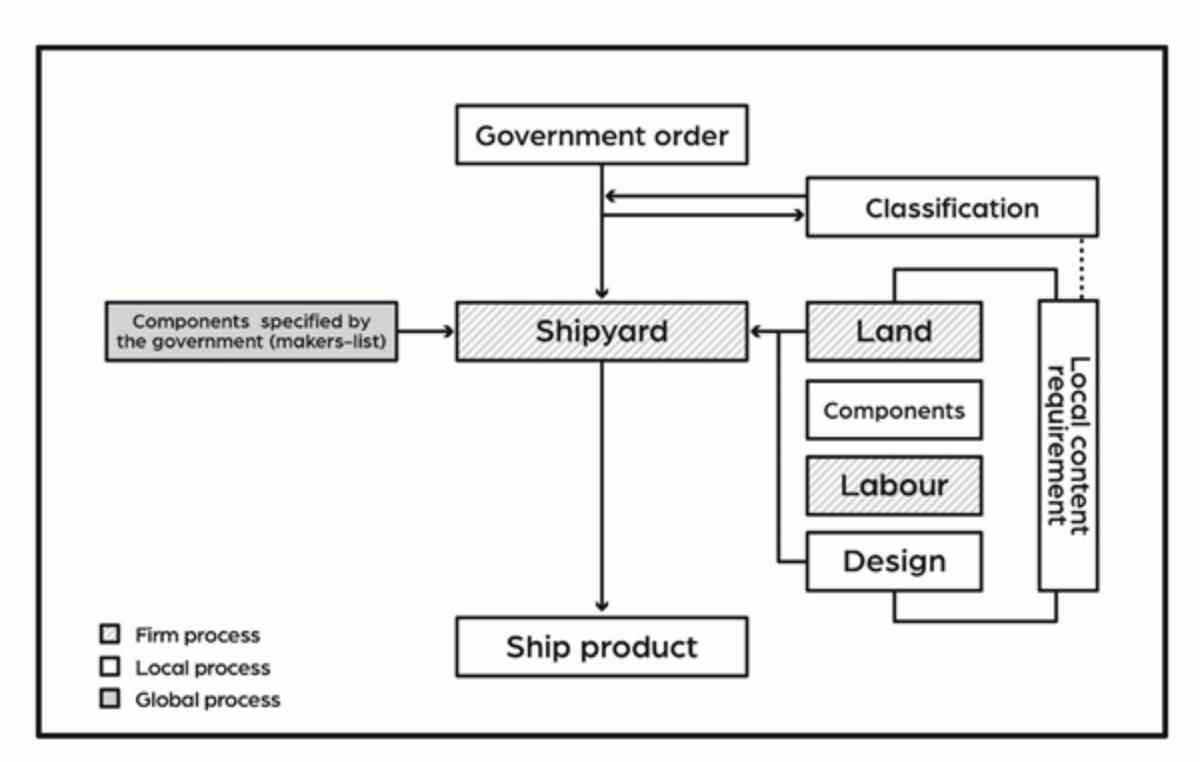

Figure 7.3 The Governance of Local Government Shipbuilding order

From the information provided by the shipyard's representative (and as discussed in Chapter 6), the most critical element required from the global supplier is to source the ship not produced in Indonesia. Further, another issue with sourcing engines lies in the difficulty to approach and persuade the engine maker to sell one or two engines. This problem, however, can be addressed by forming a *purchasing group* amongst local shipyards (Chapter 5). In this case, the industry association plays a significant role in communicating the demands of the industry to global ship makers. It is by identifying and delegating a shipyard representative who responsible for negotiating the terms and condition of collaboratively purchased items. During the interview, the owner of shipyard PVSY03 noted that the *purchasing group* is not merely negotiating the price and the minimum number of engines acceptable, but also negotiating the delivery terms. That means, the more engines being ordered, then the group order will be prioritised. Typically, the negotiator is selected by the association members based upon the individual experience of negotiating critical group purchasing agreements. The representative is responsible for

administering the relationship with the component manufacturer and group members as well as safeguarding the importation process including customs. This purchasing group is considered as a temporary but critical element that contributed to overcome a project-related obstacle faced by the *PBF*. In addition, it is interesting note that *group purchasing* is an unofficial and temporary mechanism. The mechanism of selecting the negotiator does not involve a written or official contractual agreement between the local shipyards. This reflects the embeddedness, trust, and long-term relationships that was built prior to the development of *group purchasing*.

The *group purchasing* initiative considered as a loose network of core partners working together on a project-based production system from time-to-time. This form of temporary PPN that is not yet included in the governance literature. To Gereffi *et al.,* (2005) production is organised through an explicit coordination that includes power asymmetries. In the case of the shipbuilding industry, ways to coordinate the production of project-based products have developed. There are different ways of governing the relationships between actors in a shipbuilding project, and these are varies by contract and by the type of ship.

In pathway 2, government shipowner controls the development of PPN due to the funding of the project that comes from the tax-payers. Therefore, it is important to ensure that the project involves an appropriate number of local contents required to comply with the regulation. This includes the process to procure any element used in state infrastructure (state-vessels). The expectation of this regulation is to help develop local capabilities in relation to maritime infrastructure. The *local content requirement* also dictates the governance of PPN by limiting the involvement of overseas suppliers and enhance the relationship between *LPN*. By doing this, the involvement of global actors occurs mainly on the supply side.

Further, the development of local suppliers' capabilities has also become a central element of ship orders made by the Indonesian government. Thus, PVSY36 confirmed this as:

> *"We always try to give the same opportunity to the local component manufacturer to be involved in a government project. The main thing for them is not only to be able to sell their products, but to also develop and extend their capability to manufacture other related product. Just a story though, we have once received an overseas order which we then sourced all the furniture locally. It turns out the shipowner was very delighted with the craftsmanship and has helped to spread the news since".*

The decision-making process regarding the configuration of *PPN* for the state-order mainly regulated by the client (buyer-controlled *PPN*). This includes the provision of a *makers list* provided to the shipyard during contract negotiations. Once the contract is agreed and signed, the shipyard commence the procurement process with suppliers and this including negotiating the terms and conditions. This process implying that there are two decision-making elements to an order made by the Indonesian government. It is partly determined by the client, and partly determined by the regulation. The regulation is the 'product' of the government, as well as the requirement to register to the local classification agency (BKI) also owned by the government. Therefore, in the buyer-controlled PPN, the government act as buyer and regulator.

It is worth noting that the governance of large project-based products does not involve a process that locks suppliers into one type of relationship with a lead firm – the shipyard. Instead decision made by the shipyard reflects the ways in which LPN and GPN are configured to meet each project requirements, i.e., occurs on a project-by-project basis. PPN is organised at inter-firm level through a variety of methods. The following section continues to explore another alternative way in which a shipyard configures their PPN based on the nature of the transaction, geographic locations, and reputations that are embedded, in some cases, in particular locations.

7.3.3 Local Private Order [PPN 3]

The approach to developing local private order PPN often allows shipyard to deliver all production stages in one location, although other LPN actors are involved in this type of project. For instance, during the interview, PVSY29 confirmed that they were directly appointed to build *Self-Propelled Urea Barges* (SPUB) or a vessel that is used to distribute fertiliser across the islands in Indonesia. This special design was created to overcome the specific challenge of low water levels (less than five meter) in the river beds where *SPUB* operates. To transport fertiliser to the Island of Sumatera, the vessels requires to carry 10,000 tons, but with a much smaller draft. In addition, the 26 metres long ship project required to be completed in 16 months. To date, SPUB is the first vessel produced in Indonesia that applied the *Common Structure Rules* from the *Association of Classification Societies* (IACS).

The *local content* for the SPUB project was relatively high due to the majority of components is sourced locally. The project also involved a research institute from the local university (LPPM – ITS) as well as NASDEC design that assisted with testing including first-cutting and a hydrodynamic or towing test. The BKI also plays an important role in building local competencies by certifying the welders after the provision of in-house training by a shipyard. The primary non-firm actors included the classification agency and local government in the form of the local content requirement that set a standard for the minimum number of locally sourced components and workers that has to be involved in this project (Figure 7.3).

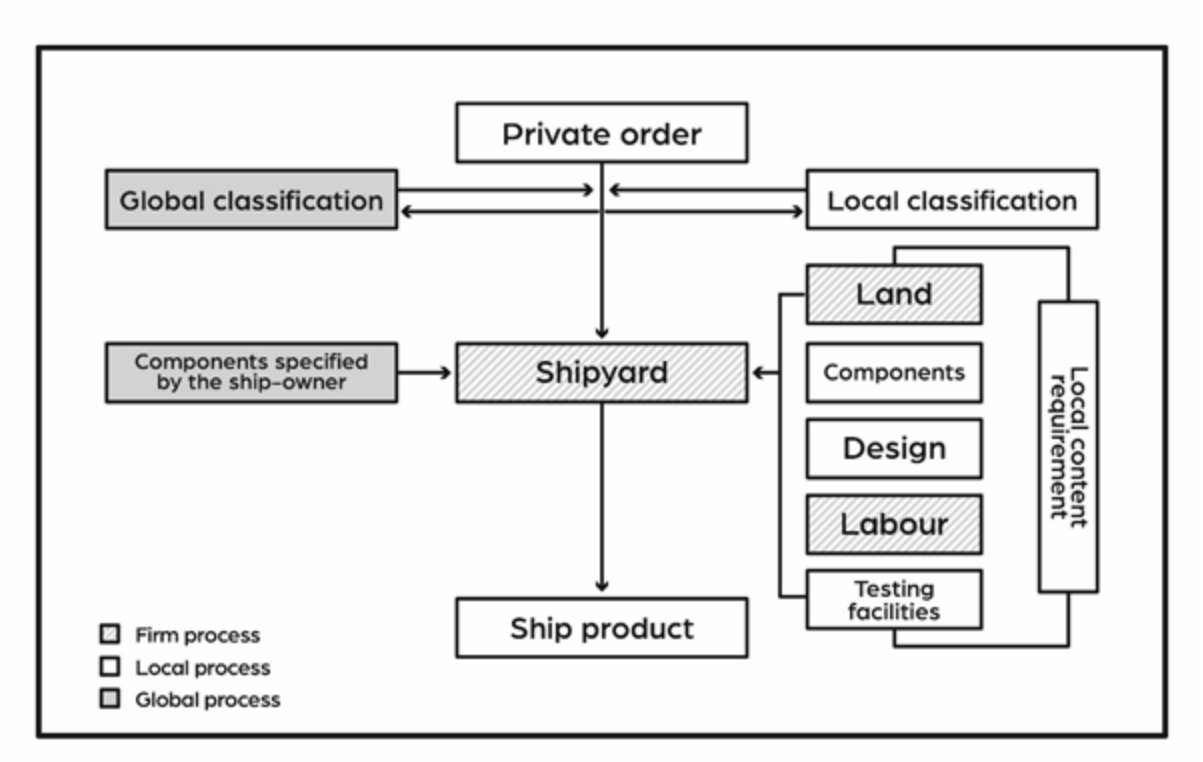

Figure 7.4 The Governance of Local Private Shipbuilding order

Another example comes from a shipyard located on Borneo Island that was managing the construction of a series of similar ship projects (sister-ships). In this case, one *Project Director* was responsible for all projects in the shipyard. At the time of the interview, the shipyard was in the process of building four units of 150 metre vessel (DWT capacity per year 13650 tonnage). In the case of completing the sister-ships project, the *Project Director* was assisted by four *Project Managers*. He stated that the major challenge was not during the construction phase. Rather, it was the lack of engineering expertise and skills in project management. Thus,

> "*To be honest, I am not concerned about completing the construction tasks. I think we have good knowledge and experience in translating many ship designs into the construction task. Instead, it's the planning stage that is usually pretty challenging, you know, it's difficult to precisely divide the task into many different divisions that will be working simultaneously. The issue is that some of them will work together on the same site, but some of them will work on some other site. A little story, I was very impressed*

with one of the small shipyards in Japan that I have visited recently. They only have 35 employees, 25 of them are Indonesians by the way, and 10 are Japanese. They work only 10 hours a day, but they are capable of completing 1200 tons a month and deliver 20 vessels per year! Impressive, very efficient, I am sure it's because of the projects are carefully planned".

For a private local order PPN, both the shipyard and the ship buyer are able to propose procurement terms. In some cases, the ship buyer provides a *makers list,* but when a private client did not provide a makers list within the contract (which are the majority of the case), the shipyard makes the decisions regarding the configuration of the *PPN*. The procurement proposal, including a list of potential suppliers, is discussed prior to the budgeting phase. However, even when it's the shipyard's responsibility to source the components and other inputs, the process is monitored by the shipowner. Thus

"There was one accident recently. One of suppliers didn't follow up our order and failed to deliver the component as scheduled in the contract. This is unacceptable as our project got delayed. Therefore, no matter how competitive the price is, once we experience this neglected behaviour, we won't continue working together with them. Delivery commitment and follow up service from vendors are fundamental". [PVSY14]

PVSY14 suggested that both the shipyard and ship-buyer closely monitored the performance of vendors that directly impact the ship construction process. Supply difficulties were centred on the temporary nature of the PBF which required shipyard and the ship-owner to continuously re-evaluate sourcing mechanisms as well as suppliers. This re-evaluation was applied to both component suppliers (for materials and equipment) and subcontractors (for labour including welders). PVSY14 was one of the few domestic shipyards located in Batam who currently struggled due demand difficulties demand. Besides, Batam also suffered from

the application of different regulations applied towards heavy industry. Shipyards in Batam had to pay higher minimum wages due to the regulation No. PER-01/MEN/1999 that set the minimum *Sectoral Minimum Wage* at 5% above the local minimum wage (*Department of Industry*).

7.3.4 Ship Servicing Order [PPN 4]

Servicing and repairing ships is not as complex as shipbuilding. Chapter 4 discussed ways in which many shipyards are focusing on the ship repair market due to the more stable income stream and higher profits compared building new ships. There are at least 18,000 ships operated in Indonesian sea water that needs to be repaired each year. This is partly to comply with the regulations and as a process to renew ship licence. For instance, the increasing market for ship servicing in Cilegon contributes to the shipyard PVSY32 competitive advantage as they are now able to expand their fabrication facilities into three different areas. In addition, a positive reputation also played an important role in attracting new domestic customers. PVSY32 confirmed that a recommendation from a loyal customer was considered helpful in advertising the quality of the services provided by the shipyard. Thus,

> '*Ship-owners do rely on 'word of mouth' in order to select a shipyard that can provide a good quality of service and maintenance*.'

To response to the increasing demand, they increased the number of employees to more than 1500 permanent employees. PVSY32 focuses on providing the steelwork, fitting, blasting, mechanical, and electrical inputs for all ship maintenance projects. In addition, the organisation of the workflow between these three different areas is still managed and integrated by the head office. The market for ship service maintenance not only comes from the domestic market but also from foreign vessels that operate within Cilegon area (Figure 7.5).

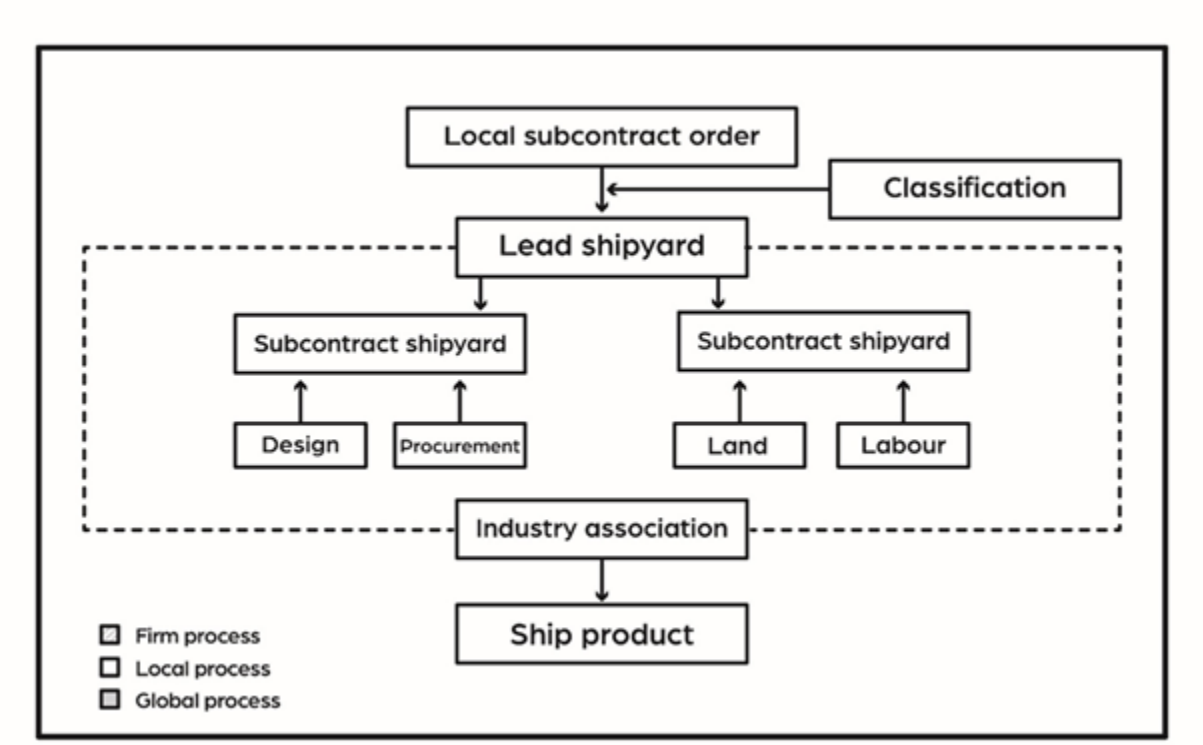

Figure 7.5 The Governance of Ship Service Order

Furthermore, delivery also plays an important role in the ship servicing market. To avoid delays, PVSY32, and many of the service-focus shipyards, stated that they invite the client's surveyor or shipowner's representative, to lodge inside the shipyard complex during the project completion. This is due to major challenge faced in completing maintenance project was a poor communication between shipyard and shipowner. A rapid response is required from the shipowner if alteration is required during a ship maintenance. During this time, the owner's representative is responsible for monitoring progress, whereas the shipyard's project management team is responsible for communicating all issues. By doing this, decision can be reached quickly. Therefore, permitting the client's representative to stay within the shipyard is a useful strategy to tackle PBF issue, mainly: (1) to monitor the maintenance progress, and (2) to quickly discuss and respond to any issue that are identified by the shipyard's internal team. The strategy echoed by the shipyard PVSY24, another *service-focus* shipyard:

> "*It is critical to be on time although even though this is not a new build project. I mean our yard has to work on more than 20 different vessels with various starting points, various requirements, and various delivery time, so the biggest challenge is to manage our workforce and to allocate resources. If one project got delayed, it would impact on the labour allocation for the other projects"*.

