

# **Implications of Customer Roles in Service Supply Chain**

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## **Summary**

This study set out to unveil implications of customer roles in service supply chain. It developed a conceptual model for explaining the customer roles in knowledge-intensive service supply chain. It further applied the conceptual model to MISI Company's Drilling Engineering and Well Services in a case study research. Application of the conceptual frameworks to MISI Company culminated in making five propositions. It rounded up by recommending how MISI Company's Drilling Engineering and Well Services, as knowledge-intensive service firm, can improve its business performance by more effective management of customer roles in its service supply chain. It is expected that if customer roles in SSC of MISI Company's Drilling and Well Services are managed very well it will have more positive impact on the KPIs.

## **Key Insights**

1. In a knowledge-intensive service business, service characteristics (variability, perishability, heterogeneity, co-production) influence some of customer roles in SSC, which in turn impacts SSC performance.
2. In knowledge-intensive SSC customer plays logistics service provider role.
3. Varied degree of labour, knowledge, and capital inputs by service provider influences customer roles in SSC which in turn impacts SSC performance.
4. Combinations of customer's various inputs influence customer roles in SSC which in turn impacts SSC performance.
5. Degree of intensity of relationship between service provider and customer influences customer roles in SSC which in turn impacts SSC performance.

## **Introduction**

Over the years, economies of the developed nations starting from agriculture have shifted to manufacturing and now it is majorly service-based. Services have been reported to account for two-thirds of the output of the advanced economies of these nations (Kelly, 1997). The number of manufacturing

companies that generate more revenue from their service units is on the increase as the case with GM and IBM (Quinn, 1992). Supply chain (SC) no doubt, plays paramount role in manufacturing, and as a result, supply chain management in manufacturing industries has been extensively researched (Baltacioglu et al, 2007; Spring, 2008; Stock et al, 2010).

There exist some similarities, and of course differences between service supply chain (SSC) and manufacturing supply chain. Value delivery process in SSC to a very large extent is made up of human labour whereas in manufacturing SC, the value process is in physical handling of products and their transformation (Sengupta et al, 2006). It should be noted that roles of customers differ between SSC and manufacturing supply chain. In manufacturing supply chain, the ultimate customers are final consumers of products in the supply chain. Therefore, their task is usually selection, payment, and usage of the products. In addition, they may assume role of marketer by providing word-of-mouth marketing, and also contribute to improvement of products, or creation of new products through their feedbacks (Sampson & Spring, 2012). Based on the work of Sampson & Spring (2012), customers do assume much more roles in SSC than in manufacturing supply chain. These roles of customers actually influence service delivery process, outcome of service and business performance of service provider.

In service science and service marketing a lot have been published about various roles that customer play in service delivery process, and these roles depend on type of services being provided (Bruhn & Georgi, 2006). However, in SSC, there is much scantier literature on roles of customer in SSC, making published work of Sampson & Spring (2012) on roles of customer in service supply chain a lead work on this subject. The paper identified eight roles that customers play in service supply chain. Seven of the roles are explored in this study because the eighth, customer-as-product is applicable only in human services or health sector.

However, there is paucity of published work on how service providers in service supply chain can create value through managing and integration of customers and service processes that goes beyond the confines of their organisation (Voss & Hsuan, 2009). This study is conducted with focus on Drilling Engineering and Well Services business segment of MISI Oil and Gas Services Company (Code name for the case company). The company is a multinational firm and one of the leading companies providing services in upstream of oil and gas industry. It has over 100,000 employees working in over 75 countries and supplies broad range of technical products and services to various oil companies in the oil and gas industry.

In the work of Sampson & Spring (2012), the focus was on opportunities for innovation that could result from roles of customer in SSC. In addition to gaps identified in research on service supply chain vis-à-

vis customer roles, the author of this thesis is inspired to carry out this research to see the application and/or relevance of the roles identified by Sampson & Spring (2012) in industry of interest of this study, and what are the performance implication of customer roles in SSC, and possibly come up with additional Oil and Gas Service Industry- specific role(s) that customer play in Drilling Engineering and Well Services of MISI Oil and Gas Services. In this explorative case study research, the unit of analysis is dyad, because the focus is on interaction between two firms, oil and gas service provider, and oil and gas company (Sekaran, 1992), and primary actor of analysis is oil and gas services provider (primary service provider (Kotzab et al, 2005).

