An Investigation of Engineers Knowledge on Supply Chain Requirements in Manufacturing Process

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Abstract

In the supply chain management process, many people are involved in different activities to achieve company goals. The effectiveness of the supply chain process mainly relies on the knowledge of the people that are directly or indirectly involved in the process. However, some people involved in the supply chain process have little awareness of their role and responsibilities in the supply chain process. These groups of people mainly are the company staff involved indirectly in the supply chain process. This research is conducted to investigate the knowledge of engineers that play a crucial role in the manufacturing process. The research is exploratory in nature where a qualitative approach using the focus group interview was conducted to uncover the theme and issue on the subject research. The study has made several findings that contribute to research and supply chain process and can be referred to as a business case to understand the knowledge of engineers in the supply chain process and can be referred to as a business case to understand the knowledge of engineers in the supply chain in the manufacturing environment.

Keywords: Supply Chain Management, Manufacturing Process, Engineers knowledge.

1 Introduction

The supply chain process is a systematic way of managing the transformation process of goods from the producers of raw materials in the manufacturer's facility until delivery to the end customer. An ineffective supply chain process can affect manufacturers in many ways including the accessibility to inputs needed for production processes, cost, and profitability of manufactured goods (John T. Mentzer et. al, 2001). Throughout the supply chain process, there are many types of roles involved directly and indirectly in the supply chain process that engineer. includes the However, the involvement of engineers in the supply chain process is less being investigated as compared to the other role in supply chain research.

Hence, this study aims to investigate the basic knowledge of engineers in supply chain management, identify the challenges faced by engineers in supporting the supply chain process as well as develop a framework to improve the engineers" involvement in supply chain management.

2 Significance of the study

In the supply chain process, engineers play an important role to support the process. This is because engineers have mastered specialized body knowledge. In a supply chain, any problems might occur, and engineers can be the ones who can help to solve the problems and create efficient supply chain management. According to Capobianco, B. M., et al (2013) and Sheppard, S. et al (2006), engineers' task is the connection between scientific discoveries and the industrial purposes that meet societal and customer needs. For example, in developing new equipment, the engineer will develop a specific functional requirement, design and test the components, evaluate the design's overall effectiveness, monitoring the cost, reliability, and safety of the new equipment. As we can see, the engineer's job scope is not specific to the supply chain process though the manufacturing process even involved the supply chain flow. In general, the engineer has been working isolated from the supply chain scope although there is a link in the engineer role to the supply chain role that is not being aware by the engineers themselves and the organization. This situation has created a gap in the process that provides an opportunity for investigation.

3 Review of related studies

3.1 Supply chain management practice in the manufacturing environment

Many articles suggest the importance of the firm to establish the supply chain management practice that allows them to act within the supply chain management philosophy. Based on John T. Mentzer et. al (2001), the effort between the supply partners, such as suppliers, carriers, and manufacturers to dynamically respond to the needs of the end customer is coordinated in the activities of SCM. The integration process starts from sourcing to manufacturing and distribution through the supply chain is needed in supply chain management implementation. This can be accomplished through cross-functional teams, plant supplier personnel, and third-party service provider. To successfully implement supply chain management, all firms and organization must overcome their functional barrier and adopt a process approach. Different supply chain strategies and management practices might be used by a company with different suppliers which depends supplier on competence

3.2 Organizational culture in supply chain The evolution of supply chain function has been accelerated in recent years mainly driven by fast development in technology, rise in the omnichannel segments, a shift of the consumer habits and preference, and emerging big data capabilities to make the SCM process more collaborative which led to a shift in Supply Chain culture. As the Supply Chain function becomes more strategic which covering the end-to-end supply chain process. The need to attract and retain the right people who are aligned with the organization's culture is a key to leveraging people in changing the culture (McCarter, M. W. et al, 2005). Due to high volatility in the business environment, the current practice in SCM has been forced to be more flexible, agile, and innovative to face the current challenges. The shift in the SCM culture should in parallel with the change in the SCM management style to encouraging and improving collaboration throughout the chain

3.3 People in supply chain management Successful companies or firms will always consider human capital as an asset for company sustainability. Human factors in these areas are important for the effective development of global process networks that encompass the process of making, deliver, and use a product or service and they depend on the supply chain to provide them what they need to survive and effective succeed. An supply chain management requires improvement in customer service and the internal operating efficiencies of the companies in the supply chain. Even though technologies have replaced much human work, the need for human or people manpower and ideas are crucial in supply chain management. Sourcing, manufacturing. customer service and retailing are activities in logistics that involve people or humans to optimize the end-to-end supply chain in their planning and scheduling (Marinko Jurčević et al, 2009). The role of people that works in supply chain management is the main concern for the business to succeed. All of them that work in the process of the supply chain is crucial. The operator, logisticians, driver, maintenance, and engineers, etc. To create an efficient supply chain each of them must work together and this team approach must permeate every level of the organization involved (Tracey, M., et al, 2001).