More importantly, scheduling is a critical element during the servicing of a ship. If the shipyard is unable to complete the maintenance on time (for example for a cargo ship), then this delay impacts on the cargo loading schedule. For the shipowner, the result is a reduction in their profitability. Although in most cases, a shipyard and a ship-owner will have established yearly docking schedules in advance to avoid potential delays. During the interviews, 6 out of 30 shipyards confirmed that the primary reason for focusing on services was due to the increase in the size of this market every year. These shipyards stated that focusing on ship servicing market enhances cash-flow because (1) servicing comes with a higher profit margin compared to shipbuilding, (2) approaching ship maintenance does not involve a complicated bureaucratic process, and (3) the demand is not only stable, but also is increasing. Unlike other PPN, *service-focus* shipyards rarely involved LPN or GPN. The majority of tasks are handled internally by the shipyards. Thus,

> "*We may recommend another shipyard to our clients when we have full capacity, but no, we did not really co-produce or share resources or anything like that. Every activity is handled internally"* [PVSY39]

At the time of the interview, PVSY39 was extending its fabrication area and also developing an indoor service to extend their ship repair activity.

7.3.5 Local-lead Subcontract Order [PPN 5]

During the shipbuilding boom of 2015, collaboration between shipyards is encouraged by the industry association. This was a coping mechanism to deal with the increasing in the number of orders but, more importantly, this was intended to help shipyard with the limited resources issues. Shipyards who won a contract (*contract holder*) is responsible for overseeing the procurement stage including information gathering rom supplier. During the information gathering stage, suppliers are invited to provide terms and conditions to purchase components and materials. A typical local lead subcontract PPN consists of a set of actors from the private shipyards with a heterogeneous knowledge-base and experience as well as differential levels of technical expertise. It is a PPN that allows LPN to collaborate and share resources with one another. Firm with a strong reputation is more likely to be directly appointed by a shipowner to undertake the development of a new vessel. This type of PBF is a central actor in local subcontract PPN. They control, develop, and invites other shipyards to participate in a shipbuilding project. In this case, the lead PBF plays a critical role in the configuration of PPN (Figure 7.6).

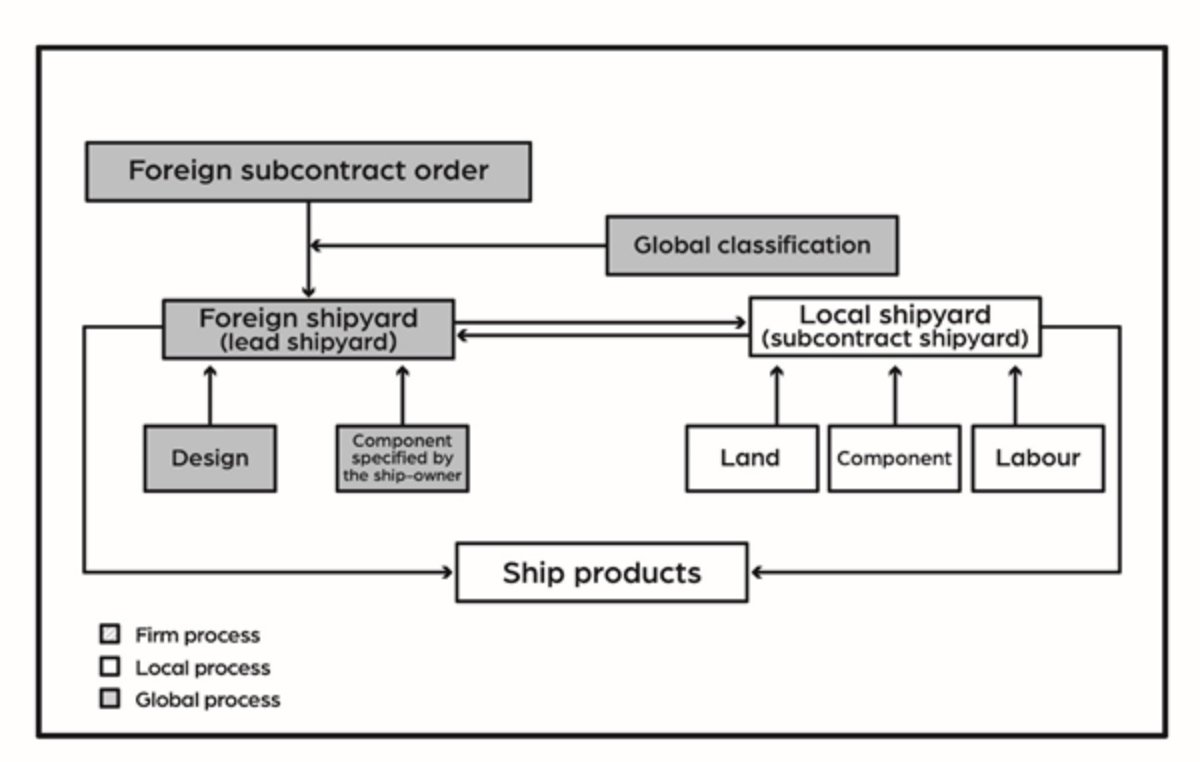

Figure 7.6 The Governance of Local-lead Subcontract Shipbuilding Order

Figure 7.6 reflect the process of the development of local-lead subcontract PPN. For example, PVSY08 is one of the shipyards located in Java Island, who recently received an order to build a series of patrol vessels. However, due to current commitments with on-going projects, their facilities were at full capacity. In this case, PVSY08 sub-contracted the construction phase to a competitor that was located on the same coastline who then responsible for hull construction and system integration. Prior to this, PVSY08 was responsible for the pre-production phase including the initial design and project management as well as post-production activity such as final checking and customer support.

The lead shipyard is typically the most experienced shipyard in handling shipbuilding projects. The ship's project is organised and assembled to develop the shipyard's knowledge so that all shipyards involved had experience of working together. More importantly, the newly established shipyards could have opportunities to engage in delivering more projects. Joint production with this type of large yard has helped strengthen the position regarding the local

production of ship products for two reasons. The difficulty in responding to client demand is usually based upon (1) whether the shipyard had previous experience of building the required vessel, or (2) whether the shipyard has the capacity. Therefore, for the subcontractor shipyard, a *joint production* provides flexibility to respond to various customer demands. Whilst for the lead shipyard, it removes the investment risk of expanding their facilities to accept more orders. *Joint production* allows shipyards to increase their flexibility in responding to the market.

In the diagram, subcontract shipyard #1 is responsible for organising the pre-production activity includes completing the design and procurement. This process also includes assessing the specifications and the quality of materials ordered. Thus,

> "*Our Quality Control (QC) department have to check everything in detail. We check the certification for each product as well as the serial number and registration number in each steel plates, for example*."

A quality inspector or QC plays a vital role in checking product compliance prior to the construction process. Therefore, QC is not part of the Project Management team. Instead, it directly reports the quality of the ship to the shipyard owner or the President Director. As a designated body who manages the rigorous assessment process, their judgement cannot be influenced by the shipyards production team. The QC is responsible to ensure compliance with the various regulation attached to the vessels, includes (1) the Classification agency as certifier, (2) SOLAS, (3) Ministry of Sea Transportation, and also (4) the ship owner's requirement.

Furthermore, the subcontract shipyard #2 is responsible for providing a fabrication area and supplying labour during the construction phase. In this case, prior to joining a local production networks, PVSY42 was primarily involved only in the production of small-scale fishing boats. To provide a background, PVSY42 owned a large fabrication area and had grown their domestic sales in recent years. Over the years, they are interested to involve in *co-production*

activity in order to build their capabilities and to acquire a reputation for constructing more complex vessels. When joining PPN 5, PVSY42 is responsible for 80% of construction beforehand the ship over to the lead shipyard for the performance testing. The development of this type of PPN contributes to trust building and in creating stronger ties between local firm actors. On the one hand, this form of PPN resulted in cost savings due to the overhead and facilities are shared between the two shipyards. On the other hand, the speed of project deliver provides a significant advantage for both shipyards. Technology, equipment, and expertise shared during the production phase has significantly reduced the time needed to complete a project. Thus, a critical PBF issues is tackled through PPN.

7.3.6 Foreign-lead Subcontract Orders [PPN 6]

A foreign-led subcontract PPN is discussed by exploring the case of the completion of a dredger ordered by a European shipyard. In this case, PVSY44 is a foreign shipyard who actively seeking to collaborate with shipyards in low-cost production sites including Indonesia, Vietnam, and Thailand. However, PVSY44 does not owned their own land nor fabrication area in Indonesia. They offer their design expertise and connection to the global buyer.

PVSY44, a shipyard located in the Netherland, has a long experience in delivering hopper dredgers as well as *Cutter Suction Dredgers* (CSD) from its own yard. This company subsequently established *joint production* in countries with relatively lower land and labour costs, including Indonesia. Although the location is relatively low cost, the drivers for outsourcing this activity to Indonesia was also based on the opportunity to expand their position in the market for dredgers. It is worth noting that even though PVSY44 was the contract holder for the dredging project, the ship-owner was an Indonesian shipping company who will operate the dredger along the long river in South Kalimantan (Borneo).

The demand for dredging vessels has been growing globally since 2000 as more coastal land needs to be reclaimed and protected from erosion and floods. Furthermore, the dredging industry has played an essential role in the European maritime cluster and has contributed to the development of 66% market share of dredging in worldwide markets (European Dredging Association, 2015).

In this case, PVSY44 holds a contract to build this project from the Indonesian government and was responsible for pre-production (i.e., planning, design, communication between stakeholders, and procurement) but sub-contracted the production stage to a trusted local shipyard PVSY03. Following this, the foreign shipyard's planned and developed the PPN with regards to identifying critical component provided by foreign suppliers. Due to the complexity of the vessel, only a small percentage of local suppliers involved in this project. A local subcontractor for welders was involved, but the technical expertise was provided from PVSY44 head-quarter in Netherlands. This project combined local element (fabrication area) and global element (classification society). PVSY44 stated that they only subcontracted the construction phase to the shipyards in Indonesia. The process of ship design, sourcing spare parts and components, as well as providing after sales service will be conducted by them. On the one hand, this mechanism allowed foreign firm to undertake production activities in a low-cost production site. On the other hand, it helped Indonesian shipyards to develop their production capabilities and gradually to build up their portfolio and to shift from only serving domestic clients to working for some overseas clients (Figure 7.7).

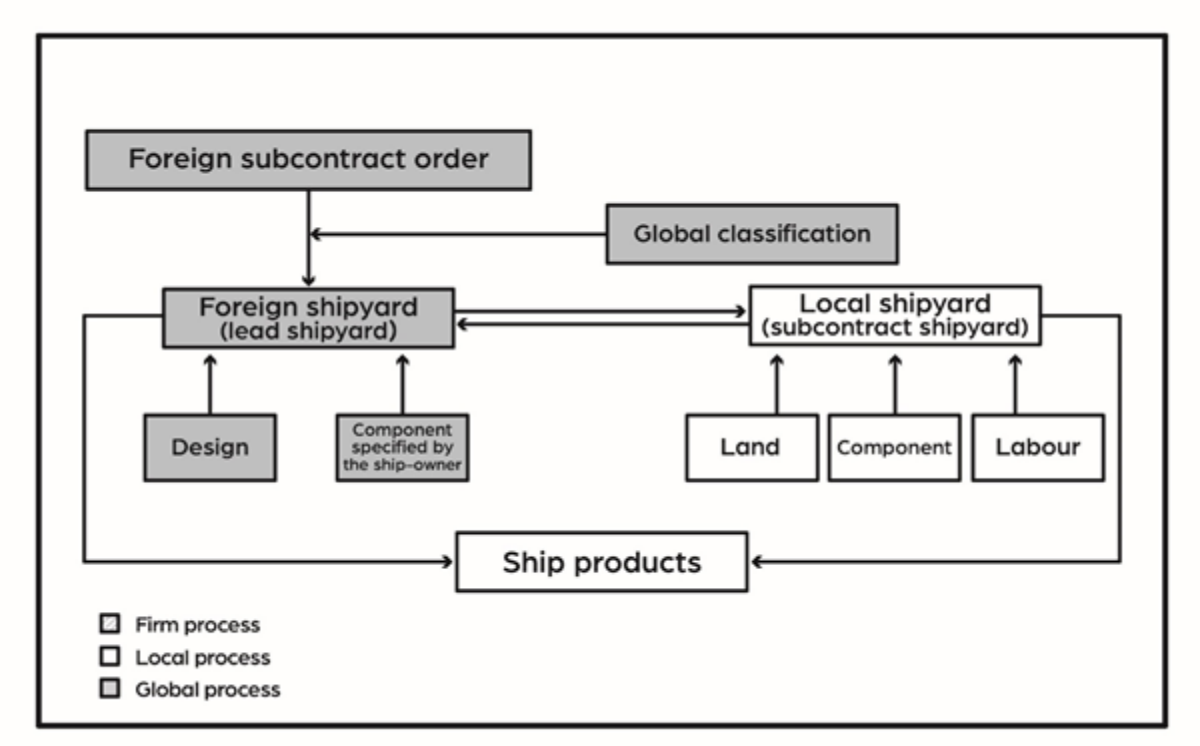

Figure 7.7 The Governance of Foreign-lead Subcontract Shipbuilding Order

In this type of project-based production network, the flexibility to accommodate client demand and the speed of project delivery are critical elements that contribute to a yard's sustainable competitive advantage. Relocating the construction stage from Europe to Indonesia reduced the construction cost that are land and labour intensive.

7.4 TOWARDS *PROJECT-BASED PROUCTION NETWORKS* (PPN)

This chapter identifies the different ways in which shipbuilding production is organised by the buyer-controlled and shipyard-controlled *PPN*. The development of the *PPN* for each shipbuilding project is greatly influenced by the contract holder. Further, the framework also identifies how project-based firm lead the development of PPN, unlike previously discussed in netchain literatures (GCC/GVC/GPN/GPN2.0). More importantly, PPN put shipyard as a primary driver behind the organisation of the shipbuilding production ecosystem.

The variety of PPN also reflects the importance of firm and non-firm actors in contributing to the development of PBF competitiveness through enhancing shipyards capabilities. Non-firm actors have played a critical role in supporting the shipyard through providing guidance and safety assessment, facilitating training, as well as assisting in research and design.

The type of order plays an important role in governing the constellation of PPN involved in shipbuilding project, which controlled by the contract specification. A controlling factor in the six different PPN explored in this chapter is that the relationships are partly controlled by the ship-buyer and partly controlled by the shipyard. Some ship buyers dictate the degree of involvement by LPN/GPN in a shipbuilding project. For instance, the decision to locally or globally source components, or the decision to register the vessel with a local classification or international classification society. In addition, these decisions also based upon the shipyard's current capacity, i.e., to manage all the production processes in their own shipyard using their internal resources, or to subcontract one or more production stages to other shipyards. All these decisions influence the development of PPN.

Within a shipyard, there also has some degree of decision-makings in relation to decisions to focus on one activity or multiple activities in the same yard. About eight out of thirty shipyard participants in this study decided to only focus on ship servicing due to the more stable cash flow and higher margin. Conversely, the remaining shipyards provides a more extensive range of services i.e., serve both ship maintenance and shipbuilding market. The issue with the GVC or GPN is that it has been placed that too much emphasis on the governance and less emphasis placed on dynamics and change. The dynamics processes are central to the Indonesian shipyard. The project-based industry offers an alternative way to explore the governance of project-based products that reflect different ways of organising production. More importantly, PPN reflects different ways in which a shipyard balances the involvement at the firm-, local-, and global-

level. The analysis of Indonesian shipbuilding sector highlights that a shipyard uses different approach to configure their production network depending on the type of the order, as well as the yard capacity at the time of order. When a shipyard won an order, there has a set of choices and decisions needs to be made and this include many options and reasons to developing the PPN. Therefore, the dynamics of the shipbuilding industry lies in the decision-making process that reflects current conditions of the shipyard, which varies from time to time. Some of these choices are constrained by the ship-owners specific requirements (i.e., the type of the vessel, for example, whether it is for a defence or commercial purposes) regulated by a contract. In this case, the contract holder has flexibility in configuring the degree of involvement LPN and GPN. This is critical because the contract holder has some degree of choice, but some choices are locked down or locked-out by the buyer's requirements and or determined by policy, for example a requirement for local content.

