Customer-supplier interactions in the servitization context: An analysis using Process Chain Network (PCN) diagrams

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Abstract

The purpose of this study is to examine the customer – supplier interaction during service delivery process and how the customer's input contributes to successful service delivery by using multiple case study analysis. Given that the customer provides significant input into the service process, the Process Chain Network (PCN) diagrams were used as a service visualisation technique to facilitate the understanding of the interactive process between service provider and customer. The findings suggest that the level of service offered and the nature of the product and related services are significant in determining the level of customer-supplier interaction during the service delivery phases.

Keywords: Servitization, Interaction process, service delivery

Introduction

Since the term servitization was first coined in 1988 by Vandermerwe and Rada (Vandermerwe and Rada, 1988), it has become an area of growing interest among researchers from a broad range of academic fields developed. These researchers used different terminology to describe the phenomenon of integrating products and services by manufacturers seeking to increase their revenues through new combined offerings to the customers. Wise and Baumgartner (1999) referred to it as "going downstream", Mont (2002), Tukker (2004) called it "product service systems" while Baines *et al.* (2007) used the term "advanced services". All these terms share the basic concepts of servitization as being "the innovation of an organisation's capabilities and processes to shift from selling product to selling an integrated product and service offering that delivers value in use" (Baines et al., 2007). However, even though there has been a growing output of articles and papers addressing servitization, literature to date has been dominated by studies from the perspective of individual organizations. For example; the studies that focus on the operations strategy in servitization by Baines *et al.* (2009) and Spring and Araujo (2009), research on organizational transformation by Martinez *et al.*, (2010) and the particular attention on the financial consequences of adopting servitization by Neely (2009). There is therefore limited

research studying servitization from an inter-organisational perspective and research on the impact of servitization strategy into customer-supplier relationship, specifically on service delivery-related interaction is needed.

Given the dearth of prior research in addressing this perspective, this paper aims to fill the gap by looking at the customer-supplier interactions in three different types of servitization contexts. This study addresses the following research questions:

(i) How do different servitization models affect customer-supplier interactions during the service delivery process?

(ii) How does the customer's input in the different servitization contribute to successful service delivery?

Literature Review

Definition of services

The notion of servitization has led to revisiting interesting questions about the concept of services and the attributes that make them services. The basic starting points in the literature that discuss servitization commonly define the services and their differences from the product (Parasuraman, 1998, Lovelock and Gummesson, 2004). Academics have offered various and evolving definitions of services, for example, in operation management text book (Slack *et al.*, 2010), service is defined as intangible products. Karmarkar and Pitbladdo (1995, p. 372) claimed that the distinguishing characteristic of services was "…intangibility of service output, the lack of inventories, the difficulty of portability, and complexity in definition and measurement...". There followed widespread use among academics focussed on "IHIP" characteristics to describe the attributes of services such as their Intangibility, Heterogeneity, Inseparability and Perishability. A few scholars further developed these distinctive IHIP characteristics of services. For example, Harvey (1998) claimed that customer contact is one of the most distinguishing features of services and this notion of customer contact brought a new perspective into services. If IHIP emphasised the physical attributes of services (i.e. inseparability and perishability), the ideas of customer contact is more focussed on the production process which is more aligned to the operation management perspective. Echoing this, Sampson and Froehle (2006) introduced the Unified Services Theory (UST) to include services where the "customer provides significant inputs into the production process"(Sampson and Frohele, 2006, p. 331). Despite this development, to the best of our knowledge, the extant literature on servitization, particularly in the operation management fields, where the context of customer contact during the production process is addressed, is still relatively limited.

Customer contact approach

Chase (1977) defined services based on the amount of "customer contact" referring to the physical presence of the customers during the production process and gave rise to the notion of customer involvement. Froehle and Roth (2004) questioned this stating that the customer's presence was not always necessary in the production environment. Wemmerlöv (1990) divided contact between customer and service systems into three categories. In the first, the customer is directly involved physically during the service operation through eye contact, hearing or touching – referred to as "direct contact". In this setting, manufacturers have less control over the process and rely on customer inputs, as the claim is that "letting the customer directly interact with the service process creates a potential risk of process disturbance…" (Wemmerlov, 1990, p.29). In the second, there is only indirect contact between customer and service provider, where they communicate through a human carrier or others media such as telephone, electronic mail etc. In this case, customers provide the input but are not physically present in the service process setting. The service provider acquires information in advance