3.4 Direct people in supply chain management

Almost all types of companies or businesses, either big or small, need a supply chain and logistics to help with inventory and accounts receivable. A small business usually has one or two-person in charge of these duties while big companies have an entire supply chain and logistics departments. There is various jobs type in the supply chain or logistics department (Haines. R, 2017). A supply chain manager or logistician has a responsibility in directing the efficient movement of products or services from the supplier to the consumer. A logistician is in charge to handle the product from the very beginning of acquisition to the very end of secure delivery (Tracey, M., et al, 2001). We can say that all positions in the supply chain department involve in movement, storage, and processing of inventory. There is many more jobs position in the supply chain such as logistics assistant, purchasing and procurement, lorry drivers, forwarding agent, etc.

3.5 Indirect people in supply chain management

Everyone remotely related to the product, including distributors and suppliers is included in the supply chain process. The activity which utilizing different capabilities, adds value to a material, and making possible different uses of that material is called manufacturing. Every step in the process adds value. In the manufacturing process, many job positions are involved in the supply chain. It includes operators, maintenance, quality checking, and engineers (Prajogo, D., & Sohal, A., 2014). For example, in the furniture industry, it comes from the person who sources the original wood from a tree to the company that delivers the finished furniture to the store. All of them need to efficiently fit beneath the supply chain management umbrella.

3.6 Role of engineers

i. Nature of Works

The engineering sector is one of the wells know the industry in the world. The engineer does various types of work in resolving an abominable condition through the application of technologies. An engineering job is about solving problems. Engineering work intends to affect change in the world. Unlike the scientist, engineers are tasked with being change agents (Capobianco, B. M., et al, 2013). Besides, instead of mechanizing and digitizing the world to make life less challenging and countries more powerful, it is a career that ought to improve the world for the frequent excellent. Professional engineers accumulate practical knowledge that brings together the information and abilities in a way that satisfactorily serves a unique purpose for the appropriate humanity

ii. Link between engineers with supply chain management

In SCM, engineers play an important role throughout the process. This is because engineers are the critical function in the manufacturing process involved in the technical task of the process. In performing the duty, engineers used to work with the other supply chain function such as procurement, logistics, material handling, etc to ensure the product requirement is meeting. The involvement of engineers in the supply chain process is crucial as it is highly dependent on each other to complete the process. Other than that, engineers are the person who knows well about the product the company produced. They know very well about the production stages of any product, so it is easy to understand the complicated supply chain of products. This means, indirectly, engineers are involved in the supply chain process (Sheppard, S. et al, 2006).

iii. Contribution of Engineers in Supply Chain Management

Engineers have a discipline that addresses complex systems and looks at the methods and processes that can be utilized to evaluate and then improve certain processes that are prevalent in the supply chain process. Engineer's jobs offer analytical skills which give value to supply chain processes, practices, and issues. Supply chain management will integrate with the engineering department during production operations management where supply chain managers and engineers interact to make sure the projects will be finished in time and within the right budget (Shapiro, J. F., 2004). For example, mechanical engineers depend entirely on logistics management experts during the execution of projects to make sure the project cargo is delivered to respective sites within the right time. Both verbal and nonverbal forms of communication play an important role during this period. To ensure the right machinery, materials, or equipment acquisition, following the right quality and specifications within the set standard, logistics and procurement managers need to have effective communication (Neiro, S. M. S., & Pinto, J. M.,

2004). The chance of facing the consequences of the product return management process which can lead to abnormal project delays can be reduced.

iv. Adoption of supply chain knowledge Based on, collaboration and utilization of knowledge in supply chain and intellectual assets are the key ingredients in the implementation of knowledge in the supply chain that enables the supply chain to be more adaptive and responsive and ultimately achieve an improved strategic competitive position in the marketplace. However, this can only be achieved if the guidelines for successful supply chain knowledge adoption, and subsequent use and adoption, are seriously addressed and followed.