In the project-based shipbuilding industry, the primary challenge is to source critical ship components from suppliers located overseas. These are critical components including the main engine, propulsion system, and navigation systems that are not produced in Indonesia and must be imported. They must secure the price and the availability of these items prior to submitting a proposal to build and agreeing an initial design with the client. It is often difficult for a shipyard to purchase the necessary resources and to have access to the competencies required to create a ship (Burgers *et al.*, 1993). Therefore, the study identifies that collaboration between co-located shipyards does not always occur during the construction phase (as discussed, by *sharing resources* or *co-production*) but also in the earlier stage of production. For instance, by 'borrowing reputation' from the more experienced shipyard to win a tender (also discussed Chapter 4).

It is important to understand the origins, competitiveness, and the operation of local production networks, which in the case of a shipbuilding project are dependent on who holds the contract. The contract holder is the one who develops and designs the GPN depending on the product and the requirements of the ship-buyer. In this complex process, in some cases, the client determines part of the geography of the production system as the client specifies named components. In other cases, the yard makes these decisions. The production of a ship involves a process of joint creation or sharing of a contract between co-located yards, but this is, in most cases, a sub-contraction relationship. The contract holder, or lead firm, is a foreign shipyard who wins a domestic ship contract due to their design and technical capability. However, since they do not own their own facility in Indonesia, they sub-contract the construction activity to the Indonesian yards.

In other cases, the contract holder is the Indonesian shipyard, which act as a prime contractor and system integrator (Sauerhoff, 2014). This means that they are involved in all aspect of shipbuilding, includes: (1) providing the design, (2) constructing the vessel, and (3) in integrating and delegating tasks to be undertaken by one or more other firms during different stages of a shipbuilding project. These actors include competitor, suppliers, R&D facilities, financial institutions, insurance companies, classification societies, and in some cases shipbrokers (for tendering process).

Furthermore, shipyards in Indonesia are currently growing due to an increase in domestic orders – from both the government and the private sector. The increasing demand contributes to developing shipyard's reputation through shipbuilding portfolio. As discussed in Chapter 4, shipyard's portfolio and positive reputation in delivering many types of ship project is critical element in PBF competitiveness. Due to this, many shipyards in Indonesia has not only been able to support the *Global Maritime Fulcrum* programme, but also to extend their market reach

into global ship market. More importantly, by specialising in particular types of vessel (previous chapters discussed *product specialisation* in Corvettes, SSV, and MRSS type of vessels), Indonesian shipyards been developing their capability to comply with a more complex international standard.

To win a government ship contract, shipyards has to go through a competitive bidding process, which sometimes involving a legal assessment and tight compliance process. In addition, due to the significant increase in the number of domestic ship projects, many shipyards are encouraged (by the government and the industry association) to collaborate and co-produce vessels, despite of the ship of the shipyard. The intention is to improve the competitiveness of local shipyards by allowing small/medium sized and new established shipyards to learn from the more experience shipyards. More importantly, to give them the opportunity to explore a range of expertise in serving both domestic and foreign clients.

Decisions about the design of a PPN are mainly based on (1) the type of ships (government owned/private). (2) the purpose of the vessel (i.e., the type of cargo that it is intended to carry which reflect the size and the requirements). Typically, Indonesian shipyards are mainly receiving orders to construct vessels for the purpose of carrying bulks of raw materials (intermediate goods in containers, oil and natural gas) and people (ferries), or to support offshore activity (oil extraction, construction, and research), as well as for defence-related purposes. Specifically, the government military purchase varies between fast patrol vessels, frigates, corvettes and search and rescue vessels. The high variation of vessel product reflects the complexity of developing the PPN required to complete each different project. For example, when orders are received for bulkers or tankers, shipyards will need to immediately secure the supply of steel and engines as these components account for more than half of the construction process. Other types of vessels, such as large platform LNG/LPG vessels, would have higher

specifications including components that might not be available locally and would need to be sourced from overseas manufacturers. The degree of coordination of a shipbuilding production network then, in many cases, is decided by a local shipyard based on the technology that must be embedded in the final product. In addition, the selection of component suppliers also based on their (1) geography (domestic and international), (2) availability and ease of the ordering process include a rapid response and the speed of delivery.

It is important to note that LPN plays an important role in providing one of the most critical elements required for shipbuilding – land and labour. There are few of the government policies that focus on the localisation of shipbuilding activity. The effort includes: (1) the development of public-private research and training institutions to improve workforce development strategies (Chapter 5), as well as developing horizontal linkages to support the industry, notably heavy industry and components. The traditional focus in the Indonesian shipbuilding industry has been on improving the efficiency of construction by optimising workflows and processes. The shipyard as a contract holder of the shipbuilding project are faced by two conflicting strategies, which are (1) to recruit and train more human resources, or (2) to invest more on the construction equipment to support the construction activity i.e., machinery.

7.4.1 Geography, Policy, and Development: The Case of Batam & Surabaya

To extend the understanding of governance in shipbuilding industry, the relationship between the LPN/GPN configuration and some of government policy attached to Indonesian shipbuilding regions is explored.

First, the case of shipyards in Batam is explored. Shipyards located in this *Free Trade Zones* (FTZ), the reduction in tariffs does not necessarily provide shipyards with a direct economic advantage. Sjoberg and Sjoholm (2004) suggests that there is no obvious relationship between regulation and the growth of an industry. In this view, the benefit of FTZ related to imported

tax for the ship components does not really useful, as the labour cost in this area is higher than the labour cost in Java non-*FTZ*. More critically, after 2008, there was a significant reduction in shipbuilding production in Batam, resulted in many domestic shipyards reduced their activity or closed down the operation completely. Secondly, previous study suggests that the liberalisation of trade only reduces restrictions on firm ownership. This is reflected by the majority of shipyards located in that area are foreign-owned, i.e., mostly owned out of Singapore. In this case, the reduced tax or the policy interventions developed by the Indonesian government to develop domestic shipyards, are actually benefit foreign-owned shipyards.

In comparison, the shipbuilding industry in Surabaya continues to grow in spite of the absence of tax benefits. The growth was supported by the increasing number of locally-owned establishments – be it local shipyards or local component manufacturers. This indicates that the competitiveness of the Indonesian shipyards was not based on *foreign direct investment* but rather the locally orientated activities. This finding is different to the previous study of governance where the global lead firms were considered as the driver of the development of production network.

Despite not receiving special taxation benefits, the growth of the ship building industry still occurred. The growth in a number of locally owned shipyards also closely related to the local entrepreneurship behaviour embedded in this area, and many local businesses considered themselves to be the *son of the region* (Chapter 4). People that consider themselves as *sons of the region* felt that they are needed to develop the city where they were born and raised. The emotional attachment to particular place combined with familiarity with the home location provided these entrepreneurs with advantages. For instance, shipyard owners have a good knowledge about the specific requirements or consumer preferences in their local area. In addition, they also rely upon the family business networks to access labour and finance.

Involvement in LPN supports the governance of PPN in the shipbuilding project. LPN is important as it includes key firm actors such as component manufacturers and co-located competitors, as well as non-firm actors such as design and testing facilities. In this case, the role of non-firm actors such as design and testing facilities contributes to the development of shipyard competitiveness by helping shipyards to meet the international standards.

The process of adaptation by firms located in these cities is place specific which sometimes can be idiosyncratic. The decisions that determine current investments are, in many cases, influenced by decisions that have been made in the past (Boschma and Frenken, 2011; Bryson *et al*., 2017). The shipbuilding cities of Batam and Surabaya are the outcome of layers of decisions that build upon forms of path dependency including the ways in which the availability of locally embedded assets (land and labour) and a set of regulations plays an important role in the development of PPN.

7.5 CONCLUSION

This chapter identifies various different ways in which shipbuilding is organised, based upon the nature of the order. The process of developing PPN includes balancing the configuration of LPN and GPN in each project, which taken into account not only firm actors but also non-firm actors. The PPN approach address the limitation of the existing governance model that focusses on mass production by including (1) the project-based forms of organisation, and (2) the various nature of shipbuilding contracts.

The existing research on the governance and inter-firm relationships has tended to focus on large-scale mass production systems and has neglected the element of dynamics and the distinct ways is which production is organised in project-based industries. This analysis of the Indonesian shipbuilding industry in particular suggests that *PPN* involves more dynamics than the types of production systems previously explored in understanding governance. In this study,

shipbuilding sector provides a clear distinction must be made between buyer-controlled and shipyard-control *PPN*.

The shipyards have layers of decisions to make with regards to the configuration of the production networks required in each project. Every project has different dimensions. In addition, the configuration of a shipbuilding *PPN* is partly influenced by the shipyard's current capacity of on-going projects, as well as the buyers' requirements. There are a number of impacts attached to these choices, including the client and the role played by the *Classification Society*. Nevertheless, every shipyard has a set of decisions that provide choices regarding the configuration of each shipbuilding *PPN*. The many decisions to be made during the project allows a set of dynamic relationships and interactions to become the central element of *PPN*, be it a more globally-orientated or locally-orientated *PPN*.

The finding extends the understanding of the current governance, whereas it is impossible to take the *local* out of the *global* in the shipbuilding GPN. In addition, it is also impossible to isolate the *global* from the *local*. In the Indonesian shipbuilding industry, the interaction between the local and global inputs matters. Every ship is the outcome of a combined decisions that reflect the nature of the order, the shipyard current workload, and the location of the yard.

8. CHAPTER EIGHT

CONCLUSION:

PLACE-BASED RESOURCES AND NETWORKING AND THE COMPETITIVENESS OF PROJECT-BASED FIRM

8.1 Introduction

Given the importance of the shipbuilding industry to Indonesia's economic growth, this thesis aimed to understand firm competitiveness and the Indonesian shipbuilding industry. This study addressed emerging debates on production networks and value chains regarding the importance of relationships, including non-firm actors involved in shipbuilding projects. The current production network approach integrates the roles of state actors and governmental agencies as well as local/regional factors such as culture, networks, and infrastructure into the analysis, nevertheless, it still tends to focus heavily on the interests of global actors. The roles of local firms in the organisation of production at a local and global level is relatively underdeveloped in this debate. Thus, this thesis brings together a number of debates required to understand shipbuilding: firm-level (*micro*), local-level (*meso*), and global-level (*macro*) perspectives with the project-based literature.

The qualitative approach to the research involved three phases of data collection, which are (1) desk-based research, (2) fifty-two in-depth interviews with participants from the Indonesian shipbuilding industry, and (3) attendance at shipbuilding conference and ship launches. Three stages of data analysis were conducted to ensure all research questions were addressed.

The research has made two core contributions. First, it has developed understanding of a strategic yet underexplored industry by identifying the source of competitiveness of the firms taking into account three different analytical scales: micro, meso, and macro; and the impact of each on the organisation and governance of a shipbuilding project. Second, the research addressed specific gaps in the governance literature, related to the development of project-based production networks.

New theoretical contributions have been revealed. The shipbuilding industry has a distinctive project-based character and the analysis in this thesis has contributed to on-going debates on the governance of commodity chains by developing a ***project-based production network*** approach **(**PPN). This highlights how project-based production has been overlooked in the debate on GVC/GPN. Additionally, research gaps were addressed by exploring the role played by non-firm actors in the shipbuilding industry. It was necessary to explore non-firm actors because the shipbuilding industry has a complex structure in which regulatory bodies (be they local or global) play a major part in ensuring product safety. The nature of competitiveness in the shipbuilding industry varies depending on the configuration of firm and non-firm actors involved in each shipbuilding project. Additionally, it was recognised that the nature of a shipbuilding contract impacts on the development of a project-based production network.

This concluding chapter identifies key contributions from the research by bringing together the findings from previous chapters. The first section outlines the key contribution regarding micro, meso, and macro relationships and the Indonesian shipbuilding industry. This is followed by a discussion of project-based production networks (PPN).

8.1.1 Firm-Specific Competitiveness (*MICRO*)

It was critical to explore the importance of *location* in this thesis, since understanding the shipbuilding firm's competitiveness requires an appreciation of the regulations attached to

particular locations. In addition, the focus was also on identifying various ways in which firms compete within a location. The research identified direct and indirect advantages attached to a particular region where a shipyard is located, whilst highlighting firm-specific specialisation in products and services. Therefore, exploring the location of the shipyards and the relationship with *differentiation* was a core element in identifying the inter-shipyard competitiveness as project-based firms.

8.1.1.a Does location matter?

The analysis of firm-level competitiveness emerged from a theoretical approach that combined the resource-based view (RBV) with a project-based approach (Barney, 1991; Peteraf, 1993; Dubois, 2015; Bryson and Ronayne, 2014). In the case of the Indonesian shipbuilding industry, resources are not only attached to the firm, but also the region. For example, different regulations and tax benefits complement the ways in which shipbuilding is regionally organised, as it provides access to sufficient tangible resources including land and labour, or access to tax benefits. The significance of each firm-specific resource, and how they are organised or developed by the firm, is described below.

Chapter 4 argued that location plays an important role in firm competitiveness, however this cannot be achieved without firm-specific advantages such as differentiation in product, or flexibility in services. As project-based firms, shipyards not only compete on speed of delivery and cost but to stay in business, they must possess an ability to provide distinctive design services, and they must also be able to oversee project uncertainty by securing resources such as outsourced labour, and lastly the ability to maintain and develop a reputation. These elements provide a source of competitive advantage because, whilst location offers tax benefit and/or a large pool of skilled labour and land, firm-specific differentiation is required in a project-based industry. Consequently, there is an advantage related to a location in a shipbuilding region whereby shipyards can benefit from locally specific demand, i.e., Surabaya

industrial city and the demand for tankers. There are a number of different drivers related to a regional location, including: (1) investments made by previous decision (path dependency), (2) access to labour and land, (3) access to supporting institutions, (4) tax benefits, (5) and closeness to market. A shipyard's ability to deliver a project to requirements is dependent on their capacity at the time of receiving the order, as well as having access to resources. This highlights the significance of tangible resources in the competitiveness of the shipbuilding industry. The RBV debate argues that tangible resources are relatively poor sources of advantage compared to intangible resources (Fahy, 2006). Nevertheless, land and labour are two of the most important inputs for shipbuilding production. In practice, tangible assets (location) complement intangible assets (regional reputation for shipbuilding) and these cannot be separated.

8.1.1.b Competing on product, service, and reputation

The products and services provided by shipyards were also investigated to explore project-based competitiveness. They were found to be influenced by the geographic advantages and market demand attached to particular locations. For example, the majority of ships ordered in shipyards around Surabaya focused on differentiation by design, as the vessel was usually ordered by the state. Whilst shipyards in Batam were typically selected on the basis of price linked to their location in a free trade zone. However, vessels produced in this area often used similar designs to those previously approved and which has been used for other clients.

Service was important as it comes with better profit margins compared to a new built project. In addition, the provision of services is becoming increasingly important due to a more stable market and it enables firms to forecast their cash flow in advance. For example, most shipyards are providing service contracts with shipping companies for a period of time. Therefore, rather than chasing new build projects through complex time-consuming bidding processes, shipyards

provide docking service to ships operated close to the location of the yard. Very few studies have explored the potential benefits that come from a firm's location in relation to potential client demand (Cholasuke et al., 2004; Koehn, 2008).

Regular ship servicing also needs to be conducted as part of compliance that is linked to the ship's license and certification. This rule is set by the classification societies and the *International Maritime Organisation* (IMO) to ensure the safety of marine transportation carrying both people and cargo. Local (BKI) and global classification (LR, RINA, BV, ABS, etc) plays an important role in surveying and issuing vessel certificates helping ship owners protect themselves against risk. There are four types of survey: (1) renewal statutory survey to verify that the condition of the structure, machinery, and equipment is in compliance with the regulations, (2) annual statutory survey includes a general inspection of the structure and equipment to confirm that it has been maintained according to the regulations, (3) intermediate statutory survey is an inspection of specific items relevant to the particular certificate to confirm its satisfactory condition, (4) periodical statutory survey generally take place to renew certificates after one or two years after previous survey (IACS, 2015). Therefore, the service activity provided by the shipyard is also a result of regulatory governance based on the role of non-firm actors involved in the production of a ship.

Reputation has two forms: (1) inherited through the previous generation (2) acquired through a rigorous practice. It impacts mainly on the ways in which shipyards are obtain orders. Identifying reputation as a competitive advantage and defining its form is important; reputation in the context of firm competitiveness has been largely ignored and is not considered in the RBV literature. This is in spite of reputation being identified as a care competitive advantage for providers of services.

Reputation differentiates shipyards by indicating reliability and responsiveness to customers which encourages trust. Interestingly, sometimes the reputation is not always attached to the shipyard as a firm, but to the leader/owner/manager of the company. An element such as family reputation in the shipbuilding business, the role of a yard's leader in the industry association, as well as friendship between shipyard owners provides a shipyard with higher status in the market and leads to competitiveness. Developing a reputation takes time, since it requires a shipyard to deliver the project on time and on budget consistently for a period of time. Consequently, the value attached to the project firm's reputation in the shipbuilding industry encourages potential benefit for business creation. This finding aligns with Rogoff and Heck (2003) on how family embeddedness and personal relationships are likely to influence customer decisions.

The embedded relationship between the shipyard and its location is also reflected in the concept of 'son of the region'. This term was used by participants to reflect (1) the decision regarding a shipyard's location, and (2) how this concept helps to win a tender. This mechanism also reflects the cooperative spirit among shipyard owners located in the same area as a form of solidarity when 'sharing orders'.