Prior to this study, MISI Company has been managing its supply chain that is responsible for facilitating the flow of materials, information and people who are essential for any task it handles, but this study seeks to apply SSC approach to explore MISI Company's Drilling Engineering and Well Services operations.

Therefore, the research question is:

- How can knowledge-intensive service firms improve their performance by more effective management of customer roles in service supply chain?

The purpose of the research is to: Develop a conceptual model for explaining the customer role in knowledge-intensive service supply chain; Apply the conceptual model for a case study in knowledge-intensive service industry; And propose how better management of customer roles in MISI Company's drilling engineering and well services business can improve its KPIs

Literature review on service and its characteristics, Knowledge-Intensive Business Services, SSC, and customer roles culminated in developing theoretical frameworks, that the following independent factors determine customer roles in SSC, which in turn affect SSC performance:

- Varied degree of labour, knowledge, and capital inputs by service provider.
- Combinations of customer's various inputs (Sampson & Spring, 2012)
- Service characteristics.
- Degree of intensity of relationship between service provider and customer (Lovelock, 1983; Miles, 2003).

The framework is represented in Figure 1.

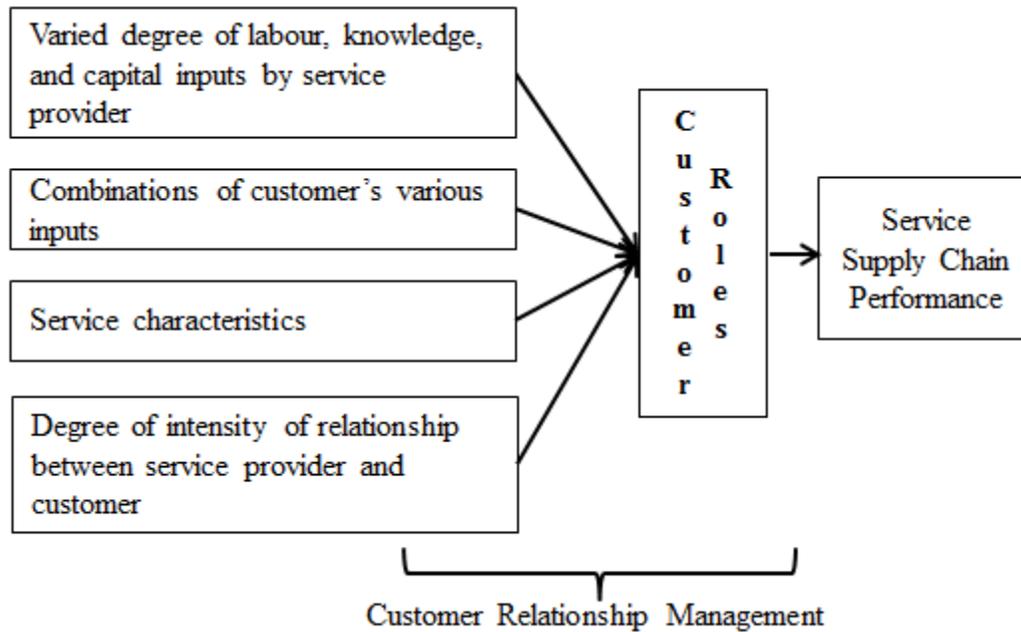


Figure 1: Four independent factors affecting customer roles and SSC performance

## Methodology

The author chose this case because MISI Oil and Gas Service Company is into service provision in the upstream oil and gas sector, in addition to the fact that the company appears to be a knowledge-intensive service provider. It is expected that MISI Company's customers assume different roles in its services provision and that these roles may affect its business performance.

This study adopts exploratory case study approach. Case study approach is preferred because it is an empirical investigation of a contemporary phenomenon of SSC with its real life context, particularly when there is blurred border between phenomenon and context (Yin, 2003). Exploratory approach is adopted because there is limited information on similar research problems in field of SSC, as a result preliminary work like this one is needed for comprehension of nature of the problem (Sekaran, 1992). It is for reasons of being able to gather as much information and gain insight to a relatively new field that the non-standardized, semi-structured interviews were used in data collection for this study.