4 Research approach

To provide a comprehensive base for the analysis, this study was done based on the data collected using a qualitative method from the focus group discussion. The choice of focus group interview method in this study is appropriate due to the limitation of information available on the subject research. A set of questionnaires was prepared based on the previous study as a guide or the interview session. To comply with the research ethic and to gain quality responses, the respondent was selected from a different engineering background that currently serves at one of the manufacturing companies operating in Pasir Gudang, Johor. These respondents have a different exposure to the supply chain process which enriches the quality of the discussion

5 Result and discussion

A. Basic knowledge of engineers in supply chain

Based on the interview session, the researcher found that the scope of the supply chain is not clear to engineers even though they understand the basic process of it. This is because they have all never take any supply chain courses previously and their own company does not provide any educations or training regarding supply chain to engineers. However, they believe that the supply chain is important to the whole organization including their department which is engineering and maintenance. This is as mentioned by (Tan, K. C., 2001), that the entire SCM is started from the eradication of raw materials to its end of useful life was included in supply chain management. Not only has that, but the respondents also agreed that their job is related to the supply chain. As indicated by (Marinko Jurčević, 2009), Engineers are the person who is involved in design and development in manufacturing companies. Indirectly, they are working in the supply chain process without they realize it by themselves. This is because some of them are working in the production line which is involved a lot in the supply chain process. Some of them cooperate with the supply chain department regularly because while some of them have their superior contact another department.

B. Challenged faced by engineers in supporting supply chain and how they overcome

The engineers are directly or indirectly related the supply chain process in the to manufacturing process. Without engineers, the supply chain may not function well throughout the process. A stated by Gosling, J., & Naim, M. M. (2009), engineers are the critical function in the manufacturing process involved in the technical task of the process. In other words, engineers play an important role in the process. However, there are challenges faced by engineers in supporting the supply chain. The main challenges are engineers do not have proper knowledge of the supply chain to support and help the supply chain. Not only is that sometimes miscommunication happens between engineers and the supply chain team. This supports Neiro, S. M. S., & Pinto, J. M. (2004), which mentioned that to ensure the right machinery, materials, or equipment acquisition, following the right quality and specifications within the set standard, logistics and procurement managers need to have effective communication with engineers.

C. Engineer's involvement in the supply chain process

Besides, based on the interview, respondents mentioned that the biggest challenges they faced are delays and the last minute. The other department such as production or the supply chain itself sometimes have problems that cause delay, and this might affect the engineer's works. This problem makes it hard for engineers to support the supply chain requirement. Not only that, but the other problem is also there is a lack of manpower in the supply chain department. This will affect the process of supply chain and indirectly engineers work as well. As stated by Tracey, M., (2009), To create an efficient supply chain each of them must work together and this team approach must permeate every level of the organization involved. Based on the interview, the respondents have shared their ideas and opinion to overcome the challenges that they mentioned. Most of them agreed that the company should create awareness among workers including the engineering department. They also believe by getting training about the supply chain can improve an engineer's skills knowledge. Lastly, and improving communication skills among employees is also important to be more effective and to create a healthy working environment. Most engineers agree that the supply chain can contribute to the engineering work of the field. It can help their work run smoothly and become more efficient in terms of time, money, and energy or manpower. They believe by understanding the supply chain, they can reduce the mindset of people that engineering is a last-minute job and also reduce their stress by working late.

6 Conclusion

This study offers a complete understanding of the theoretical framework that integrated with the adoption of supply chain knowledge among engineers. The research proves that the nature of work does affect the adoption of supply chain knowledge among engineers. The engineer's job scope does relate to the supply chain but does not being realized by them in their nature of works. The second is the organizational culture. Based on the research, the company or organization does not give any related supply chain tasks to engineers throughout their job scope. This creates an organizational culture that has minimum adoption of supply chain knowledge among engineers. Third, education and skills. Based on the focus group interview that has been conducted, engineers admit that they have less knowledge and awareness in the supply chain. Lastly, the training program. All engineers that have been interviewed mentioned that there are training or seminar about supply chain provided by their company which is not involving other functions except than SCM function. This training is crucial to give an early education and awareness to engineering on the SCM process

and engineer involvement. Two developed frameworks have been found during this research. The first is self-awareness. After the interview, the majority of engineers admit that they are aware of this issue and hope they can involve more in the supply chain and study the process in the future. Finally, the added value in a career. One of the interviewees believes that by having extra knowledge in the supply chain, engineers have added value in their careers. They can stand out more than other engineers when it comes to applying for a job. In conclusion, based on the theoretical framework, all factors in the adoption of knowledge of supply chain among engineers that are listed are valid with the results obtained as shown in Figure 1.

Figure 1. Refined Theoretical Framework



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