Location remains an important factor in the shipbuilding industry as location provides access to tangible inputs (land, labour, and materials) but also to intangible elements such as advantages presented by a location, be it tax benefits or clustering or import processing zones. To conceptualise the structure of a firm-level organisation and its linkage to the location in the shipbuilding industry, the *Resource-Based View* (RBV) typology was applied (Barney, 1991; Peteraf, 1993). The importance of location extends the understanding of *RBV* by addressing shipbuilding industry-specific features. For instance, in the case of ships produced in Indonesia, it is common that ships share similar features with other ships. However, the configuration of actors involved in a project (PPN) differ from one another depending on the type of ship

produced and the contract holder. The PPN can involve only one shipyard or more, depending on the scale of the project and the capacity of the shipyards. Therefore, the *uniqueness* of the shipbuilding project lies in the PPN configuration, instead of the end-product. The ways in which production is organised between firms located in Indonesia is discussed in the next section.

8.1.2 *Local Project-Based Production Networks* (MESO - *LPPN*)

A *local project-based production network* (LPPN) is valuable for the Indonesian shipyards because they provide the yards with access to resources that are unavailable elsewhere. For example, shipyards are competing and completing each project sometimes without knowing when they will win another project. Therefore, even when faced with full capacity, a shipyard is reluctant to reject a contract to build a ship. The solution is to find other shipyards with spare capacity that are able to wholly partial construct a vessel for the lead shipyards, on a sub-contract basis.

Partnerships with competitor firms is valuable when developing strategies include procuring components. A shipbuilding project is considered to have 'late delivery' stigma. This is quite common as the waiting time for imported materials can be up to 6 months. With a joint purchasing strategy is put in place, a shipyard can deliver a project rapidly compared to purchasing critical components individually. Additionally, *LPN* facilitate access to information about a potential project.

Unlike the private shipyards, state-owned yards are not free to select their suppliers. The procurement of components for state-owned vessels is framed by legal norms set by the Indonesian governments. Governance in state-level procurement involves the *e-Catalogue* mechanism. The *e-Catalogue* was introduced to increase transparency is the expenditure of government funding. This is an example of how non-firm actors play an important role in the

development of production networks. Furthermore, in the case of producing state vessels, government plays a dual role as a regulatory body as well as a ship owner. It influences the selection of suppliers.

Not only in collaborating with another shipyard (competitor), a shipyard also gains advantage by networking with non-firm actors. For example, partnering with a local university supports shipyards access to skilled naval engineers which is important for accessing knowledge. For instance, the process goes both ways between shipyards and educational providers. In some cases, universities provide knowledge exchange by developing module with the shipyards.

Shipyards may access knowledge in building different types of ships when they are invited to become involved in project collaboration. In this case, the industry association plays an important role in facilitating information exchange between members. More importantly, the association consolidates and represents the interests of members. For example, the industry association takes a central position when a group of shipyards negotiated import duty restrictions on ship components. Private actors (large shipyards) are also involved, as they influence policy actions through negotiating with the *Department of Industry*.

The industry association also played a joint role in facilitating the delivery of welders' training, together with the *Department of Industry* and the local classification agency (BKI). This activity is conducted in different shipyards. Welding certification must be obtained for every training intervention increasing welders' employability. Consequently, there is evidence of 'hire and fire' as an impact of this flexible working condition. These findings show that greater network orientation contributes to shipyards in various project stages from winning to completing a tender. These forms of collaboration between firm and non-firm actors highlight the interdependency of the industry, more importantly, the involvement of *LPN* does matter for a shipyard.

8.1.3 *Global Project-Based Production Networks* (MACRO - *GPPN*)

Joint procurement and *sharing resources* amongst shipyards is not uncommon in the Indonesian shipbuilding industry. Consequently, there is a separation between collaboration between firms and collaboration between firms and non-firm actors. This is due to the differences between projects (such as the type of vessel ordered and the owner of the ship itself: state or private sector), which alters the ways in which production is organised. As a system integrator, sourcing parts and materials is considered as a major task for shipyards. More than 50% of ship components are still imported. To increase the capability of local suppliers, the government introduced a local content policy which stated that every ship produced for the state had to have a minimum of 51% locally procured components. This regulation also takes into consideration the amount of time needed for domestic manufacturers to develop the capabilities to meet demand. However, a problem arises when many "locally procured" components are not actually been manufactured locally but are imported products that are bought from a local subsidiary. The difficulty with locally manufactured components is the lack of accreditation and certification, and the Indonesian shipyards have become heavily reliant on overseas suppliers. Local supplier's training and accreditation has previously been ignored as a factor impacting on firm competitiveness in the project literature because it is not directly managed within a firm.

Overall the analysis highlights that the organisation of the ship production process varies depending on the type of product and buyer. The recognition of this distinction is important because the literature has focussed on lead global player and the ways in which they coordinate production. This is not necessarily the case in the shipbuilding industry. The organisation of production and the degree of overseas involvement varies depending on each shipbuilding project.

The second part of the analysis explored how shipyards located in regions with different degree of involvement from overseas actors resulted in the production of different forms of competitiveness. For example, shipyards situated in Batam had two distinct locational advantages. They received economic treatment from the government with a zero-tax policy as well as benefited from proximity to Singapore resulting in shorter waiting times for ship components. However, the Batam FTZ has recently suffered from a reduction in demand; the majority of vessels produced in Batam were designed to transport coal. Whilst, shipyards in Surabaya had the advantage of being close to the many joint facilities including design providers, the naval university, and testing facilities. These supporting facilities enabled shipyards to renew and produce different types of ship designs which led to their ability to produce specialised vessels.

Further, the current GPN framework addresses the active process of information sharing and internalising knowledge between the company and its external actors. The framework provides an understanding of the production network by conceptualising various types of network configuration that result in value creation, enhancement, retention, and other economic impacts. Nevertheless, GPN analysis emphasises that global actors are considered more important than local, i.e., the organisation of production is designed and developed by the global actor. In the Indonesian shipbuilding industry, that is not always the case. Local embeddedness is a critical mechanism that encourages shipyards to engage with a global network. Therefore, it is important to understand that there is different configuration of *LPPN/GPPN* between different shipyards. The design and development of *LPPN/GPPN* reflect the heterogeneity of shipyards. Local shipyards do retain some degree of control, as they set the budget and select which suppliers to work with. In the case of a government ship order, they also impose their own procurement rules through the *e-Catalogue* mechanism, which is influential as those rules apply to both local and global suppliers.

In the shipbuilding industry, there are only a small number of importers (subsidiaries) due to the character of producing a product with uncertain demand – a product that is customised to meet the needs of each client. The shipyards are dependent on a few key component suppliers. Suppliers in this relationship are chosen on the basis of the availability of the product instead of price. However, this is not applicable in the case of low added value inputs including steel. In this case, shipyards have greater flexibility; in Indonesia there are many steel producers who could provide the shipyards including state-owned steel companies.

Overall, the analysis highlighted the ways in which Indonesian shipyards deals with the production of large project-based products and this process has not been explored in the GVC/GPN literature. The complex and customised element of these products requires different level functionality that can either be (1) driven by the local buyer who then play an role in influencing the configuration of a local production network, (2) driven by the local buyer and execute by both a combination of local and global production networks, (3) driven by the global buyer and executed by the global shipyards that subcontract the project to the Indonesian shipyards. In some industries, GPN strategic coupling ultimately drives regional development through processes of value creation, enhancement, and capture, but the Indonesian shipbuilding industry introduces another variety of configurations that in some cases are driven by the global production networks, but more often they are driven by local production networks.

8.1.4 *Project-Based Production Networks* (*PPN*)

It is vital to explore governance in this research, since the shipbuilding industry operations at the intersection between overlapping and complex local and global regulatory frameworks and it relies not only on external firms, but also on government support. The focus was to identify the governance of production which is different for each project depending on the nature of the order. The analysis was divided between six key processes and the forms of governance vary between these processes. A shipbuilding project is led by the primary ship contract holder, who

serves as project leader and coordinates all activity by allocating tasks and resources to various firm and non-firm actors.

The ways in which a shipbuilding project is assembled and organised takes into account different geographic scales: firm-level, local/regional production level, and global production level. The focus on forming local production networks is typically based on addressing capacity issues, whilst networking with global production is mainly intended to secure critical components from key suppliers. A stylised example of a shipbuilding production network was presented in Chapter 7 to understand the governance of shipbuilding project. The chapter focussed on the relationship between firms and non-firm actors that contribute to the delivery of a ship project. The involvement of supporting institutions such as a classification agency as ship certifier was a prime example of this. A shipyard traditionally produces low volumes, sometimes one-off products, in which the product is then registered and announced in a directory or registrar (*Lloyd's directory* is one of the examples). This contributes to increasing a shipyard's portfolio, as once registered, the yard can compete against both domestic and international ship bidding. Therefore, the relationship between shipyards (firm) and classification agency (non-firm) is a central element of a shipyard's competitiveness.

The empirical chapter reflects challenges facing the shipyards that were identified during the fieldwork. During the analysis, it became clear that the practice of developing and forming a production network for each project can be dictated by the classification agency where the ship will be registered; a classification has a set of regulations regarding the specifications needs to be installed prior to obtaining a certificate (foreign order). This then governs the supplier selection process. In some other cases, for example, a state order from the Indonesian government, supplier selection is limited to, first, suppliers who comply with the *e-Catalogue* requirement, and, second, 51% must be locally produced components due to local content requirements.

The conceptual framework (Chapter 2) identified knowledge gaps in the conception of project-based production which had been previously defined as a form of interorganisation activity that integrates diverse, bespoke, and specialised resources and expertise within a temporary system. A project-based firm is understood to involve layers of interacting local and global networks that are configured to meet clients' demand. To date, however, research on project-based firms has not yet investigated the interaction between a 'customised' production network and its linkage to firm competitiveness. These gaps were explored in the context of external actors' involvement. The focus was to understand the geographic organisation of production taking in to account the nature of the contract.

Shipyards respond to clients' requirements through developing various configurations of production network. The order type plays an important role in the composition of production networks. Six different production networks were identified reflecting the management of relationships that are partly controlled by the ship buyer and partly controlled by the shipyards. More importantly, each approach reflects the ways in which a shipyard balances the involvement of firm-level, local production level, and global level relationships in producing different types of vessels. The current argument within the GVC debate emphasises governance with less emphasis placed on dynamics and change. Consequently, it has tended to highlight various elements involved in producing, marketing, and distributing a good and service to identify 'value' embodied in those elements, rather than in paying attention to governance issues concerning the organisational dynamics of project-based firms as they emerge and evolve in relation to particular orders and influences. While on one level, Gereffi's notion of governance is in accord with that developed in this thesis to explain the coordination of inter-firm and extra-firm activities that characterise production networks. At another level, the intention of this thesis has been more concerned with establishing a frame of governance based to explore the dynamics of projects taking into consideration the range of choices that must be

taken into account to understand the organisation of project-based production networks from the perspective of the Indonesian shipbuilding industry.

A shipyard, as a project-based firm, develops an appropriate production network for all orders received. This is significant, as it shows the role non-firm actors play in the governance of the shipbuilding sector and highlights the shipyards role in configuring a project's production network. The form of governance involved in this process highlights the choices made by the shipyard to deliver the project whilst addressing the client's requirements. In project-based production networks, flexibility to accommodate client demand is a critical element to sustain competitiveness.

Subcontract relationships play an important role helping to remove risks related to, for example, investing in more land or fabrication or to permanently employ more shop floor workers. In addition, direct relationships between shipyard's manager and networks of sub-contractors were uncommon. For instance, at the busy time, shipyards can hire a 'sub-contract' temporary project manager to support the project. The temporary project-manager is usually a person who is a part-time project manager in another shipyard. In other words, he/she has the ability to manage several ship projects located within the same region. This unique relationship between the shipyard (PBF), sub-contracted project manager, and competitors considered as bespoke relationships which extend the understanding of intangible resources in the shipbuilding industry. It highlights why it was important to combine two sets of relationships (firm-firm and firm-non-firm) in the analysis of shipbuilding production projects as the project-based literature has overlooked intangible resources.

8.2 REVISED CONCEPTUAL FRAMEWORK

The conceptual framework for this research was outlined in Chapter 2 and is based on the relationship between micro, meso, and macro processes in production processes. The

framework combines firm-level concepts of competitiveness (Barney, 1991; Martin and Sunley, 2006; Bryson *et al*., 2013; Phelps and Fuller, 2016), with local/regional relationships (Bell and Abu, 1999; Hassink, 2005; Taylor, 2010), global level relationships (Dicken *et al.,* 2001; Gereffi *et al,* 2005; Yeung and Coe, 2015), as well as project-based firms (Hobday, 2000; Turner, 2010; Baker *et al*., 2016), to provide a more integrated approach to understanding how project-based products and services are organised. This section provides a revised framework (Figure 8.1), which includes additions to reflect the analysis of the Indonesian shipbuilding. The alterations are outlined below, which include: (1) identifying firm-internal factors which impact on firm competitiveness taking into account the importance of location, (2) outlining various actors involved, including non-firm actors within shipbuilding projects, (3) providing details on the types of global relationships involved in the production of shipbuilding projects; and (4) identifying the various ways of organising project-based production networks which differ depending on the nature of the contract. As such, this thesis re-centres the element of dynamics within the governance debate which was previously set aside by the introduction of the GPN 2.0 approach.

The approach to understanding firm level competitiveness was to identify advantages derived from particular shipbuilding locations, exploring the links between them and the resource-based literature, and then to outline when and how location matters in increasing firm competitiveness. In the Indonesian shipbuilding industry, shipyards are competing through: (1) product specialisation, (2) focusing on services, and (3) reputation. The different type of focus between the shipyards highlights that location plays an important role in firm competitiveness, however this cannot be achieved without a good knowledge of specific market demand. For example, shipyards in Surabaya focus on developing new designs given closeness to various R&D facilities, whereas shipyards in Batam focus on producing ships to a previously approved design. Therefore, managing internal relationships throughout all business units is critical. The

resources and capabilities of project-based organisations are important aspects of competitiveness with respect to the challenges of managing and delivering day-to-day operations. Moreover, in a project-based environment, different capabilities such as design and construction are required where the majority of products and services are bespoke to meet the needs of specific customers and their vessels (Keegan & Turner, 2002). In the section about micro (firm-specific organisation) process, a number of RBV factors were identified: valuable to the customer; rare and unique, inimitable and non-substitutable. All plays a critical role in a project-based organisation and the provision of bespoke products and services, with an alteration. The application of a resource-based perspective highlights that shipbuilding product is not that rare, and that the production process is also imitable. However, the competitiveness of shipyards lies in configuring different inputs provided by local/global production networks are which differ from project-to-project. This study of the shipbuilding industry suggests that both tangible and intangible elements contribute to the competitiveness of Indonesian shipbuilding. This thesis highlights that competitiveness comes from a combination of a firm's internal resources but also their geographic location. This is to argue that a firm has two elements to its competitiveness. First, a set of intra-firm resources and assets and second, advantages that lie beyond the firm that are directly and indirectly related to its location. The ability to compete in a project-based industry is partly about a firm's location and it is the location that influences the types of services and products provided by the firm. This is to highlight the importance of developing a locational-based view of the resource-based view of the firm.

The organisation of the projects and the competitiveness of the firms are influenced by external factors. The external actors may be firm or non-firm actors including strategic coupling between firms and state actors (non-firms). The literature on local/global networks plays an important role in understanding the geographic organisation of the Indonesian shipbuilding

industry as it provides a framework for understanding the relationships between shipyards and other firm actors, as well exploring the role of non-firm actors in shaping shipyard's competitiveness and in the configuration of production networks. However, the study of a particular industry should not just focus on the governance of local or global production networks. Instead the research must acknowledge that, prior to developing a local and global production network, each project's contract reflects different choices and decision-making processes developed by a project management team at a particular time and in response to, first, the specific needs of clients, and, second, the shipyard's capacity at that time. The distinction between the development of local production networks and global production network which is driven by the nature of the contract is a new contribution to the project-based literature and is a useful extension of understanding a complex production system.