and has more control on the service process. In the third, there is no contact between customer and service provider and preparations work activities for the service operation are carried out beforehand without any customer input. Wemmerlov (1990) illustrates this with the example "a restaurant faces direct contact with its patron in the dining area, has only indirect contact with them during the food preparations processes in the kitchen, and has no direct contact with them during its purchasing and maintenance activities". (Wemmerlov, 1990, p. 29). Building on this premises, Sampson and Froehle (2006) introduced the PCN diagram where customer interaction and influence on the operations impact on service efficiency. Hence the construct of services that underpin the PCN framework by Sampson (2012) is how customer interaction provides resources to the production and how customers participate in the actual execution of the process. In the PCN diagrams, customer contact is divided into three areas: direct interaction, surrogate interaction and independent interaction. Sampson (2012) illustrates Wemmerlov (1990)'s concept of process control by adding the triangle shape on the top of the diagram. Customer or service provider can and do influence process in the independent region and the surrogate region but has less control in the direct interaction region. This echoes Thompson (1998) who called this "uncontrollable work" when customer and service provider interact, and "controllable work" when the process does not require the presence of the customers".

Customer input in the servitization context

Before the move towards the servitization business strategy, manufacturers had been reluctant to take over the responsibility for the "post-sale activities" such as maintenance activities of the product/ machinery equipment that sold to the customer (Oliva and Kallenberg, 2003). In the traditional business setting, the focus was on the activities that facilitated the sale of the products. However, after the servitization strategy was adopted into the business model, customers have become a more and more essential part of the manufacturer's operation offering integrated solutions for the product and services (Windahl and Lakemond, 2006). The adoption of the servitization model also led to the shifting of the relationship between customer and manufacturer from transaction to relationship based (Oliva and Kallenberg, 2003). Furthermore, research also indicated that buyer-supplier relationships were a source of competitive advantage for the business (Dyer and Singh, 1998, Joseph P. Cannon and Homburg, 2001). In fact, strong external relationships play a significant role in the development of integrated solutions (Windahl and Lakemond, 2006). Oliva and Kallenberg (2003) also suggest that, the provision of the integrated solutions in the servitization context requires more relational than transactional interaction with the customers. Given that, in this study we will be applying the "customer contact approach" to look into the implementation of servitization strategy in the manufacturing industries.

Methodology

As the nature of this research is exploratory, a multiple case study approach was deployed to enable an in-depth investigation into the phenomenon of interest (Voss, 2016). In total, four case studies were included; representing the three types of servitization (product-oriented services, use-oriented services and result-oriented services). We believe that using these three distinctions enable us to obtain an understanding of how the levels of services provided by manufacturer influence the customer-supplier interaction during the service delivery phases. The companies for this study were selected based on the Tukker (2004) typologies which are presented as follows with the background of the respective customers in each case.

- Company A (Product-oriented services - POS): Manufacturer of outdoor playground equipment, where the main operations focus mainly on sales of products with some after sales services such as scheduled preventive maintenance added.
    - Background of the selected customers for this case: The local authority organisation (City Council) and a commercial sea- life themed attraction in the UK.

- Company B (Product-oriented services - POS): Manufacturer of filtration machines, where the main operation is the manufacture of bespoke filtration machines for the food industry, with some extended after sales services such as scheduled preventive and breakdown maintenance added on.
    - Background of the selected customer for this case: The producer of citric acid and related co-products. Their main operation is to produce the citric acid which is later used as a flavour enhancer in soft drinks, fruit juices, sweets, preserves and gelatine products. It also serves as an antioxidant in prepared meat products and canned fruit and vegetables.

- Company C (Use-oriented services - UOS): Manufacturer of bespoke excavation safety equipment. The main product still plays a primary role in the business operations but the responsibility for maintenance, ownership and control of the product remains with the manufacturers.
    - Background of the selected customer for this case: A sub-contractor for the project of building one of the power stations in the UK, specifically working on basement construction, for the Biomass Eco store Rail Unloading Facility. They are working with a Principal Contractor, who is responsible for the whole project.