Convenient sampling method is adopted for this study because it allows the author to select study subjects (interviewees) based on their availability, knowledge of topic of the study, meeting the criteria for qualification as subject, and fairly low cost of gathering the data for the study. In addition, this case is chosen on basis of theoretical sampling because according to Given (2008), theoretical sampling promotes selection of case according to ability of the case in allowing the author to advance his/her

research goals, such as proposition development on how better management of customer roles in knowledge-intensive service business can improve business performance.

Interview method was adopted for the study. The interviews were conducted using a semi-structured method because they provide a flexible instrument to access primary data. It also provides a flexible mode of data gathering (Saunders et al., 2003). The semi-structured interview protocol was developed based on the work of Sampson & Spring (2012). Protocol for the interview was developed based on work of Ellram (1996). Preamble section of the protocol contains: objective of the study; nature of interview; benefits of the study to MISI Company; and ended with confidentiality statement. Following the preamble is background section that seeks to gather information about profile of interviewees, so as to be sure they meet predetermined interviewee's criteria. A brief definition of SSC is provided here just as it contains purpose of the interview and list of 7 roles that customers could assume in this industry. The first part of interview questions contains six questions to elicit responses ranging from description of MISI Oil Company's Drilling Engineering and Well Service business; importance of technical know-how in its operations; importance of knowledge, labour and capital in its business; data and information exchange; customers segmentation; and to list of key performance indicators of Drilling and Well Services. The second section of the interview questions is to elicit response on specific role that customer assumes in service operations of MISI Oil Company's Drilling Engineering and Well Services.

The content validity of the questions was assessed through relevant literature review and consultation with subject matter expert (author's supervisor) to ensure that the questions actually measure adequately domain of interest (Tharenou et al, 2007). Though, face validity is subjective, yet the questions must appear at face value to be measuring what they are supposed to measure: the questions for this study meet this face validity requirement. To ensure reliability of interview questions, efforts were made to ensure that data collection techniques and analysis procedures will yield same results on other occasions; similar observations will be recorded by other observers; and there is transparency in how the data collected was used. In addition, threats to reliability by subject error, time error and observer effects were minimized (Easterby-Smith et al. 2008; Saunders, et al, 2009).

Three semi-structured face-to-face interviews with employees of MISI Company were conducted. Those interviewed met criterion of interfacing or have history of interfacing with customer during Drilling Engineering and Well Services operations. They were chosen based on expert suggestion within MISI Company (Saunders et al, 2009). After piloting the interview protocol with contact person in MISI Company, he suggested three names of those who could provide useful information for the study. From that stage on, the interviewing followed snowball method. The process is depicted in Figure 2. With

consent of interviewees, the interview was tape recorded and was later transcribed. The interview took roughly 60 minutes.

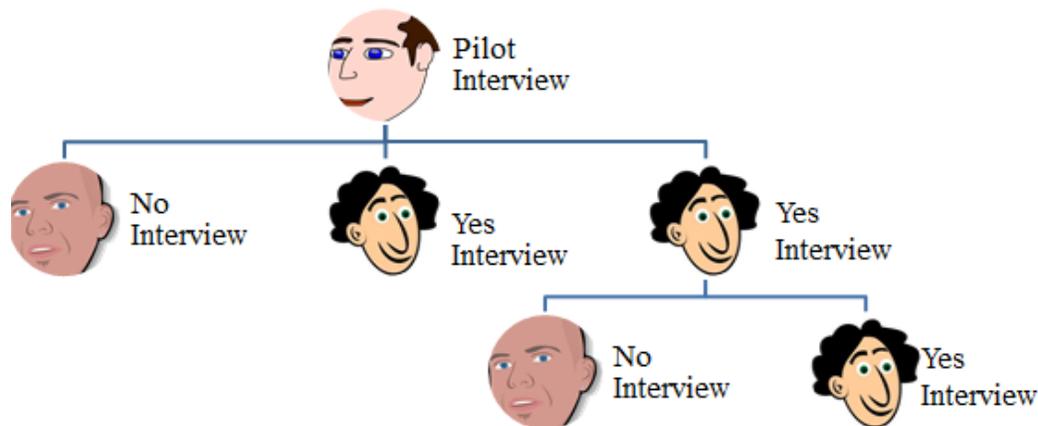


Figure 1: Snowball recruitment of study interview participants

### Data Analysis

In analyzing the data collected from the interviews for this study, the researcher adopts Yin (1994) first and preferred approach because the data collection is informed by theoretical frameworks developed in this study. The data analysis used in this study follows three steps suggested by Miles & Huberman (1994). They are data reduction, data display and conclusions drawing.