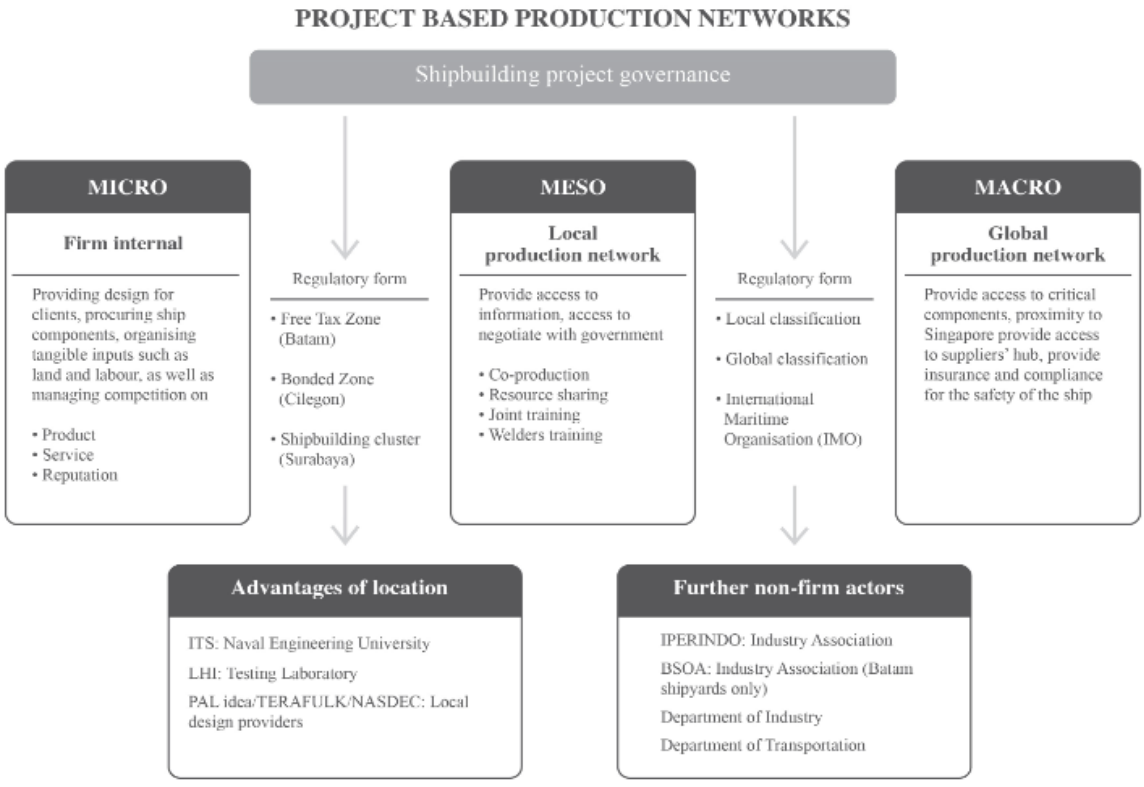

Figure 8.1 The geographic organisation of *PPN*

The approach to understanding the organisation of shipbuilding production in this conceptual framework was to identify a series of projects to explore the links between shipyards and their local/global relationships, and to outline how they are influenced by the nature of the contracts. In the shipbuilding industry, a set of relationships in a project-based production network impacts or shapes the development of a firm's competitive advantages. The links between the actors are governed by the contract and the extent of these relationships characterised by their temporary (or one-off) aspect. This distinction that comes from the analysis of production network is a new contribution to the net/chain (GCC/GVC/GPN) literatures and is a helpful extension for advancing understanding of project-based production systems.

In essence, project-based production systems provide continuing capability to the temporary element presented in the project-based industry. The permanents resource owned by the firm remain unchanged, however the manifestation of assets in the market place will be constantly mutating depending on the fluctuation on demand and competitive condition. Thus, competitive strength will evolve and be maintained over time through the application of the competence and capability embedded in the networks – derived themselves from the firm permanent assets. These applications of the temporary strategic assets will be the constituent part of strategy the ways in which the shipyards seek to pursue and establish.

Further, temporary strategy assets in the form of network are manifested in intangible aspects such as trust and process to develop relationships, whilst permanent strategic assets are reflected in the more tangible aspect such as the yard's location. It is therefore important that shipyards as project-based firms do not confuse the current successful project-based production networks with permanent strategic capability. Effort to develop firm-to-firm and firm-to-non-firm relationships should be recognised and continuously managed over time. Consequently, success can only be sustained by keeping close to ship buyers (customers). Thus, the temporary

advantage gained by the shipyards will be competed away and without the strong and strategic relationship with networks, the shipyards would face decline.

The approach developed within this framework to understand the competitiveness of Indonesian shipbuilding firms is to identify firm-specific competitiveness which differentiates those firms from their competitors (Barney, 1991; Peteraf, 1993). These specialisations are developed based on market requirements as well as to build upon a firm's specific assets, such as land and labour. This research added to the RBV argument by highlighting the importance of these tangible assets that were previously considered less valuable compared to intangible assets.

8.3 LESSONS FOR INDUSTRY AND POLICY MAKERS

The conceptualisation of micro, meso, and macro relationship as an integrated approach to understanding project-based production networks based on collaborative interfirm relationships views interactions as central to project-based organising. On the one hand, reputation based on trust is considered as a resource within a network, which is built upon particular shipbuilding experience. On the other hand, formal contractual relationships are an integral part of an agreement between actors to achieve shared goals within a project. Their incorporation reflects a great complexity that generates interdependence between actors, over a period of time. The temporary aspect of project-based activity is important as towards the end of a contract all parties involved may or may not work together again.

Firm-specific

- Location does matter in terms of having access to a large pool of skilled labour and land for the fabrication area. This highlights the importance of tangible aspects in shipbuilding projects.

- Over-reliance on the economic advantages attached to a particular location, however, creates a vulnerability that impacts on a firm's ability to grow. Reassessing tax benefits in Batam may be required.
- Shipyards in Surabaya seems to cope better with the changing demand. The relationship between shipyards and supporting institutions located in this region contributes to the competitive success of the shipyards.

Local project-based production networks (LPPN)

- At first, the government played a central role in supporting the industry through a tax scheme and facilitating the growth of the firm. However, a non-economic element such as sharing and working together towards the completion of the project is considered as a significant element in the shipbuilding production network.
- The shipbuilding industry is a prime example of the ways in which non-firm actors can alter the development of firm competitiveness from the establishment of a local production network.
- High localisation becomes a key source of competitiveness for the Indonesian shipyards.

Global project-based production networks (GPPN)

- The development of shipbuilding production networks is based on the type of product and clients, and often the decision is not made by a global lead firm.
- The increase in domestic market demand plays a vital role in the establishment of the shipbuilding production network in Indonesia.

8.4 FURTHER RESEARCH

The study has developed an interesting account of the shipbuilding industry in Indonesia by exploring decision-making processes in the context of developing a more integrated approach

to understanding the production of project-based products and. It has also highlighted the importance of acquiring valuable inputs and relationships with all actors involved in shipbuilding project. The relationships between the shipyards and their competitors, as well as non-firm actors, has been identified as been a significant element for the success of a project. These findings emerged from interviews with shipyard representatives located in four major islands in Indonesia. However, in order to strengthen the contribution to the literature, further research is required.

First, the procurement of ship components by the shipyards warrants further exploration in two areas. Firstly, the use of industry associations to facilitate the procurement of critical component resulted from problems with the minimum orders placed by Indonesian shipyards. This required the development of group procurement. This illustrates a more complex production chain than is currently conceptualised. Research needs to explore similar types of group procurement in other sectors. Further research may draw attention to the significance of the ship contracts as a source of competitiveness, comparing different types of contract, and how they are developed in varying circumstances.

Secondly, further study is required to understand the varying nature of relationships as a source of competitive advantage. This would involve identifying other industries in which relationships between stakeholders contribute to competitiveness. Overlapping authorities pose a significant barrier to interfirm relationships. Indonesia currently has thirteen different agencies that are stakeholders in the maritime industry including the Navy (TNI-AL), the Police, the Civil Service Investigator of ten different ministries – including customs and Fisheries – and the Maritime Security Agency. Research involving these non-firm actors would be valuable to further develop the analysis of the Indonesian shipbuilding industry.

Finally, the current *Sea Toll* programme, launched in 2014 has now been officially incorporated into an authoritative document. The *Presidential Regulation* (Peraturan Presiden) No. 16 of 2017 reflect Indonesia's greater ambition to become the *Global Maritime Fulcrum* (GMF). GMF is defined as the vision for "*a sovereign, developed, and strong maritime state capable of positively contributing to the peace and security of the region and the world, according to national interests*" (National Action Plan 2016 – 2019). Exploring the impact of this would require future research on the governance and regulation of the Indonesian shipbuilding industry including:

(1) Micro: The analysis in this thesis has recognised the importance of ship maintenance and servicing to provide better cash flow for the Indonesian shipyard. However, many of the docking activities for the Navy ships owned by the *Department of Defence* are still conducted in foreign shipyards. To address this issue, research is needed to explore ways to increase the capability and capacity of ship maintenance and service facilities.

(2) Meso: The integration of GMF vision into *National Action Plan* is faced with a significant increase is policy activities that were tasked to the *Department of Transportation*, the *Department of Industry*, and the *Department of Marine Affairs*. Further study is needed to explore the integration between firms and these additional non-firm actors in the maritime industry.

Macro: The study considers the importance of global relationships towards shipyard competitiveness. However, there are other concerns surrounding global issues (such as South China Sea) which may have further implications for the development of Indonesia's shipbuilding industry. As such, a study that includes maritime diplomacy would be valuable to support the expansive vision laid out in the GMF strategy.

APPENDIX 1 – ETHICS APPROVAL

Dear Professor Bryson and Dr Zhang

Re: "Embedding the local within the global: A sector-based and case study from Indonesia shipbuilding industry"

Application for Ethical Review ERN_15-1242

Thank you for your application for ethical review for the above project, which was reviewed by the Humanities and Social Sciences Ethical Review Committee.

On behalf of the Committee, I confirm that this study now has full ethical approval.

I would like to remind you that any substantive changes to the nature of the study as described in the Application for Ethical Review, and/or any adverse events occurring during the study should be promptly bought to the Committee's attention by the Principal Investigator and may necessitate further ethical review.

Please be aware that whilst Health and Safety (H&S) issues may be considered during the ethical review process, you are still required to follow the University's guidance on H&S and to ensure that H&S risk assessments have been carried out as appropriate. For further information about this, please contact your School H&S representative or the University's H&S Unit athealthandsafety@contacts.bham.ac.uk.

Kind regards

Susan Cottam
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APPENDIX 2 - PARTICIPATION REQUEST

Dear Participant,

My name is Amore Minayora, and I am a doctoral researcher at Birmingham Business School under supervision of Prof. John Bryson and Dr. Yufeng Zhang at the University of Birmingham, UK.

We would like to invite you to participate in our research project. I am interested in understanding the dynamics of the Indonesian shipbuilding industry and identifying barriers to growth within the industry. In this study, we will ask you set of questions that will give us background information about the company, your role within the company, followed by drivers, challenges and changes facing the industry. Through your participation, we hope to increase our understanding of how firms (shipyards) add value to their products and provide better services to obtain competitiveness.

The potential outcome of this research project aims to engage with the policy makers to tackle obstacles to growth within the shipbuilding industry. The result of this project will be used for doctoral research at the University of Birmingham in the United Kingdom.

Your participation is voluntary. Regardless of whether or not you choose to participate, please let us know if you would like to receive a summary of our research findings. To register interest in receiving a summary, please provide us with your email address. You have the right to withdraw your participation any time by contacting the researcher (contact details below) within one year after the interview.

If you have any questions or concerns about completing the questionnaire, or about participating in this research study, you may contact us at:

Amorettya Minayora	Prof. John Bryson	Dr. Yufeng Zhang
[redacted]	(+44) 121 414 5549	(+44) 121 414 6695
[redacted]	j.r.bryson@bham.ac.uk	zhangys@bham.ac.uk

We are highly appreciative of any time you may give participating in this research and your assistance in completing the group discussion.

Statement of Confidentiality

All your responses are anonymous and all information that might in any way permit identification of you or your company will be regarded as strictly confidential, it will be used for the purposes of operating and evaluating the study only and will not be disclosed or released for any other purpose without your prior consent.

Regards,

Amorettya Minayora	**Prof. John Bryson**	**Dr. Yufeng Zhang**
Doctoral Researcher	**Professor of Enterprise and Competitiveness**	**Senior Lecturer in Management**
Birmingham Business School	**Birmingham Business School**	**Birmingham Business School**
University of Birmingham	**University of Birmingham**	**University of Birmingham**

APPENDIX 3 – PARTICIPANT INFORMATION SHEET

UNIVERSITY OF BIRMINGHAM

COVER LETTER - INTERVIEW

Dear Participant,

Thank you for sparing your time to participate in this study. This study aims to understand the competitive dynamics of the Indonesian shipbuilding industry and to identify barriers to growth within the industry. We have selected various firms involved in the shipbuilding activity in Indonesia with different roles towards shipbuilding activity. We believe that the participation of the **[name of the firm]** will be particularly relevant.

The outcome of this study and my PhD is to engage with the policy makers to tackle barriers to growth in the industry. I look forward to understanding how shipyards manage their dispersed knowledge and resources to deliver competitive products and service. I am interested in finding your perspective about this concept.

The interview would take approximately one hour and would be tape recorded. Your response will be kept anonymous and the results of the research will be used for academic purposed only. We also ensure that there will be no attempt to identify individuals based on your answers to the questions. Participation in the research is strictly voluntary.

Once again, I greatly appreciate your participation in this study. If you have any questions or concerns about the study, please do not hesitate to contact us:

Amorettya Minayora
[redacted]

Prof. John Bryson
(+44) 121 414 5549
j.r.bryson@bham.ac.uk

Dr. Yufeng Zhang
(+44) 121 414 6695
zhangys@bham.ac.uk

Thank you for being a part of the research!

APPENDIX 4 - CONSENT FORM

UNIVERSITY OF BIRMINGHAM

INDONESIAN SHIPBUILDING INDUSTRY:
LOCAL/GLOBAL RELATIONSHIPS AND
THE ORGANISATION OF PROJECT-BASED PRODUCTIONS

Thank you for participating in this interview about shipbuilding production networks in Indonesia. Through your participation, we hope to increase our understanding of how shipyards add value to their products and services to obtain competitiveness. The results of this project will be used for doctoral research at the University of Birmingham in the United Kingdom. Please keep in mind that we would like to see your own view point about the industry. There are no right or wrong answers in our survey.

"By signing this form, I am agreeing to participation in the study on the terms outlined below:

- I have been fully informed and understand the purpose of the study.
- I have had the opportunity to ask any questions related to this study, and received satisfactory answers to my questions, and any additional details wanted.
- I give permission for the interview to be recorded using audio recording equipment.
- I understand that I can withdraw from the study at any time without prejudice.
- Any information which might potentially identify me will not be used in published material.

Therefore, I agree to the research as outlined to me".

Name of the participant:
Signature of the participant:
Date:

APPENDIX 5 – INTERVIEW DISCUSSION GUIDE

Questions on: PROJECT

Q1	What is the focus of your company activity
Q2	When was this company founded? What led to its creation
Q3	Could you briefly describe the main shipbuilding activities that your company has been involved in?
Q4	Who is your biggest client (public/private/local/foreign)
Q5	What portion of your turnover is coming from building a new ship and from ship servicing activity
Q6	Who leads the project and who decides who is going to be on the team
Q7	Who are the other stakeholders
Q8	Is any of the work subcontracted
Q9	How does learning take place between firms
Q10	Has any patent registration been made by your company
Q11	How many shipbuilding project your company involved in one year
Q12	Have you got a repeat project
Q13	Are there any recent changes in how project carried out
Q14	Who is your company main competitor
Q15	What makes you different from your competitors
Q16	Is competition within this industry increasing/decreasing

Questions on: PRODUCTION

Q17	How often is your company involved in shipbuilding activities in one year
Q18	Could you please discuss some of your most recent shipbuilding activities
Q19	How does your company win the contract
Q20	How you distribute the work within your firm

Q21	Who leads the production within your firm
Q22	What is the outcome of your company activity (goods or services)
Q23	How you finance the production activity
Q24	Are there any additional services to your customer
Q25	Do you have knowledge transfer from another company (example)
Q26	Is there any order spillover from other company (competitor/sister/parent company)
Q27	Is there any join production
Q28	Is work carried out in the same location as your primary office
Q29	How does your company recruit its production team, what qualification are needed
Q30	Are they tend to stay with your company, any temporality in their status
Q31	Do challenges facing the industry have any implication for the team recruitment
Q32	Are new technologies impacting on the way that your activity is carried out

Question on: NETWORKS

Q33	Who involved in your networks
Q34	Which are the main networks for your products/service (local/regional/global)
Q35	How is the work distributed within your networks
Q36	How successful has it been
Q37	What contributions has this network made to your firm's into winning shipbuilding contracts
Q38	What is your company role within shipbuilding networks
Q39	How does your company build this this network
Q40	How do you maintain your relationship with them, are there any challenges
Q41	What knowledge/resources did you perceive to be relevant to do business in this market

Q42	Were there gaps in the information, resources, expertise, that you think had to be filled to carry this project?
Q43	Did you communicate to anybody outside this firm about the obstacle on carrying the project (If yes, with whom and which institution or organization does she/he belong to)
Q44	What would you consider is the most important relationship for the shipbuilding project that your firm has with other companies/organisations
Q45	Is there any shifted in the industry
Q46	Is shipbuilding moving away to ship servicing activity
Q47	Anything else you would like to discuss

[Researcher inform that this is the end of the interview, ask participants if they wish to give any questions or suggestions, and thank them for sparing their time with the interview]

LIST OF REFERENCES

Adhuri, D. S., Rachmawati, L., Sofyanto, H., & Hamilton-Hart, N. (2016). Green market for small people: Markets and opportunities for upgrading in small-scale fisheries in Indonesia. *Marine Policy*, *63*, 198-205.

Ageron, B., Gunasekaran, A., & Spalanzani, A. (2012). Sustainable supply management: An empirical study. *International journal of production economics*, *140*(1), 168-182.

Aliev, B., & Kochetkov, Y. (2016). RISKS IN THE SHIPBUILDING AND SHIP REPAIR INDUSTRY IN LATVIA. *Management (16487974)*, *28*(1).

Airriess, C. A. (1989). The spatial spread of container transport in a developing regional economy: North Sumatra, Indonesia. *Transportation Research Part A: General*, *23*(6), 453-461.

Amin, A. (2002). Spatialities of globalisation. *Environment and planning A: Economy and Space*, *34*(3), 385-399.

Amin, A., & Thrift, N. (1994). Holding down the global. *Globalization, institutions, and regional development in Europe*, 257-260.

Amin, A., & Thrift, N. (1995). *Globalization, institutions, and regional development in Europe*. Oxford university press.