- Company D (Result-oriented services - ROS): Manufacturer of energy wind converter, where the manufacturer and customers agree on a result or performance and with the customer not buying the product but the output of the product according to the level of use.
    - Background of the selected customer for this case: An institution of Higher Education in the UK, which operates energy wind converter as one of their initiatives to create renewable energy and to demonstrate their commitment to sustainability and carbon reduction.

Two procedures were used to collect qualitative data: semi-structured interviews and analysis of documents, both enabling access to contemporaneous and retrospective data. So far 25 semi-structured interviews have been conducted with the relevant personnel in the organisation who are responsible for the service delivery process. Table 1 provides a list of the interviewees of a multiple interviews session conducted in the four companies. The semi-structure interviews, lasting an average of approximately 1 hour per interview were audio recorded.

The reliability of the data was transcribed to ensure reliability. These in-depth interviews covered multiple themes around the services delivery process such as customer and supplier obligations, the flow of the process and direct interaction between customer and supplier during service delivery. A case study protocol was developed to ensure consistent coverage of the interviews questions and due attention was given to research ethics procedures. Interaction during service delivery between customers and suppliers was used as the unit of analysis. In addition to the interviews, we collected and analysed documentary

evidence such as contract documents, archives of email exchange between customer and supplier and service maintenance reports. All the above data were stored, organised, analysed and coded using NViVO software.

Table 1: List of interviewee position

Organisation	**Interviewee position**
Company A	Managing Director
	Customer Service Manager
	Operation Manager
	Contract Manager
Company B	Northern Regional Manager
	Operation Manager
	Customer Service Manager
	National Key Account and Engineering Manager
	Project Manager
Company C	Technical Director
	Operation Manager
	Contract Manager
	Service Desk Executive
Company D	Energy Manager
	Contract Manager
	UK Sales Manager
	Operation Manager
	Customer Relations Coordinator

Findings

The analysis of the interviews and documents shows that the levels of customer supplier interaction increase as the manufacturer move from POS to UOS and ROS. The more the service that is provided, the more interaction is required between manufacturers and customers in delivering the services. During this process, manufacturers rely on customer input in order for them to deliver the service successfully. To show that level of customer supplier interaction, PCN diagrams were adopted as a service visualisation technique to facilitate the understanding of the interactive service operations between service provider and customer (Sampson, 2012). Due to the data collection activities is currently still on-going, only the findings from Company A and C are presented and discussed here.

PCN Diagram: Company A (POS)

Figure 1 illustrates the PCN diagram for company A which represent the categories of POS. It can be seen that only one activity occurs in the direct interaction region where the manufacturer has to interact directly with the customer to discuss the outcome of the maintenance report. For this activity, both manufacturer and customer have to be at the site, walking around the playground equipment to see if any parts require repair or replacement. Apart from that, most of the activities take place in the surrogate region where manufacturer and customer perform their job by interacting with non-human resources such as information and equipment which act as surrogate representations.

