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The Impact of Open Innovation and Supply Chain Management Towards Firm Performance

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Abstract
This paper discusses about the potential of open innovation that can improve the performance of company in shipping industry. The paper also takes a pragmatic approach of strategic management to examines the internal components of the models in order to discover the relationship between open innovation as a form of technology and innovation and supply chain management which influences the firm's performance to achieve above average returns in the container shipping industry.
Keywords: Open innovation, Firm Performance, Supply Chain Management, Organization

Introduction
In today's complex supply chain conditions, businesses in shipping industry facing challenges to find a balance between the total logistics costs and resource utilization (Kritchanchai, 2015). In order to maximize its economic of capacity, accounting base pointers tied to supply chain management systems that improvise the efficiency and effectiveness of operation to produce above-average return on the firm's financial performance (Kritchanchai, 2015). Parallel to this, supply chain management is the backbone of any shipping industry to coordinate and manage logistics for the suppliers, producers or consumers; which is traditionally organized and managed by management information system (MIS) such as the Enterprise Resource Planning (ERP). However, in today's rapid growing disruptive technological world, there's been a radical shift in business; which forces the roles between suppliers and consumer to overlap, sometimes making certain organizations irrelevant as the bridges of roles that overtaken by artificial intelligence (Belk R., 2014).

Despite the advantages of technology innovations, only big firms with capital strength are capable to explore using this technique (Sellbom, 2002). In fact, technology adoption rate starts to accelerates about 50%, when the community has adopted the technology; as it boils down to

cost benefit analysis that creates a chasm to progress (Sellbom, 2002). The gap between two stages of adopters and technology enthusiasts is mainly due to the comfort level of the user, confidence of the user towards the technology and the reliability of the infrastructure by the producers to the consumers. Therefore, to facilitate the declining shipping industry and barriers in the adopting technology innovation in the supply chain management, this study will look into perspective of open innovation towards supply chain management for better financial performance in the shipping industry.

Firm Performance Indicators

Brito (2012) proposed a measurement model of firm's performance based on the stakeholder theory and market indicators with two dimensions; first-order dimension (market growth, sales revenue, profitability) and second-order dimension (employee satisfaction, customer satisfaction, social and environmental performance) (Brito, 2012).

Table 1. Firm Performance Indicators

Dimensions	Indicators
Profitability	Return on Assets, EBITDA margin, Return on investment, net income/revenues, Return on equity, Economic value added
Market Value	Earnings per share, stock price improvement, dividend yields, stock price volatility, Market value added, equity,
Growth	Market-share growth, asset growth, net revenue growth, net income growth, number of employees growth
Employee Satisfaction	Turn-over, investment in employees development and training, wages and reward policies, career plans, organizational climate, general employees satisfaction
Customer Satisfaction	Value added, Mix of products and service, new customer retention, repurchase rate, general customer satisfaction, number of new products/services, overall number of complaints
Environmental Performance	Number of projects to improve environmental, level of pollutants emission, use of recyclable materials, recycling level and reuse of residuals, number of environmental lawsuits
Social Performance	Minority employment, number of social and cultural projects, number of lawsuits filled by employees, customers and regulators agencies.

Source: Brito (2012)

Understanding Open Innovation

Basically, innovation is one of tool that used by most of firms in gaining competitive advantage other than low cost, differentiation and focused strategy (Porter, 1980). However, Chesbrough (2012) considered innovation as a traditional model which he classified as closed innovation (CI) due to the process of innovation starts internally by the firm; for the sole purpose of the firm's benefit and use to improve market share, sales, firm performance or employee satisfaction (Chesbrough, 2012). Chesbrough added that, innovation models have made fixed boundaries for the firms and did not allowed unrealized ideas to flow out of the firm or allow any external ideas into the firm. Hence, Chesbrough (2012) has defined innovation by separate into two entities; open innovation (OI) as the ability of the firms to commercialize their ideas and projects or accept other innovations for the benefit of their own organization, and close innovation as the classical concept of vertical integration or a firm's internal research and developments (Chesbrough, 2012). Moreover, Henry Chesbrough further explained open innovation as a business model and a source of income by leveraging on external innovation and a platform to advance their technology in the market (Chesbrough, 2003). In 2006, Chesbrough refined the understanding of open innovation as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation" (Chesbrough, 2006). In 2012, Chesbrough further extended the understanding of open innovation as in-house ideas become concept, turned prototypes and final products for the purpose of external party consumption as a source of revenue which is total opposite of vertical integration (Chesbrough, 2012). This paper simplified open innovation as innovating partnership with bodies or individuals outside a company and spreading the risk and credits of the process to both the adapters and innovators.