Amit, R., & Schoemaker, P. J. (1993). Strategic assets and organizational rent. *Strategic management journal*, *14*(1), 33-46.

Anderson, M. J., & Shaw, R. N. (1999). A comparative evaluation of qualitative data analytic techniques in identifying volunteer motivation in tourism. *Tourism Management*, *20*(1), 99-106.

Andritsos, F., & Perez-Prat, J. (2000). The automation and integration of production processes in shipbuilding. *State-of-the-Art report, Joint Research Centre. European Commission, Europe.*

Argyres, N. (1996). Evidence on the role of firm capabilities in vertical integration decisions. *Strategic Management Journal*, 129-150.

Artto, K., Davies, A., Kujala, J., & Prencipe, A. (2011). The project business: analytical framework and research opportunities.

Arya, B., & Lin, Z. (2007). Understanding collaboration outcomes from an extended resource-based view perspective: The roles of organizational characteristics, partner attributes, and network structures. *Journal of management*, *33*(5), 697-723.

Aulia Windyardani. (2008). Prospek Industri Galangan Kapal Dalam Negeri Guna Menghadapi Persaingan Global. Jurnal Teknik : Vol. 29 No. 1 Tahun2008, ISSN0852-1697

Asheim, B. T. (2002). Temporary organisations and spatial embeddedness of learning and knowledge creation. *Geografiska Annaler: Series B, Human Geography*, *84*(2), 111-124.

Asheim, B. T., & Isaksen, A. (1997). Location, agglomeration and innovation: towards regional innovation systems in Norway?. *European planning studies*, *5*(3), 299-330.

Atkinson, R., Crawford, L., & Ward, S. (2006). Fundamental uncertainties in projects and the scope of project management. *International journal of project management*, *24*(8), 687-698.

Banda, O. A. V., Hänninen, M., Lappalainen, J., Kujala, P., & Goerlandt, F. (2016). A method for extracting key performance indicators from maritime safety management

Bakker, E., Walker, H., & Harland, C. (2006). Organizing for collaborative procurement: An initial conceptual framework. *Advancing Public Procurement: Practices, Innovation and Knowledge-Sharing. Academic Press, Boca Raton, FL*, 14-44.

Bair, J. (2008). Analysing global economic organization: embedded networks and global chains compared. *Economy and Society*, *37*(3), 339-364.

Barney, J. B. (2001). Is the resource-based "view" a useful perspective for strategic management research? Yes. Academy of management review, 26(1), 41-56.

Barreto, I. (2010). Dynamic capabilities: A review of past research and an agenda for the future. *Journal of management*, *36*(1), 256-280.

Bathelt, H., & Taylor, M. (2002). Clusters, power and place: inequality and local growth in time–space. *Geografiska Annaler: Series B, Human Geography*, *84*(2), 93-109.

Basuki, M., Manfaat, D., Nugroho, S., & Dinariyana, A. (2014). Probabilistic risk assessment of the shipyard industry using the bayesian method. *International Journal of technology*, *5*(1), 88-97.

Bell, M., & Pavitt, K. (1995). The development of technological capabilities. *Trade, technology and international competitiveness*, *22*(4831), 69-101.

Bengtsson, M., & Kock, S. (2000).” Coopetition” in business Networks—to cooperate and compete simultaneously. *Industrial marketing management*, *29*(5), 411-426.

Benito, G., Berger, E., de la Forest, M. and Shum, J. (2003). A cluster analysis of the maritime sector in Norway. *International Journal of Transport Management*, 1(4), pp.203-215.

Bernat, S., & Karabag, S. F. (2018). Accumulating technological capabilities through R&D projects: studies on the Brazilian defence industry. *International Journal of Technological Learning, Innovation and Development*, *10*(3-4), 203-230.

Berry, J. M. (2002). Validity and reliability issues in elite interviewing. *PS: Political Science & Politics*, *35*(4), 679-682.

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: an empirical investigation. *MIS quarterly*, 169-196.

Bird, C. M. (2005). How I stopped dreading and learned to love transcription. *Qualitative inquiry*, *11*(2), 226-248.

Black, J. A., & Boal, K. B. (1994). Strategic resources: Traits, configurations and paths to sustainable competitive advantage. *Strategic management journal*, *15*(S2), 131-148.

Beugelsdijk, S. (2010). Entrepreneurial culture, regional innovativeness and economic growth. In *Entrepreneurship and culture* (pp. 129-154). Springer, Berlin, Heidelberg.

Beugelsdijk, S., McCann, P., & Mudambi, R. (2010). Introduction: Place, space and organization—economic geography and the multinational enterprise.

Blake, G. (1960). Lloyd's register of shipping, 1760-1960. Lloyd's Register.

Boisson, P. (1994). Classification societies and safety at sea: Back to basics to prepare for the future. Marine Policy, 18(5), 363-377.

Boschma, R. A., & Frenken, K. (2006). Applications of evolutionary economic geography. *Applied evolutionary economics and economic geography. Edward Elgar Publishing, Cheltenham Google Scholar*.

Boschma, R. A., & Wenting, R. (2007). The spatial evolution of the British automobile industry: Does location matter? *Industrial and corporate change*, *16*(2), 213-238.

Brenner, N., Jessop, B., Jones, M., & Macleod, G. (Eds.). (2008). *State/space: a reader*. John Wiley & Sons.

Bryson, J., Daniels, P., & Warf, B. (2013). *Service worlds: People, organisations, technologies*. Routledge.

Bryson, J. R., Clark, J., & Mulhall, R. (2013). The competitiveness and evolving geography of British manufacturing: Where is manufacturing tied locally and how might this change. *Future of Manufacturing Project: Evidence Paper*, *3*.

Bryson, J. R., Mulhall, R. A., Song, M., & Kenny, R. (2017). Urban assets and the financialisation fix: land tenure, renewal and path dependency in the city of Birmingham. Cambridge Journal of Regions, Economy and Society, 10(3), 455-469.

Bryson, J. R., & Ronayne, M. (2014). Manufacturing carpets and technical textiles: routines, resources, capabilities, adaptation, innovation and the evolution of the British textile industry. *Cambridge Journal of Regions, Economy and Society*, *7*(3), 471-488.

Bonoma, T. V. (1985). Case research in marketing: opportunities, problems, and a process. *Journal of marketing research*, 199-208.

Boyer, R. (2004). The Rediscovery of Networks-Past and Present-An Economist's Perspective'. In *50th Annual Meeting of the Business History Conference, Le Creusot*.

Booth, A. (Ed.). (1992). *The oil boom and after: Indonesian economic policy and performance in the Soeharto era*. Oxford University Press, USA.

Buckley, P. J., Pass, C. L., & Prescott, K. (1988). Measures of international competitiveness: A critical survey∗. *Journal of marketing management*, *4*(2), 175-200.

Buckley, P. J., Pass, G. L., & Prescott, K. (1990). Measures of international competitiveness: empirical findings from British manufacturing companies. *Journal of Marketing Management*, *6*(1), 1-13.

Buckley, P. J., Pass, C. L., & Prescott, K. (1992). Measures of international competitiveness: Empirical findings from British banks, building societies, and insurance companies. *Managing organizations in*, 3-20.

Burgess, R. G. (1984). An Introduction to Field Research.

Burke, H., Jenkins, L., & Higham, V. (2010). Transcribing your own qualitative data.

Burman, M. J., Batchelor, S. A., & Brown, J. A. (2017). Researching girls and violence: Facing the dilemmas of fieldwork. In Feminist Theories of Crime (pp. 3-19). Routledge.

Bunnell, T. G., & Coe, N. M. (2001). Spaces and scales of innovation. *Progress in Human geography*, *25*(4), 569-589.

Caldwell, N., & Howard, M. (Eds.). (2010). *Procuring complex performance: Studies of innovation in product-service management*. Routledge.

Callon, M. (1986). Some elements of a sociology of translation. *Domestication of the scallops and the fishermen of St. Brieuc Bay." I Technoscience. The politics of intervention, redigert av Kristin Asdal, Ingunn Brenna, og Ingunn Moser*, 57-78.

Callon, M., & Latour, B. (1981). Unscrewing the big Leviathan: how actors macro-structure reality and how sociologists help them to do so. *Advances in Social Theory and Methodology: Toward an Integration of Micro and Macro-Sociologies*, 277-303.

Carney, M. (2005). Corporate governance and competitive advantage in family-controlled firms. *Entrepreneurship theory and practice*, *29*(3), 249-265.

Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A. J. (2014, September). The use of triangulation in qualitative research. In *Oncology nursing forum* (Vol. 41, No. 5).

Charles, P. (2000). Content Analysis and Narrative Analysis. *Handbook of Research Methods in Social and Personality Psychology*, 313.

Chen, W., Los, B., McCann, P., Ortega-Argilés, R., Thissen, M., & van Oort, F. (2018). The continental divide? Economic exposure to Brexit in regions and countries on both sides of The Channel. *Papers in Regional Science*, *97*(1), 25-54.

Chukwunweike, N. V., Ani, M. I., Ocheje, F. J., & Akunna, O. V. (2015). Production Subcontracting: A Strategy for the Survival of Small and Medium Scale Industries in Nigeria. *Mediterranean Journal of Social Sciences*, *6*(4), 639.

Cimoli, M., Dosi, G., Nelson, R. R., & Stiglitz, J. E. (2009). Institutions and policies shaping industrial development: an introductory note. In *Industrial Policy and Development: The Political Economy of Capabilities Accumulation,* Cimoli, M., Dosi, G., Stiglitz, J. E (eds). Oxford University Pres: Oxford, UK; 19-38.

Clark, G. L., & Wójcik, D. (Eds.). (2018). *The New Oxford Handbook of Economic Geography*. Oxford University Press.

Clegg, S. R., Pitsis, T. S., Rura-Polley, T., & Marosszeky, M. (2002). Governmentality matters: designing an alliance culture of inter-organizational collaboration for managing projects. *Organization Studies*, *23*(3), 317-337.

Coe, N. M. (2001). A hybrid agglomeration? The development of a satellite-Marshallian industrial district in Vancouver's film industry. *Urban studies*, *38*(10), 1753-1775.

Coe, N. M., & Bok, R. (2014). Retail transitions in Southeast Asia.

Coe, N. M., Hess, M., Yeung, H. W. C., Dicken, P., & Henderson, J. (2004). 'Globalizing' regional development: a global production networks perspective. *Transactions of the Institute of British Geographers*, *29*(4), 468-484.

Coe, N. M., & Yeung, H. W. C. (2015). *Global production networks: Theorizing economic development in an interconnected world*. Oxford University Press.

Coe, N. M., Dicken, P., & Hess, M. (2008). Global production networks: realizing the potential. *Journal of economic geography*, *8*(3), 271-295.

Coff, R. W. (1999). When competitive advantage doesn't lead to performance: The resource-based view and stakeholder bargaining power. *Organization science*, *10*(2), 119-133.

Cope, M. (2010). Coding Transcripts and Diaries 27. *Key methods in geography*, *440*.

Corley, K. G., & Gioia, D. A. (2004). Identity ambiguity and change in the wake of a corporate spin-off. *Administrative Science Quarterly*, *49*(2), 173-208.

Coviello, N. E., Ghauri, P. N., & Martin, K. A. (1998). International competitiveness: empirical findings from SME service firms. *Journal of International Marketing*, 8-27.

Cova, B., Ghauri, P., & Salle, R. (2002). *Project marketing: beyond competitive bidding*. Wiley.

Cox, A., Sanderson, J., & Watson, G. (2001). Supply chains and power regimes: toward an analytic framework for managing extended networks of buyer and supplier relationships. *Journal of Supply Chain Management*, *37*(1), 28-35.

Cox, A. (2004). The art of the possible: relationship management in power regimes and supply chains. *Supply chain management: an international journal*, *9*(5), 346-356.

Cox, A., Lonsdale, C., Watson, G., & Wu, Y. (2005). Supplier relationship management as an investment: evidence from a UK study. *Journal of General Management*, *30*(4), 27-42.

Creswell, J.W. 2004. Educational Research. Planning, Conducting, and Evaluating Quantitative and Qualitative Research (2 ed.). Pearson Education, Upper Saddle River, USA.

Creswell, J.W. 2009. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (3 ed.). Sage Publications, Thousand Oaks, USA.

De Felice, D., & Janesick, V. J. (2015). Understanding the marriage of technology and phenomenological research: From design to analysis. *The qualitative report*, *20*(10), 1576-1593.

Davies, A., & Brady, T. (2000). Organisational capabilities and learning in complex product systems: towards repeatable solutions. *Research policy*, *29*(7-8), 931-953.

DeFillippi, R. J. (2002). Organizational models for collaboration in the new economy. *Human Resource Planning*, *25*(4).

DeFillippi, R., Grabher, G., & Jones, C. (2007). Introduction to paradoxes of creativity: managerial and organizational challenges in the cultural economy. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *28*(5), 511-521.

De Propris, L., Menghinello, S., & Sugden, R. (2008). Multinational Networks of Local Production Systems: A Basis for Analysis and Policy. *Networks, Governance and Economic Development: Bridging Disciplinary Frontiers*, 78.

Dicken, P., & Henderson, J. (2003). Making the connections: global production networks in Europe and East Asia. *ESRC Research Project*, *238535*.

Dicken, P., & Malmberg, A. (2001). Firms in territories: a relational perspective. *Economic geography*, *77*(4), 345-363.

Dicken, P., Kelly, P. F., Olds, K., & Wai-Chung Yeung, H. (2001). Chains and networks, territories and scales: towards a relational framework for analysing the global economy. *Global networks*, *1*(2), 89-112.

Dicken, P., & Thrift, N. (1992). The organization of production and the production of organization: why business enterprises matter in the study of geographical industrialization. *Transactions of the Institute of British geographers*, 279-291.

Djafar, W. (2017). Indonesian Shipbuilding Industry in the perspective of Collaborative Manufacturing Network (CMN). *International Journal of Engineering and Science Applications*, *3*(2), 161-167.

Dimov, D. (2011). Grappling with the unbearable elusiveness of entrepreneurial opportunities. *Entrepreneurship Theory and Practice*, *35*(1), 57-81.

Dolan, C., & Humphrey, J. (2000). Governance and trade in fresh vegetables: the impact of UK supermarkets on the African horticulture industry. Journal of development studies, 37(2), 147-176.

Dolan, C., & Humphrey, J. (2004). Changing governance patterns in the trade in fresh vegetables between Africa and the United Kingdom. Environment and Planning A, 36(3), 491-509.

Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of management review*, *23*(4), 660-679.

Eccles, R. G. (1981). The quasifirm in the construction industry. *Journal of Economic Behavior & Organization*, *2*(4), 335-357.

Dubois, A., & Gadde, L. E. (2000). Supply strategy and network effects—purchasing behaviour in the construction industry. *European journal of purchasing & supply management*, *6*(3), 207-215.

Ebel, T., George, K., Larsen, E., Shah, K., & Ungerman, D. (2013). Building new strengths in the healthcare supply chain. *Pharmaceutical and Medical Products Operations*.

Eich-Born, M., & Hassink, R. (2005). On the battle between shipbuilding regions in Germany and South Korea. *Environment and Planning A*, *37*(4), 635-656.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they?. *Strategic management journal*, *21*(10-11), 1105-1121.

Ernst, D., & Kim, L. (2002). Global production networks, knowledge diffusion, and local capability formation. *Research Policy*, *31*(8-9), 1417-1429.

Etzkowitz, H. (2008). *The triple helix: university-industry-government innovation in action*. Routledge.

Fahy, J. (2000). The resource-based view of the firm: some stumbling-blocks on the road to understanding sustainable competitive advantage. *Journal of European industrial training*, *24*(2/3/4), 94-104.

Firmansyah, M. R., Djafar, W., & Muhammad, A. H. (2018). Initial Model Development of an Integrated Shipbuilding Industry in Indonesia: a Case Study of Indonesian State Owned Enterprises (BUMN) Shipyards. *International Journal of Engineering and Science Applications*, *4*(2), 183-190.

Flyvbjerg, B. (2009). Optimism and misrepresentation in early project development. In *Making essential choices with scant information* (pp. 147-168). Palgrave Macmillan, London.

Flyvbjerg, B., Bruzelius, N., & Rothengatter, W. (2003). *Megaprojects and risk: An anatomy of ambition*. Cambridge University Press.

Flyvbjerg, B., Holm, M. and Buhl, S. (2002). Underestimating Costs in Public Works Projects

Gann, D. M., & Salter, A. J. (2000). Innovation in project-based, service-enhanced firms: the construction of complex products and systems. *Research policy*, *29*(7-8), 955-972.

Gereffi, G., and Kaplinsky, R. (2001). The value of value chains: spreading the gains from globalisation (Vol. 32), Brighton: Institute of Development Studies.

Gereffi, G., Humphrey, J., & Sturgeon, T. (2005) The governance of global value chains, Review of international political economy, 12(1), 78-104.

Gereffi, G., (2001). Beyond the Producer-driven/Buyer-driven Dichotomy The Evolution of Global Value Chains in the Internet Era, IDS bulletin, 32(3), 30-40.

Geertz, C. (1973). *The interpretation of cultures: Selected essays* (Vol. 5019). Basic books.

Ghoshal, S., & Bartlett, C. A. (1990). The multinational corporation as an interorganizational network. *Academy of management review*, *15*(4), 603-626.

Gindarsah, I., & Priamarizki, A. (2015). Indonesia's Maritime Doctrine and Security Concerns. *RSIS Policy Report*, *9*.

Giuliani, E. (2006). The selective nature of knowledge networks in clusters: evidence from the wine industry. *Journal of economic geography*, *7*(2), 139-168.