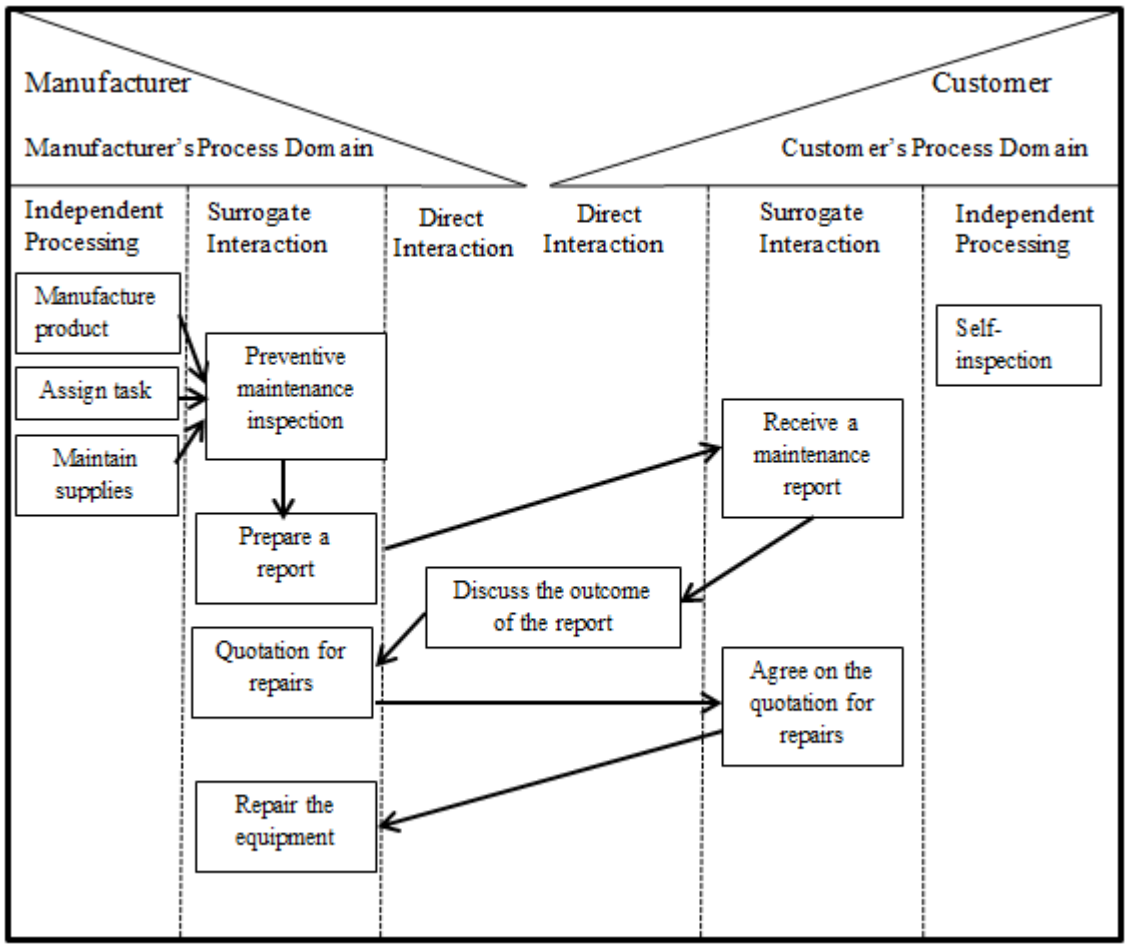

Figure 1: PCN diagram for POS service delivery process

The empirical data unearthed the nature of the product and related service provided, the depth of influence and the level of customer-supplier interaction involved during the service delivery phases. In this particular case for POS, the service provider carried out the preventive maintenance activities on the playground equipment at the customer's site (i.e. scheduled inspection) without the need for the customer to be present. Although the customer had to be informed beforehand about the details of the services such as the date and time, to ensure the most appropriate time for providing access to the maintenance team, no direct interaction is required during the service delivery process. The service providers perform their task using nonhuman resources (i.e. the playground equipment) which act as the surrogate representation of the customer input (Chase, 1978). One of the interviewee describes how the service delivery process took place when their service maintenance team carried out scheduled preventive maintenances:

"…so it is yearly report done by an IPII inspectors. They check all the equipment, they take photographs, and they give the recommendations as to something needing to replace, or it might be that everything's fine, and that nothing needs to.. but they also put that in the report as well, so the client knows.."

PCN Diagram: Company C (UOS)

Figure 3 illustrates the PCN diagram for the service delivery process in the UOS case study. Given the nature of the use-oriented servitization model (i.e. the ownership of the product remains with the service provider and the customer pays for the services provided by that product, the service provider has to allocate staff to make sure the equipment is in a good running condition. In this particular case as mentioned in the methodology section, Company C manufactured bespoke excavation safety boxes to the client for a specific project and provided the services to deliver the equipment to the site, assemble it and dismantle it when the project is complete. At the interviews with the project manager, he said that they had to work very closely with the customer (i.e. direct interaction) as the size of the equipment was big and heavy. Furthermore, any small mistake occurring during assembling and dismantling could cause serious injury to the site workers. In this project, triad relationship exists between the UOS Company (Company C in Figure 2) and the customer who works with the principal contractor. The role of the principal contractor in this project is to control and be responsible for all the activities that lead to the completion of the project. They have appointed one company (Customer in Figure 2) to carry out the related task of installing temporary propping using modular hydraulic frames for the project. The Customer outsources part of the job and services related to excavation safety box task to Company C.