How does the Open Innovation Functions?

The concept of open innovation encourages firms to utilize the world of technology by leveraging the risk on both adopters and technologist while forming respectful relationships in an integrative community. This is to ensure that business can provide better, faster, efficient and cost saving solution to consumers. Open Innovation also emphasizes using a decentralized approach of developments to create new opportunities for internal R&D activities to develop products or services for a firm that can be conducted by third party or organizations which are not part of the firm. This approach is collaboratively used by companies which find these solutions is suitable with their nature of business and help to improve the production process in their organizations.

The Importance of Supply Chain Management

The predominant drivers of any organizations seeking to position its brand strong in the marketplace is through supply chain management (Bernard J, 1993). Supply chain management (SCM) is consider as the top three practices after total quality management and human resource management that plays a significant role in determining a firm's performance (White, 1994). In short, supply chain is a series of activities concerned with planning, coordinating and controlling material, parts and finished goods from raw material stage to the end customer

(Stevens, 1989). Rajagopal (2005) further supports the understanding of supply chain as a global network incorporating four basic entities: a supplier, a producer, a distributor or retailer and finally consumers, used to deliver product and services from raw materials to finished goods through an engineered flow of information, physical distribution and cash (Rajagopal, 2005). Despite of money flows from the customer to the raw materials supplier, the flow of information such as invoices, sales literature, specifications and receipts goes back and forth along the chain (Rajagopal, 2005).

Shipping industry is considered an effective, cost salutary and reliable mode of logistics as compared to other industry that use land and air freights as medium of transporting product. The partnership between the shipping supply chains have become an important aspect in the transportation industry (Liao, 2015). Just like the manufacturing industry, the shipping industry supply chain generally consist of shippers also known as freight forwarders such as the trucks, rail or barge (is the raw material in a product supply chain) - carriers such as the vessels and tankers (is the production in a product supply chain and also the shipping companies) – and finally ports and terminal operators (as the end user of a product supply chain). Shipping firms applying supply chain integration as a value-added business model in order to be competitive, have better control over cost and sustainable with the challenges of globalization.

Discussion and Conclusion

Organization performance can be measures by using organizational innovativeness if the innovation is measured from the technical and administrative aspects of a multidimensional construct (return on assets and the share of capital in bank) (Subramanian A, 1996). Rose (2012) performed a study on the impact of firm performance on technology investments and innovation in Lithuanian industrial sectors from 2005 to 2012 resulted, leaders of the industry before 2010 was mostly medium-low technology organizations, but after 2010, companies which invested in innovation and technology categorized as high and medium-high technology companies emerged as market leaders following superior performance in terms of volume of export, productivity and return on assets as compared to low-tech and medium-low tech firms (Rytis Krusinskas, 2015). Besides that, high-tech firms overtook medium-tech industries mainly due to their improved operational efficiency with process automation technologies and new innovations applied throughout the value chain of the organization (Rytis Krusinskas, 2015). Coupled with technology and innovation, supply chain management creates an opportunity to collaborate along the value chain of other organizations for mutual benefits and control of supply to improve efficiency of the organization (Simatupang, 2005). Moreover, change management using technology together with a structured planning and support influences the impact on supply chain's performance (Byrd, 2003). Meanwhile, firm investment in innovation such as wireless mobile barcode scanner and IT system such as MRP (material resource planning) is identified to improve logistics efficiency within the supply chain, provided the technology is aligned with the corporate goals increases the firm performance (Wu, 2006). Previous research found that outbound innovations towards firm performance based on 136 industrial firms that applies some form of supply chain management lead to positive effect on

the firm's performance across different environmental settings which highlights the benefit of open innovation towards firm performance (Lichtenthaler, 2008).

Supply chain management is a complex established function of how an organization does fulfilment for service and supplies that are particular with overall cost and risk of supply. Supply chain management and innovation work hand-in-hand to establish better firm performance (Garwood, 2015). Open innovation disrupts traditional procurement regimes which complements supply chains objective to manage the overall process systematically by creating a closer business to business relationship whereby suppliers assist producers and vice versa using a common online platform for mutual benefit (McMahon, 2015). Moreover, open innovation also acts as an internal and external activities of product innovation process that improves the core business to increase its sales volume, reduce cots or improve competitive advantage (Barbara Bigliardi, 2010). In addition, players in the supply chain strongly agree that open innovation brings significant benefit with better service to the customers accompanied with effective research and development (R & D) activities (Barbara Bigliardi, 2010). Hence, this paper may provide insight for company in shipping industry to look at the potential of open innovation mediated by efficient supply chain management that leads to improve the overall performance of company.

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