Gorard, S. (2013). *Research design: Creating robust approaches for the social sciences*. Sage.

Grammenos, C. (Ed.). (2013). The handbook of maritime economics and business. Taylor & Francis.

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American journal of sociology*, *91*(3), 481-510.

Gregorio, S.d. (2000). Using Nvivo for your literature review. In *Strategies in qualitative Research: Issues and Results from Analysis Using QSR NVivo and NUD* IST Conference at the institute of Education, London* (pp. 29-30).

Griffiths, A., & Zammuto, R. F. (2005). Institutional governance systems and variations in national competitive advantage: An integrative framework. *Academy of Management Review*, *30*(4), 823-842.

Gulati, R. (1998). Alliances and networks. *Strategic management journal*, *19*(4), 293-317.

Gulati, R., Nohria, N., & Zaheer, A. (2000). Strategic networks. *Strategic management journal*, *21*(3), 203-215.

Gupta, S., & Polonsky, M. (2014). Inter-firm learning and knowledge-sharing in multinational networks: An outsourced organization's perspective. *Journal of Business Research*, *67*(4), 615-622.

Habbershon, T. G., & Williams, M. L. (1999). A resource-based framework for assessing the strategic advantages of family firms. *Family business review*, *12*(1), 1-25.

Hamel, G., Doz, Y. L., & Prahalad, C. K. (1989). Collaborate with your competitors and win. Harvard business review, 67(1), 133-139.

Håkansson, H., Havila, V., & Pedersen, A. C. (1999). Learning in networks. *Industrial Marketing Management*, *28*(5), 443-452.

Håkansson, H., & Johanson, J. (2001). *Business network learning*. Amsterdam, London, Oxford: Elsevier Science Ltd., Pergamon.

Hammervoll, T. (2014). Service provision for co-creation of value: insights from exchange- and production economy perspectives. *International Journal of Physical Distribution & Logistics Management*, *44*(1/2), 155-168.

Hammervoll, T., Halse, L. L., & Engelseth, P. (2014). The role of clusters in global maritime value networks. *International Journal of Physical Distribution & Logistics Management*, *44*(1/2), 98-112.

Hampton, M. P. (2010). Enclaves and ethnic ties: The local impacts of Singaporean cross-border tourism in Malaysia and Indonesia. Singapore Journal of Tropical Geography, 31(2), 239-253.

Hanson, G. H. (2001). Should countries promote foreign direct investment? (Vol. 9). UN.

Hassink, R. (2005), How to Unlock Regional economies from Path Dependency? From Learning Region to Learning Cluster, *European Planning Studies,* 13:4: 521-535.

He, T., Zhang, Y., & Xu, X. (2012). On service supply chain operations management: a service value perspective. International Journal of Product Development, 17(3-4), 277-295.

Heinz, J. A., & Casault, R. (1996). The Building Commissioning Handbook. APPA: The Association of Higher Education Facilities Officers, 1446 Duke St., Alexandria, VA 22314-3492.

Henderson, R., & Cockburn, I. (1994). Measuring competence? Exploring firm effects in pharmaceutical research. *Strategic management journal*, *15*(S1), 63-84.

Henderson, J., Dicken, P., Hess, M., Coe, N., & Yeung, H. W. C. (2002). Global production networks and the analysis of economic development. Review of international political economy, 9(3), 436-464.

Henderson, J. V., & Kuncoro, A. (1996). Industrial centralization in Indonesia. The World Bank Economic Review, 10(3), 513-540.

Heng, T. M., & Kee, N. K. (2009). The Batam, Bintan, Karimun special economic zone: Revitalizing domestic industrialization and linking global value chain. Plugging into production networks: industrialization strategy in less-developed Southeast Asian countries, 245.

Henn, S., Bathelt, H. (2015), Knowledge generation and field reproduction in temporary clusters and the role of business conferences, *Geoforum*, 58: 104-113.

Hilton, R., Pettavino, P. J., & Ullman, H. K. (1987). US maritime industries: Down for the third time.

Hobday, M. (1998). Product complexity, innovation and industrial organisation. *Research policy*, *26*(6), 689-710.

Hobday, M. (2000). The project-based organisation: an ideal form for managing complex products and systems? Research policy, 29(7), 871-893.

Holl, A. (2008). Production subcontracting and location. *Regional Science and Urban Economics*, *38*(3), 299-309.

Huberman, A. M., & Miles, M. B. (2002). The qualitative researcher's companion. *Thousand Oaks*.

Humphrey, J., & Schmitz, H. (2000). *Governance and upgrading: linking industrial cluster and global value chain research* (Vol. 120). Brighton: Institute of Development Studies.

Indonesia. (2011). *Masterplan percepatan dan perluasan pembangunan ekonomi Indonesia, 2011-2025*. Republik Indonesia.

Irawati, D., & Charles, D. (2010). The involvement of Japanese MNEs in the Indonesian automotive cluster. *International Journal of Automotive Technology and Management*, *10*(2-3), 180-196.

Isaksen, A. (1997). Regional clusters and competitiveness: the Norwegian case. *European Planning Studies*, *5*(1), 65-76.

Jaafar, M., & Abdul-Aziz, A. R. (2005). Resource-based view and critical success factors: a study on small and medium sized contracting enterprises (SMCEs) in Malaysia. *International Journal of Construction Management*, *5*(2), 61-77.

Jamieson, A. (1998). British OSV companies in the North Sea, 1964–1997. *Maritime Policy & Management*, 25(4), pp.305-312.

Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative science quarterly*, *24*(4), 602-611.

Jiang, L., Bastiansen, E., & Strandenes, S. P. (2013). The international competitiveness of China's shipbuilding industry. *Transportation Research Part E: Logistics and Transportation Review*, *60*, 39-48.

Johannisson, B., Ramírez-Pasillas, M., & Karlsson, G. (2002). The institutional embeddedness of local inter-firm networks: a leverage for business creation. *Entrepreneurship & Regional Development*, *14*(4), 297-315.

Józsa, V. (2017). Dual education models as elements of corporate embeddedness in Hungary. In *proceedings of the international scientific conference*. Latvia University of Agriculture.

Karlsen, A. (2005). The dynamics of regional specialization and cluster formation: dividing trajectories of maritime industries in two Norwegian regions. *Entrepreneurship & Regional Development*, 17(5), pp.313-338.

Keegan, A., & Turner, J. R. (2002). The management of innovation in project-based firms. Long range planning, 35(4), 367-388.

Kendrick, T. (2015). *Identifying and managing project risk: essential tools for failure-proofing your project*. AMACOM Div American Mgmt Assn.

Kimura, F. (2002). Subcontracting and the performance of small and medium firms in Japan. *Small Business Economics*, *18*(1), 163-175.

Kenward, L. R. (2004). Survey of recent developments. Bulletin of Indonesian Economic Studies, 40(1), 9-35.

Kim, H., Lee, S. S., Park, J. H., & Lee, J. G. (2005). A model for a simulation-based shipbuilding system in a shipyard manufacturing process. *International Journal of Computer Integrated Manufacturing*, *18*(6), 427-441.

Kitchin, R., & Tate, N. J. (2000). Conducting research into human geography. *Theory, methodology*

Knoben, J., & Oerlemans, L. A. (2012). Configurations of inter-organizational knowledge links: Does spatial embeddedness still matter?. *Regional Studies*, *46*(8), 1005-1021.

Knox, L., & Gibb, S. (2001). Sector level analysis of management development: The case of Scottish local authorities. *Journal of Management Development*, *20*(8), 714-730.

Komite Nasional Kecelakaan Transportasi, Analisis Data Kecelakaan dan Investigasi Trasnportasi Laut 20017 – 2010, paper.

Korsgaard, S., Ferguson, R., & Gaddefors, J. (2015). The best of both worlds: how rural entrepreneurs use placial embeddedness and strategic networks to create opportunities. *Entrepreneurship & Regional Development*, *27*(9-10), 574-598.

Kramer, J. P., & Diez, J. R. (2012). Catching the local buzz by embedding? Empirical insights on the regional embeddedness of multinational enterprises in Germany and the UK. *Regional Studies*, *46*(10), 1303-1317.

Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization science*, *3*(3), 383-397.

Koto, J., & Arief, D. S. (2017). Occupational Safety in Production of Traditional Fishing Vessels in Indonesia. *JOURNAL of OCEAN, MECHANICAL AND AEROSPACE-Science and Engineering*, *4*.

Krugman, P., & Elizondo, R. L. (1996). Trade policy and the third world metropolis. Journal of development economics, 49(1), 137-150.

Jenkins, H. (2006). Small business champions for corporate social responsibility. *Journal of Business Ethics*, *67*(3), 241-256.

Langen, P. D. (2002). Clustering and performance: the case of maritime clustering in The Netherlands. *Maritime Policy & Management*, *29*(3), 209-221.

Latour, B. (2005). Reassembling the social-an introduction to actor-network-theory. *Reassembling the Social-An Introduction to Actor-Network-Theory, by Bruno Latour, pp. 316. Foreword by Bruno Latour. Oxford University Press, Sep 2005. ISBN-10: 0199256047. ISBN-13: 9780199256044*, *1*.

Latour, B. (1993). *The pasteurization of France*. Harvard University Press.

Lazakis, I., Turan, O., & Aksu, S. (2010). Increasing ship operational reliability through the implementation of a holistic maintenance management strategy. *Ships and Offshore Structures*, *5*(4), 337-357.

Lazzarini, S. G. (2015). Strategizing by the government: Can industrial policy create firm-level competitive advantage?. *Strategic Management Journal*, *36*(1), 97-112.

Law, J. (1986). On the methods of long-distance control: vessels, navigation and the Portuguese route to India. *Power, action and belief: A new sociology of knowledge*, 234-263.Mickeviciene, R. (2013). Global Competition in Shipbuilding: Trends and Challenges for Europe.

Levy, D. L. (2008). Political contestation in global production networks. *Academy of management review*, *33*(4), 943-963.

Lee, E., Shin, J. G., & Park, Y. (2007). A statistical analysis of engineering project risks in the korean shipbuilding industry. *Journal of Ship Production*, *23*(4), 223-230.

Logam, E.D. (2017). Challenges and Opportunities in the Indonesian Shipbuilding and Maritime Sector, Presented at the German – Indonesian Forum on Shipbuilding and Maritime Technology Solutions, 20 February 2017, Jakarta-Indonesia.

Lincoln, Y. S., & Guba, E. G. (1985). Naturalistic inquiry (Vol. 75). Sage

Lindkvist, L. (2004). Governing project-based firms: promoting market-like processes within hierarchies. *Journal of Management and Governance*, *8*(1), 3-25.

Liu, Y., & Yang, C. (2013). Strategic coupling of local firms in global production networks: the rise of the home appliance industry in Shunde, China. *Eurasian Geography and Economics*, *54*(4), 444-463.

Locatelli, G., Mancini, M., & Romano, E. (2014). Systems engineering to improve the governance in complex project environments. *International Journal of Project Management*, *32*(8), 1395-1410.

Loch, C. H., De Meyer, A., & Pich, M. T. (2006). Managing the unknown: A new approach to managing novel projects. *NY: Wiley*.

Longhurst, R. (2003). Semi-structured interviews and focus groups. Key methods in geography, 117-132.

Lonsdale, C., Sanderson, J., Watson, G., & Peng, F. (2016). Beyond intentional trust: supplier opportunism and management control mechanisms in public sector procurement and contracting. *Policy & Politics*, *44*(2), 289-311.

Lundin, R. A., & Söderholm, A. (1995). A theory of the temporary organization. *Scandinavian Journal of management*, *11*(4), 437-455.

Ma'ruf, B., Okumoto, Y., & Widjaja, S. (2006). Environment-based strategic management model for Indonesia's medium-sized shipyards. *Journal of ship production*, *22*(4), 195-202.

MacKinnon, D. (2011). Beyond strategic coupling: reassessing the firm-region nexus in global production networks. *Journal of Economic Geography*, *12*(1), 227-245.

Malmberg, A., & Maskell, P. (2002). The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering. *Environment and Planning A: Economy and Space*, *34*(3), 4 Michaelowa, A., & Krause, K. (2000). International maritime transport and climate policy. *Intereconomics*, *35*(3), 127-136. 29-449.

Mahoney, J. T., & Pandian, J. R. (1992). The resource-based view within the conversation of strategic management. Strategic management journal, 13(5), 363-380.

Maramwidze-Merrison, E. (2016). Innovative Methodologies in Qualitative Research: Social Media Window for Accessing Organisational Elites for interviews. *Electronic Journal of Business Research Methods*, *14*(2).

Martin, R., Sunley, P. (2006), Path dependence and regional economic evolution, *Journal of Economic Geography*, 6: 395-437.

Marwick, K. P. (1992). Report of a study into the competitiveness of European community shipyards. *KPMG Peat Marwick, Amstelveen*.

Maskell, P. (2001), The firm in economic geography, *Economic Geography*, 77: 4: 329-44.

Maskell, P., Bathelt, H., Malmberg, A. (2006), Building Global Knowledge Pipeline: The Role of Temporary Clusters, *European Planning Studies*, 14: 8: 997-1013.

Maskell, P., Malmberg, A. (2007), Myopia, knowledge development and cluster evolution, Journal of Economic Geography, 7:5: 603-618.

McCann, P., & Ortega-Argilés, R. (2015). Smart specialization, regional growth and applications to European Union cohesion policy. *Regional Studies*, *49*(8), 1291-1302.

Melo, M. T., Nickel, S., & Saldanha-Da-Gama, F. (2009). Facility location and supply chain management–A review. *European journal of operational research*, *196*(2), 401-412.

Meijer, K., Pruyn, J., & Klooster, J. (2009). Early stage planning support. In *Proceedings of international conference on computer application in shipbuilding* (Vol. 2).

Michaelowa, A., & Krause, K. (2000). International maritime transport and climate policy. *Intereconomics*, *35*(3), 127-136.

Morrison, A., & Rabellotti, R. (2005). *Knowledge and information networks: Evidence from an Italian wine local system*. Università commerciale Luigi Bocconi.

Midler, C. (1995). "Projectification" of the firm: The Renault case. *Scandinavian Journal of Management*, *11*(4), 363-375.

Midoro, R., Musso, E., & Parola*, F. (2005). Maritime liner shipping and the stevedoring industry: market structure and competition strategies. *Maritime Policy & Management*, *32*(2), 89-106.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.

Miller, R., & Lessard, D. (2000). Public goods and private strategies: making sense of project performance. *The Strategic Management of Large Engineering Projects*.

Miller, R., & Lessard, D. R. (2001). *The strategic management of large engineering projects: Shaping institutions, risks, and governance*. MIT press.

Miterev, M., Mancini, M., & Turner, R. (2017). Towards a design for the project-based organization. *International Journal of Project Management*, *35*(3), 479-491.

Myers, M. D. (2013). *Qualitative research in business and management*. Sage.

Nadja Lee Hansen, Z., Zhang, Y., & Ahmed-Kristensen, S. (2013). Viewing engineering offshoring in a network perspective: addressing and managing risks. *Journal of Manufacturing Technology Management*, *24*(2), 154-173.

Nadvi, K. (1999). The cutting edge: collective efficiency and international competitiveness in Pakistan. *Oxford Development Studies*, *27*(1), 81-107.

Nadvi, K. (2014). "Rising powers" and labour and environmental standards. *Oxford Development Studies*, *42*(2), 137-150.

Nohria, N., & Ghoshal, S. (1997). *The differentiated network: Organizing multinational corporations for value creation*. Jossey-Bass Publishers.

Namusonge, M. J. (2014). Linking competencies with strategies: The case of small and medium-sized exporting firms in Kenya. *International Journal of Social Sciences and Entrepreneurship*, *1*(11), 418-439.

Negara, S. D. (2016). The impact of local content requirements on the Indonesian manufacturing industry.

Neilson, J., Pritchard, B., & Yeung, H. W. C. (2014). Global value chains and global production networks in the changing international political economy: An introduction. *Review of International Political Economy*, *21*(1), 1-8.

Ng, K. K. (2011). Batam, Bintan & Karimun Special Economic Zone: Attracting Foreign Investment. In *Facets Of Competitiveness: Narratives from ASEAN* (pp. 185-221).

Nikonova, K. T. (2009). *Legal aspects on shipbuilding financing: Legal evaluation of financial risks in the pre-delivery phase* (Master's thesis).

Nohl, A. M. 2009. Interview und Dokumentarische Methode: Anleitungen für die Forschungspraxis (3 ed.). Verlag für Sozialwissenschaften, Wiesbaden, Germany

Nohria, N., & Ghoshal, S. (1997). *The differentiated network: Organizing multinational corporations for value creation*. San Francisco: Jossey-Bass.

Nollet, J., & Beaulieu, M. (2005). Should an organisation join a purchasing group?. *Supply Chain Management: An International Journal*, *10*(1), 11-17.

Nollet, J., Beaulieu, M., & Fabbe-Costes, N. (2017). The impact of performance measurement on purchasing group dynamics: The Canadian experience. *Journal of Purchasing and Supply Management*, *23*(1), 17-27.

Notteboom, T. E., & Rodrigue, J. P. (2005). Port regionalization: towards a new phase in port development. *Maritime Policy & Management*, *32*(3), 297-313.

O'dell, C., & Grayson, C. J. (1998). If only we knew what we know: Identification and transfer of internal best practices. *California management review*, *40*(3), 154-174.

Oltmann, S. M. (2016). Qualitative interviews: A methodological discussion of the interviewer and respondent contexts. In *Forum: Qualitative Social Research* (Vol. 17, No. 2, p. 1).