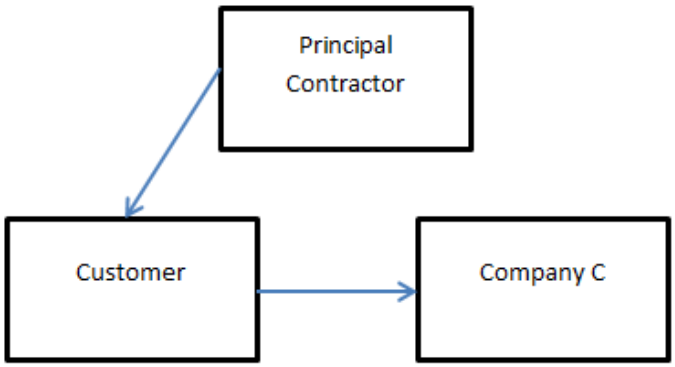

Figure 2: Triad relationship in UOS case

According to the project manager of company C, the customer had to be always present at the site during the service delivery phases. For example, the customer must be available to standby at the site when the equipment is being delivered to the site. As he stated:

" we say as an example, this equipment to go out by 1st of March, so we have that in our plan.. the transport will be reserved for that. If they ring us a day before and say, we can't take this because we need it next week. that's gonna to affect our job…"

In addition, an engineer from company C has also to be around at the site when the client is using the equipment to ensure he can provide any support if needed. Given the nature of the product and the related services, the level of customer-supplier interaction is high to ensure the service can be delivered successfully.