In this study, temporary summary of the case study was developed according to Miles & Huberman (1994), and it contains study-related data obtained from literature, MISI Company website and publications, and data from interview to gain understanding of background of MISI Company and specifically, its Drilling and Well Services segment. The summary further includes importance of technical know-how and knowledge to drilling and well services business of MISI Company vis-à-vis labour and capital input; its customer segmentation; its KPIs and how they are affected by roles played by its customers in its drilling and well services operations. Verification and conclusion are done with respect to earlier developed conceptual model (Kotzab et al, 2005).

### Findings

- A. Knowledge/Technical know-how in MISI Company:** MISI Company is a service company that provides series of engineering solutions and services to oil & gas companies. The strength of the company is its technology which differentiates it among competitors, and this is acknowledged by its clients. From the primary data, in comparing knowledge, labour and capital

importance to its operations, there is consensus that knowledge holds 35-40% place of importance, Labour 30-40% and Capital 20-30%. This position is supported by figures in Table 1 where Research and Engineering expenditure from 2010 to 2012 has consistently gulped over 21% of its net income, and at least 2.8% of its revenue. In addition, Research and Engineering expenditure is approximately three times of General and Administrative expenditure. Based on these findings, it can be argued that MISI Company has high Knowledge to labor ratio.

	2012 (Million \$)	2011 (Million \$)	2010 (Million \$)
<b>Research and Engineering (R&amp;E)</b>	1,168	1,073	919
<b>General &amp; Administrative (G&amp;A)</b>	405	427	311
<b>Revenue</b>	42,149	36,959	26,672
<b>Net Income Attributable MISI</b>	5,490	4,997	4,267
	In Percentage (%)		
<b>Ratio of R&amp;E to Revenue</b>	2.8%	2.9%	3.4%
<b>Ratio of R&amp;E to Net Income</b>	21.3%	21.5%	21.5%
<b>Ratio of R&amp;E to G&amp;A</b>	2.884	2.513	2.955

Table 1: Relationship between Research and Engineering, and Revenue, and Net Income of MISI Company (Source: MISI, 2012)

- B. Relationship between MISI Company and Customers:** MISI customers are segmented into 3 categories: International oil companies (Chevron, Shell etc.), National oil companies (Petronas, Petrobras etc.) and independent/private oil companies – these are usually small and are start-ups (Tulip Oil B.V etc.). National oil companies allow minimal flexibility in execution of their contracts whereas international oil companies do allow as long as such flexibility will result in saving money, material, and even man-hour. For independent/private oil companies, their decision making is fast, however, contract from them hardly come regularly.
- C. KPIs:** Based on literature review and primary data, nine possible KPIs were identified for measuring performance of services process/SSC of Drilling Engineering and Well Services of MISI Company. They are: Number of on-time service deliveries; Customer responsiveness; Resource utilization; Safety; Quality of service provision; Opportunity for innovation; Customer satisfaction; Service cost; Service lead time. However, secondary data collected for this study shows that there are three KPIs considered critical to Drilling Engineering and Well Services of MISI Company. They are Non-productive Time (NPT); Health, Safety and Environment (HSE); and Service Quality (SQ). Of recent and post- Macondo blowout in Gulf of Mexico, HSE has assumed first position among the KPIs. There are KPIs internal to MISI Company, shared KPIs between MISI and customer, and finally KPIs exclusive to MISI Company customers.

**D. Customer Roles:** In literature review, seven roles are identified that customer do play in service supply chain, but during primary data collection for this study, additional role of customer as logistics service provider is discovered. The roles as they apply to MISI Company's Drilling Engineering and Well Services are discussed below.