Pack, H., & Saggi, K. (2006). Is there a case for industrial policy? A critical survey. *The World Bank Research Observer*, *21*(2), 267-297.

Pallis, A. A. (2017). *The common EU maritime transport policy: Policy Europeanisation in the 1990s*. Routledge.

Perry, M. (2005). Business clusters in the south: a critical appraisal from Indonesian evidence. *Singapore Journal of Tropical Geography*, *26*(2), 227.

Parameswaran, P. (2015). Indonesia's Maritime Ambition: Can Jokowi Realise It?.

Park, J., Lee, D., & Zhu, J. (2014). An integrated approach for ship block manufacturing process performance evaluation: Case from a Korean shipbuilding company. International Journal of Production Economics, 156, 214-222.

Peteraf, M. A. (1993). The cornerstones of competitive advantage: A resource-based view. Strategic management journal, 14(3), 179-191.

Peteraf, M. A., & Barney, J. B. (2003). Unraveling the resource-based tangle. *Managerial and decision economics*, *24*(4), 309-323.

Pradhana, P. (2015). Marine Highway Program in Supporting Indonesia as the World's Maritime Pivot. *Sustaining Partnership Marine Transportation*.

Prahalad, C., & Hamel, G. (1990). The core competence of the corporation. *Harvard business review*, *68*(3), 79-91.

Prahalad, C. K., & Doz, Y. L. (1999). *The multinational mission: Balancing local demands and global vision*. Simon and Schuster.

Prahalad, C. K., & Hamel, G. (1990). The core competence of the corporation [electronic versions]. *Harvard Business Review Retrieved November*, *26*.

Polanyi, K. (1944). The great transformation: Economic and political origins of our time. *Rinehart, New York*.

Ponte, S., & Sturgeon, T. (2014). Explaining governance in global value chains: A modular theory-building effort. *Review of International Political Economy*, *21*(1), 195-223.

Porter, M. E. (1980). Competitive strategy: techniques for analyzing industries and competitors.

Porter, M. E. (1985). Technology and competitive advantage. *Journal of business strategy*, *5*(3), 60-78.

Porter, M. E. (2008). *On competition*. Harvard Business Press.

Porter, M. E. (2011). *Competitive advantage of nations: creating and sustaining superior performance* (Vol. 2). Simon and Schuster.

Poulsen, R. T., & Sornn-Friese, H. (2011). Downfall delayed: Danish shipbuilding and industrial dislocation. *Business History*, *53*(4), 557-582.

Powell, T. C. (1995). Total quality management as competitive advantage: a review and empirical study. *Strategic management journal*, *16*(1), 15-37.

Quinn, P. M. (2002). Qualitative research and evaluation methods. *California EU: Sage Publications Inc*.

Ratislavová, K., & Ratislav, J. (2014). Asynchronous email interview as a qualitative research method in the humanities. Human Affairs, 24(4), 452-460.

Robertson, P., Adamson, J., & Guzman, E. (2016). TESOL Indonesia International Conference Edition.

Rood, S. A. (2018). *Government Laboratory Technology Transfer: Process and Impact: Process and Impact*. Routledge.

Ronayne, M. (2015). 12. Manufacturing textile futures: innovation, adaptation and the UK textiles industry. *Handbook of Manufacturing Industries in the World Economy*, 191.

Roelandt, T. J., & Den Hertog, P. (1999). Cluster analysis and cluster-based policy making in OECD countries: an introduction to the theme. *Boosting innovation: The cluster approach*, 9-23.

Ronayne, M. (2015). 12. Manufacturing textile futures: innovation, adaptation and the UK textiles industry. *Handbook of Manufacturing Industries in the World Economy*, 191.

Rose, C. D., & Coenen, J. M. G. (2016). Automatic generation of a section building planning for constructing complex ships in European shipyards. International Journal of Production Research, 54(22), 6848-6859.

Rosenberg, N. & Firschtak., C.(Eds.)(1985). International Technology Transfer: Concepts, Measures and Comparison.

Roulston, K., & Lewis, J. B. (2003). Learning to interview in the social sciences. Qualitative Inquiry, 9(4), 643-668.

Royle, S. A. (1997). Industrialisation in Indonesia: the example of Batam island. Singapore Journal of Tropical Geography, 18(1), 89-98.

Rusten, G., & Bryson, J. R. (2017). Spatial divisions of expertise and transnational 'service' firms: aerospace and management consultancy. In *Knowledge-based services, internationalization and regional development* (pp. 99-120). Routledge.

Ruuska, I., Ahola, T., Martinsuo, M., & Westerholm, T. (2013). Supplier capabilities in large shipbuilding projects. *International Journal of Project Management*, *31*(4), 542-553.

Sabel, C. F. (1993). Studied trust: Building new forms of cooperation in a volatile economy. *Human relations*, *46*(9), 1133-1170.

Safa, M., Shahi, A., Haas, C. T., & Hipel, K. W. (2014). Supplier selection process in an integrated construction materials.

Salavou, H., Baltas, G., & Lioukas, S. (2004). Organisational innovation in SMEs: the importance of strategic orientation and competitive structure. *European journal of marketing*, *38*(9/10), 1091-1112.

Scarbrough, H., Swan, J., Laurent, S., Bresnen, M., Edelman, L., & Newell, S. (2004). Project-based learning and the role of learning boundaries. *Organization Studies*, *25*(9), 1579-1600.

Sauerhoff, C. (2014). Competitive differentiation within the shipbuilding industry: The importance of competence in the field of services. Springer.

Sanderson, J. (2012). Risk, uncertainty and governance in megaprojects: A critical discussion of alternative explanations. *International journal of project management*, *30*(4), 432-443.

Scapens, R. W. (2004). Doing case study research. *The real life guide to accounting research*, 257-279.

Schmitz, H. (1995). Collective efficiency: Growth path for small-scale industry. *The journal of development studies*, *31*(4), 529-566.

Schmitz, H. (2000). Does local co-operation matter? Evidence from industrial clusters in South Asia and Latin America. *Oxford Development Studies*, *28*(3), 323-336.

Schmitz, H. (2004). *Local enterprises in the global economy*. Edward Elgar Publishing.

Schmitz, H., & Knorringa, P. (2000). Learning from global buyers. Journal of development studies, 37(2), 177-205.

Schön, L., & Schubert, K. (2010). *Sweden's road to modernity: an economic history*. Stockholm: SNS förlag.

Schoenberger, E. (1991). The corporate interview as a research method in economic geography. *The Professional Geographer*, *43*(2), 180-189.

Schumpeter, J. (1983). *The theory of economic development*. New Brunswick, N.J.: Transaction Books.

Shaw, M. P., & Yeoh, C. (2000). Singapore's overseas industrial parks. *Regional Studies*, *34*(2), 199-206.

Shaw, E. (1999). A guide to the qualitative research process: evidence from a small firm study. *Qualitative Market Research: An International Journal*, *2*(2), 59-70.

Shaw, A., De Lusignan, S., & Rowlands, G. (2005). Do primary care professionals work as a team: a qualitative study. *Journal of interprofessional care*, *19*(4), 396-405.

Shenoi, R. A. (1989). *Ship Production Technology (steelwork)*. University of Southampton Department of Ship Science.

Shin, D. H., & Hassink, R. (2011). Cluster life cycles: the case of the shipbuilding industry cluster in South Korea. *Regional Studies*, *45*(10), 1387-1402.

Shoemaker, P. J., & Reese, S. D. (2013). *Mediating the message in the 21st century: A media sociology perspective*. Routledge.

Smit, A. J. (2010). The competitive advantage of nations: is Porter's Diamond Framework a new theory that explains the international competitiveness of countries?. *Southern African Business Review*, *14*(1).

Short, J. C., Ketchen Jr, D. J., Shook, C. L., & Ireland, R. D. (2010). The concept of "opportunity" in entrepreneurship research: Past accomplishments and future challenges. *Journal of Management*, *36*(1), 40-65.

Silvey, R. M. (2000). Stigmatized spaces: gender and mobility under crisis in South Sulawesi, Indonesia. Gender, place and culture: A journal of feminist geography, 7(2), 143-161.

Sletmo, G. K. (2001). The end of national shipping policy? A historical perspective on shipping policy in a global economy. *International Journal of Maritime Economics*, *3*(4), 333-350.

Simatupang, T. M., Wright, A. C., & Sridharan, R. (2002). The knowledge of coordination for supply chain integration. *Business process management journal*, *8*(3), 289-308.

Simmie, J., & Martin, R. (2010). The economic resilience of regions: towards an evolutionary approach. Cambridge journal of regions, economy and society, 3(1), 27-43.

Sirmon, D. G., & Hitt, M. A. (2003). Managing resources: Linking unique resources, management, and wealth creation in family firms. *Entrepreneurship theory and practice*, *27*(4), 339-358.

Simatupang, T. M., Wright, A. C., & Sridharan, R. (2002). The knowledge of coordination for supply chain integration. Business process management journal, 8(3), 289-308.

Solesvik, M. Z. (2007). A collaborative design in shipbuilding: two case studies. In *Industrial Informatics, 2007 5th IEEE International Conference on* (Vol. 1, pp. 299-304). IEEE.

Solesvik, M. Z., & Westhead, P. (2010). Partner selection for strategic alliances: case study insights from the maritime industry. *Industrial Management & Data Systems*, *110*(6), 841-860.

Solesvik, M. Z. (2010). Strategic alliances in maritime industry-the Norwegian experience. *Gunnar Prause (Ed.)*, 66.

Spencer, L., Ritchie, J., & O'Connor, W. (2003). Analysis: practices, principles and processes. *Qualitative research practice: A guide for social science students and researchers*, *199*, 218.

Staber, U. (2009). Collective learning in clusters: Mechanisms and biases. *Entrepreneurship & Regional Development*, *21*(5-6), 553-573.

Steinle, C., & Schiele, H. (2008). Limits to global sourcing?: Strategic consequences of dependency on international suppliers: Cluster theory, resource-based view and case studies. *Journal of Purchasing and Supply Management*, *14*(1), 3-14.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research* (Vol. 15). Newbury Park, CA: Sage.

Storper, M., & Walker, R. (1989). The capitalist imperative.

Storper, M. (1997). *The regional world: territorial development in a global economy*. Guilford press.

Soesastro, H. (2003). *Economic Recovery and Reform in Indonesia* (No. WPE066). Centre for Strategic and International Studies, Jakarta, Indonesia.

Studies–ENTR, C (2009). Study on Competitiveness of the European Shipbuilding Industry. ECORYS. ENTR/06/054

Sturgeon, T., Van Biesebroeck, J., & Gereffi, G., (2007) Prospects for Canada in the NAFTA automotive industry: a global value chain analysis, Reporte investigativo de Industry Canada.

Sturgeon, T., Van Biesebroeck, J., & Gereffi, G. (2008). Value chains, networks and clusters: reframing the global automotive industry, Journal of economic geography.

Sugihara, K. (2007). The second Noel Butlin lecture: labour-intensive industrialisation in global history. *Australian Economic History Review*, *47*(2), 121-154.

Sunaryo, S. (2013). Study On The Possibility Of Establishing Shipbuilding Cluster In Lampung Province Sumatra Indonesia As Pilot Project In Conjunction With Government's Program On The Acceleration And Expansion Of Indonesian Economic Development (MP3EI). *The Indonesian Journal of Naval Architecture*, *1*(1).

Sydow, J., Lindkvist, L., & DeFillippi, R. (2004). Project-based organizations, embeddedness and repositories of knowledge: Editorial.

Tahi Hamonangan Tambunan, T. (2011). Development of small and medium enterprises in a developing country: The Indonesian case. *Journal of Enterprising Communities: People and Places in the Global Economy*, *5*(1), 68-82.

Tallman, S., Jenkins, M., Henry, N., & Pinch, S. (2004). Knowledge, clusters, and competitive advantage. *Academy of management review*, *29*(2), 258-271.

Taylor, M. (2010), Clusters: A Mesmerising Mantra, *Tijdschrift voor Economische en Sociale Geografie*, 101/3: 276-86

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic management journal*, *28*(13), 1319-1350.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic management journal, 509-533.

Thee, K. W. (2012). *Indonesia's economy since independence* (Vol. 35). Institute of Southeast Asian Studies.

Thornton, R. A., & Thompson, P. (2001). Learning from experience and learning from others: An exploration of learning and spillovers in wartime shipbuilding. *American Economic Review*, *91*(5), 1350-1368.

Tesch, R. (1990). *Qualitative research: Analysis types and software*. Routledge

Turner, J. R., & Müller, R. (2003). On the nature of the project as a temporary organization. *International journal of project management*, *21*(1), 1-8.

Turner, R. J., Huemann, M., Anbari, F. T., & Bredillet, C. N. (2010). *Perspectives on projects*. Routledge.

Turner, J. R. (2014). *Handbook of project-based management* (Vol. 92). New York, NY: McGraw-hill.

Wang, J. (2001). The current status and future aspects in formal ship safety assessment. *Safety Science*, *38*(1), 19-30.

Valentine, G. (1997). Tell me about…: using interviews as a research methodology. *Methods in human geography: A guide for students doing a research project*, 110-126.

Vamstad, B. S., & Gordon, M. (2017). Integrating public affairs information strategy with organizational practices in healthcare delivery organizations. *Journal of Public Affairs*, e1828

Vanchan, V., Mulhall, R., & Bryson, J. (2018). Repatriation or Reshoring of Manufacturing to the US and UK: Dynamics and Global Production Networks or from Here to There and Back Again. *Growth and Change*, *49*(1), 97-121.

Van Klink, A., & De Langen, P. (2001). Cycles in industrial clusters: the case of the shipbuilding industry in the Northern Netherlands. *Tijdschrift voor economische en sociale geografie*, *92*(4), 449-463.

Van Maanen, J. (1979). The fact of fiction in organizational ethnography. *Administrative science quarterly*, 539-550.

Van Maanen, J. (1979). Reclaiming qualitative methods for organizational research: A preface. *Administrative science quarterly*, *24*(4), 520-526.

Van Staveren, I., & Knorringa, P. (2007). Unpacking social capital in economic development: How social relations matter. *Review of social economy*, *65*(1), 107-135.

Walker, A. (2015). *Project management in construction*. John Wiley & Sons.

Webb, E., & Weick, K. E. (1979). Unobtrusive measures in organizational theory: A reminder. *Administrative Science Quarterly*, *24*(4), 650-659.

Webster, E. (2004). Firms' decisions to innovate and innovation routines. *Economics of Innovation and New Technology*, *13*(8), 733-745.

Weijland, H. (1999). Microenterprise clusters in rural Indonesia: Industrial seedbed and policy target. *World Development*, *27*(9), 1515-1530.

Wernerfelt, B. (1984). A resource-based view of the firm. Strategic management journal, 5(2), 171-180.

Wilkinson, I., & Young, L. (2002). On cooperating: firms, relations and networks. *Journal of Business Research*, *55*(2), 123-132.

Winch, G. (1998). Zephyrs of creative destruction: understanding the management of innovation in construction. *Building research & information*, *26*(5), 268-279.

Winch, G. M. (2001). Governing the project process: a conceptual framework. *Construction Management & Economics*, *19*(8), 799-808.

Windeler, A., & Sydow, J. (2001). Project networks and changing industry practices collaborative content production in the German television industry. *Organization Studies*, *22*(6), 1035-1060.

Windyardani, A. (2008). Prospek Industri Galangan Kapal Dalam Negeri Guna Menghadapi Persaingan Global. Jurnal Teknik : Vol. 29 No. 1 Tahun 2008, ISSN0852-1697.

Woodward, J. (1958). Management and technology (No. 3). HM Stationery Office, London.

Wright, P. M., McMahan, G. C., & McWilliams, A. (1994). Human resources and sustained competitive advantage: a resource-based perspective. *International journal of human resource management*, *5*(2), 301-326.

Yeung, H. W. C. (2000). Organizing 'the firm' in industrial geography I: networks, institutions and regional development. *Progress in Human Geography*, *24*(2), 301-315.

Yeung, H. W. C. (2005). Rethinking relational economic geography. *Transactions of the Institute of British Geographers*, *30*(1), 37-51.

Yeung, H. W. C. (2009). Regional development and the competitive dynamics of global production networks: an East Asian perspective. *Regional Studies*, *43*(3), 325-351.

Yeung, H. W. C., & Coe, N. (2015). Toward a dynamic theory of global production networks. *Economic Geography*, *91*(1), 29-58.

Yiu, D., & Makino, S. (2002). The choice between joint venture and wholly owned subsidiary: An institutional perspective. *Organization science*, *13*(6), 667-683.

Yin, R. K. (2003). Case study research design and methods third edition. *Applied social research methods series*, *5*.

Yokoyama, E., & Nilsson, A. (2016). Company-based vocational education and training: Case studies of shipbuilding industries in Japan and Sweden. *Essays in Economic & Business History*, *34*(1), 136-164.

Zaheer, A., Gulati, R., & Nohria, N. (2000). Strategic networks. *Strategic management journal*, *21*(3), 203

Zakaria, N. G., Rahaman, M. M., & Hossain, K. A. (2010). Study on some competitive parameters for shipbuilding industry in Bangladesh. *Proceedings of MARTEC*, 413-418.

Zhang, Y., & Gregory, M. (2011). Managing global network operations along the engineering value chain. *International Journal of Operations & Production Management*, *31*(7), 736-764.

Zhang, Y., & Gregory, M. (Eds.). (2017). *Value Creation through Engineering Excellence: Building Global Network Capabilities*. Springer.