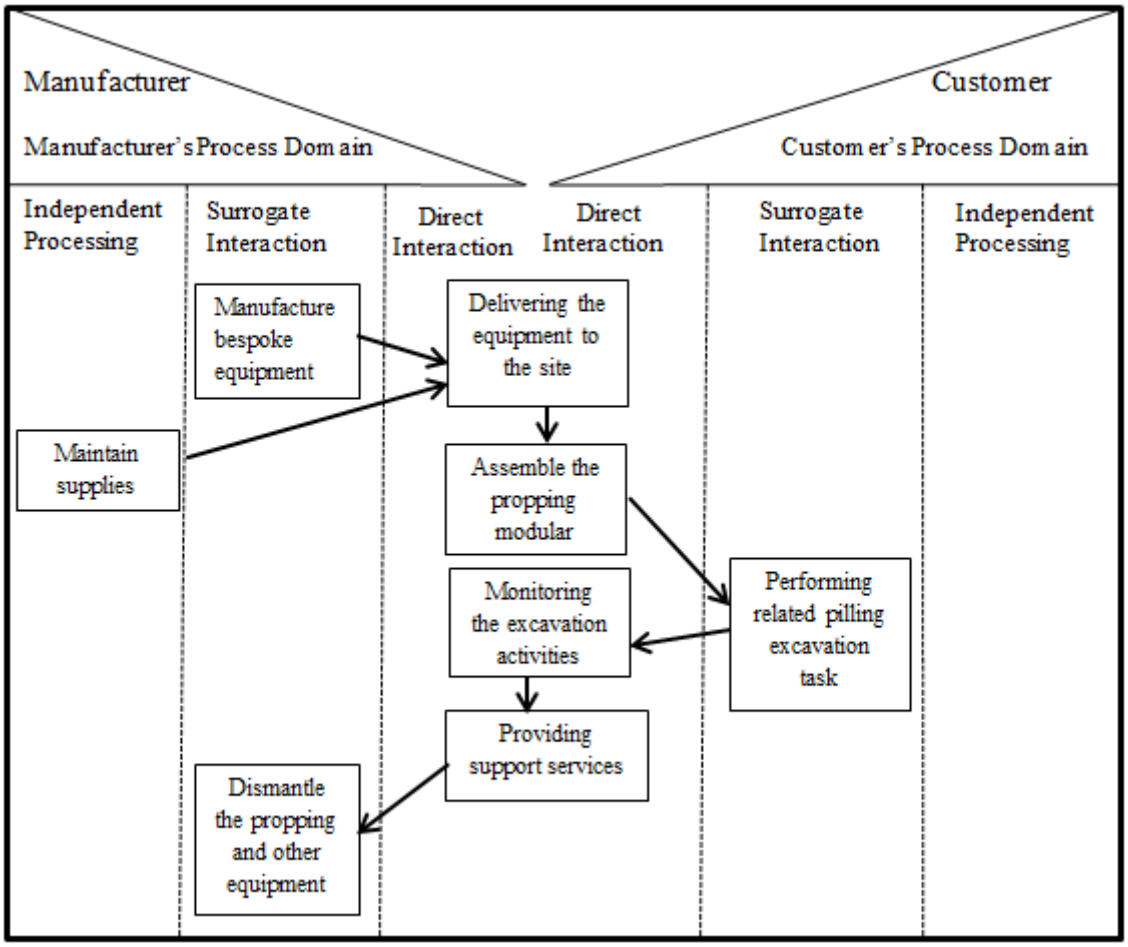

Figure 3: PCN diagrams for UOS service delivery process

The finding suggests that, in the UOS and ROS companies, the level of customer-supplier interaction was gradually increased as the level of service offered increase. More specifically in the case of Company C which represents the UOS categories, there are more service delivery activities that take place in the direct interaction region than in POS categories.

The research also unearthed another interesting finding that affects the customer-supplier interaction during the service delivery process which is the motivation of the customer to outsource the service activities to the services providers. In our third case study, company D which represents the categories of ROS, is the manufacturer of energy wind converters. They are responsible for installing and maintaining the energy wind converter to one of their customer in the UK, a Higher Education institution. As the customer does not have any technical capability and resources to look after the equipment, all the maintenance activities being outsourced to the service provider. Our data shows that the service provider will have to provide the basic skills and information to help their customer understand the basic operation of the wind energy converter. Hence, at the beginning of the relationship, many activities take place in the direct interaction regions. At this stage, we are still collecting and analysing the data for the ROS Company case study.

Customer input in contributing to service delivery

In a servitization setting, the service provider relies on customer input to enable them to deliver the services successfully. Through our interviews and analysis of the organisational documents, we found the answers for our second research question: How does the customer's input in different servitization contribute to successful service delivery?

The types of customer inputs vary depending on the nature of the service delivery process and the levels of service offered by the service provider. For our first case study with the Company A, the nature of the service operation is relatively simple and straight-forward. The service maintenance team carried out scheduled inspection on the outdoor playground equipment on a yearly basis at the customer's site. The customer input in this case is to provide access to the site and discuss the report with the maintenance team. There are not many inputs from customer that are needed for the successful service delivery in this particular case. However, in the case of UOS, our data reveal that the customer has significant roles to play in determining successful service delivery. As seen in the previous section, the nature of the product in this case was complex and bulky. The customer had to work together with the service provider to ensure the service could be delivered successfully.

Discussion and Conclusion

The present research seeks to answer the following research questions: How do different servitization models affect customer-supplier interactions during service delivery process? And, how does the customer's input in different servitization contribute to successful service delivery? From this study, it was identified that the level of service offered and the nature of the product/service related resulted in different customer-supplier interaction.

Relating back to the different types of servitization in this study, as manufacturer move along the service continuum from product oriented services to use oriented services and result oriented services, there is increasing reliance on customer input in order to deliver the service successfully. Furthermore, the background of the customer in terms of technical capabilities related to the service operation is one of the contributing factors in determining the customer-supplier interaction during service delivery.

Research implications

These findings contribute empirical evidence to the inter-organisational perspective in servitization literature with a particular focus on customer-supplier interaction during the service delivery process. This study provides an insight into the level of services continuum from product-oriented services to use-oriented services and result oriented services entailing different customer-supplier interaction during service delivery activities. It has implications for managers in servitization firms to enhance their understanding about the factors that contribute to the successful service delivery to their customers. Understanding the roles and responsibilities played by both customer and service provider will ease the process of delivering the services.

This research has some limitations that should be considered. The first limitation concerns the fact that the study is only based on a single and unique case of each type of servitization (except for two cases for POS). Although the results show that the case is representative of the three types of servitization, the conclusions are not generalizable to other servitization firms in the same categories as the nature of the technologies used in the business, the background of the customers and the complexity of the product or services involved may be different.

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