- **Customer as complementary human resources:** MISI Company customers do play this role in their service operations. This is normally done by customers' drilling team and its manager at the drilling sites. This manager supervises MISI Company activities at the well site and at the same time gives direction on how the work should proceed as well as contributes to decision making during drilling operations. MISI Company has developed Integrated Project Management (IPM) model for service delivery. The IPM model comes at higher cost to the customer, but it usually has positive impact on all the KPIs of MISI Company because it minimizes variability due to customers in service operations.
- **Customers as Design Engineers:** MISI Company customers do play the role of design engineers in its drilling and well service operations. Usually, MISI Company customers have acquired experience over the years, and that makes them expert (Chase and Aquilano, 1995), giving them ability to provide operational instructions and advice to MISI Company at drilling and well services site. This role of customers usually contribute to increased cost of contract execution, delay in service process lead time, and negatively impacts HSE, except that MISI Company has Q-Stop policy in place which empowers MISI engineers to halt the service process if they identify issues that could result in serious HSE issues.
- **Customer as Production Manager:** MISI Company customers play the role of production manager through their engineers who control MISI engineers by ensuring that the drilling and well services operations proceed according to specification earlier decided by the customer's engineers. Through IPM model, MISI Company is able to eliminate or minimize the impact of customer as production manager because MISI Company is able to holistically execute the contract by harnessing synergy of various segments within MISI Company, thereby resulting in smooth project execution. HSE, NPT and Service Quality (SQ) are affected by this role.
- **Customers as Quality Assurance:** MISI Company customers play this role by giving detailed instructions to granular level on type of materials (including brand name) to be used at various stages of execution of a project/contract. This role does affect its 3 critical KPIs as well as cost of providing the service.

- **Customers as Inventory:** There is discrepancy in primary data collected on role of customer as inventory in drilling and well services operations of MISI Company. Customer assumes this role whenever they wait for themselves, their possessions, or their information to be processed (Sampson & Spring, 2012). A section of the interviewees states that MISI Company does not keep customers, their possessions, or information waiting before, during or after service operations because MISI Company most times keeps multiple units of equipment on site to respond promptly to any equipment breakdown or system failure. Whereas the other section of interviewees believes that MISI Company minimally keeps customers, their possessions or information waiting before, during or after service operations.
- **Customers as Competitors:** Number of MISI Company customers who is assuming this role is slowly increasing. These customers are developing their own in-house service companies for strategic reasons and cost savings purposes (Lusch et al, 1992; Bitner et al. 1997; Sampson & Spring, 2012). However because of very huge investment and depth of technical-know required, few companies among those who have attempted to become competitor have been successful.
- **Customers as Component Suppliers:** MISI Company customers assume this role a lot because they are owners of oil field and providers of platform where MISI Company places its drilling pump. In addition, the customers do provide generic materials that are not unique to MISI Company. Customers may unknowingly provide compromised materials and equipment for use by MISI Company and this may affect negatively SQ, result in NPT, and even culminate in HSE events.
- **Customer as logistics service provider:** Though not found during the literature review for this study, however, from the primary data collected, it is discovered that customers also assume the role of transporter, specifically marine transporter in service operations of Drilling Engineering and Well Services of MISI Company. Customers do this by conveying materials and equipment from various points/locations and deliver them to a desired location, project site. In accordance with Sampson & Spring (2012), in this instance, customers could be considered to assume role of transporter.

## Conclusion

From the analysis and findings, it becomes clear that various service characteristics determines customer roles in SSC which subsequently affect the three critical KPIs of MISI Company's Drilling Engineering

and Well Services segment, though to a varying degree. Customer as complementary human resources; design engineer; production manager; and quality assurance appear to have a very significant influence on the three critical KPIs. Through its IPM model, it is found that the impacts of these customers' roles on service operations of MISI Company's Drilling Engineering and Well Services are substantially minimized because, in reference to the conceptual model in Figure 1, variability introduced into service process is also substantially minimized.

Since roles of customer as component supplier; competitor; inventory; and logistics service provider are to various minimal degrees covered by IPM model, MISI Company will need to devise strategies to minimize specifically, request and effort variability that customer as component supplier introduces into the service supply chain (Frei, 2006).