

**Studying the supply network configuration for the provision of
integrated solutions**

**Rationale and research questions, potential research design and
philosophical aspects of the study**

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Abstract

I embrace Partington's (2002) argument that the purpose of the research, the theoretical perspective, the research question and research design, have to be aligned. Philosophy is implicit in these elements. My research question, for which I give a rationale, is; *How does the supply network change, with respect to some of its elements, in the process of servitization? Does the focal firm (servitized manufacturer) initiate and control the change, or the network emerges and self-organizes? To what extent?*

I acquire a *critical realist* philosophical stance, and I propose a mixed method, process research design, to ensure overall consistency.

Keywords: Servitization, Product-Service Systems (PSS), Complex Adaptive Systems (CAS), Emergence, Self-organization, Supply network configuration, Change and Evolution of the network, Retroductive study, Critical realism, Depth realism, Neo-realism, Theory building, Case study, Interview, Survey.

1) Introduction

The title of this essay implies a causal relationship between research design and philosophical perspective. Precisely, it is meant that the first will influence the second. Although I agree that it can be the case for several types of management research, I favor a different approach than the one which seems to underpin the set question. Precisely, I embrace Partington's (2002) argument that the purpose of the research, the theoretical perspective, the research question and research design, have to be aligned. Philosophy is implicit in these elements. In this paper, I choose to begin with my research idea and provisional research question and continue with some philosophical and theoretical aspects of my research. I finish with my potential research design which is of course at a primitive stage.

2) Research question and background

My research question will not be precisely formulated before my systematic literature review is complete. It might even be the case that I will need to do a pilot study before finalizing my question. However, I present it as it stands at the moment: *How does the supply network change, with respect to some of its elements, in the process of servitization? Does the focal firm (Product-Service system provider) initiate and control the change, or the network emerges and self-organizes? To what extent?*

Some points have to be made. First, the elements I will focus on have not been decided yet. The paper that my supervisor and I submitted to Euroma conference helped us identify the constituent elements of the constructs *supply chain strategy*, *supply chain configuration* and *supply chain design* (the related literature is considered to be the most appropriate in order to start addressing my gap). There is an ambiguity as to which elements are encompassed by these three and also, a significant overlap regarding the boundaries and content of their respective literature domains. Over the summer, and as part of my doctoral training, I will conduct a systematic literature review which will essentially expand my thinking outside of the SCM literature. Specifically I will seek to identify the elements of network structure in contexts similar to the context under examination (i.e servitization; its contingencies are presented below) Afterwards, by choice, consultation, or more validly, by doing a pilot case study on a Product-Service

system (PSS) provider, I will decide which elements I am specifically going to look at.¹ I would really like to conduct a pilot case study, so as to also confirm that the supply network really changes when the manufacturer becomes servitized and furthermore, with respect to which elements.

Moreover, the argument that the supply network cannot be designed from end to end by a single firm (apart from some very few cases) and it consequently emerges in a way which is out of their absolute control is relatively recent. Choi et al (2001) essentially claimed this and added that the network should not be seen as stable but instead, as dynamic and in flux, and brought forward a Complex Adaptive Systems (CAS) view to explain the phenomenon. CAS is '*a system which emerges over time into a coherent form, and adapts and organizes itself without any singular entity deliberately managing or controlling it*' (Holland 1995). Instead of seeing the supply network in a deterministic way and able to be configured throughout by a sole firm, as it seems to be the case in the relevant supply chain design literature, they posited that its evolution is a result of both emergence and control. However, their paper was conceptual and finished with propositions only. Since then, modeling techniques stemming from the complexity and CAS domain, such as agent-based modeling, have been proposed and used in SCM. Empirical studies are scarce.

Third, when it comes to PSS, the complexity of managing and providing the offering is undoubtedly bigger than when managing products or services alone, due to several contingencies. Moreover, it can be the case that the manufacturer provides the core asset, while other network partners provide the after-sales service and consultancy. I believe that in this context, mechanisms should be developed to control the network but also let it emerge, in order to effectively and efficiently provide and support the PSS throughout its lifecycle (which is most often very long).

3) Rationale and aim of the research

The rationale of my research stems from the fact that although SCM literature is expanding, and firms use SCM initiatives to generate competitive advantages, to my knowledge, the servitization context has not been considered by the existing work. On the other hand, the servitization literature simply touches on network issues and does not examine them empirically. The following, also supports the rationale and aim of the research; there are some contingent characteristics, like the increased level of demand uncertainty, the long life-cycle of the solutions offered, and the longer relationships between firms, which might dictate a different approach regarding supply chain strategy and design for PSS providers than the existing ones, which have been developed within the pure manufacturing and service SCM literature. Thus, the objectives of the Service Networks project in which I participate, are to identify elements of network configuration that might enhance servitization, and develop knowledge and tools that can be deployed to facilitate network configuration for PSS providers.

Both servitized and unservitized manufacturers can benefit from my research. The first may gain an understanding as to what has happened and is happening in their network,

¹ PSS, or integrated solution, or servitized product refers to a customer-focused combination of products, services and sometimes education, consultancy, knowhow etc, provided by a manufacturer and its network to a customer, when often the latter does not pay for the product but buys its use, capability, or the ultimate result.

and formalize mechanisms that can help into the provision and support of their offering. The second may get familiar with knowledge and tools, stemming from the servitized manufacturers, which can be deployed if they decide to take the step into the provision of integrated solutions.

4) Ontological and epistemological stance

I believe that there is a social reality ‘out there’ whether or not it is observed. However, I realize that my attempts to understand and explain it can only be approximated. I tend to ‘do’ this understanding and explanation by constructing conceptual models or ‘theories’ which I compare with other plausible alternatives to find the one that fits best, in my subjective viewpoint. I realize that the choice is heavily influenced by my perspectives, prior experience and knowledge. As for the epistemological stance, I adopt *neo-realism* as presented in Blakie (2008). Thus, ontologically and epistemologically I perceive my research topic as follows; there is a reality before and after servitization regarding the network configuration, whether or not it can be fully observed and understood by anyone. There is also a ‘real’ way by which the supply network of a PSS provider evolved and changed in the process of servitization (although the way may be different for different PSS providers). By bringing my subjective view regarding which elements have changed, I will try to identify, explore and understand the underlying mechanisms that are responsible for the phenomenon. The CAS argument gives a basis for the potential development of models and frameworks of explanation. Also, I do not believe that there is any general law behind my research issue. To make this clear, I do not see the CAS argument as a general law, only as the theoretical basis according to which I can draw inferences and understand the mechanisms of change. Moreover, I tend to object to over-generalized SCM theories and frameworks, whose advocates tend to see as general laws. Some empirical studies have showed that many SCM issues are case-sensitive and context-specific. Finally, as already implied, I do not agree with the commonly held view that a network can be designed from end to end by a sole company and its behavior be fully predicted and controlled, something that seems to be assumed by most of the supply chain modeling literature.

5) Abduction, deduction and induction

Although I agree with Van de Ven (2007) that the research process involves abduction, deductive logic and inductive reasoning depending on the stage of theory building, I would say that mine is in general a retroductive study (by Blakie 2008). At first, I will seek to explore the change of the network configuration in the process of servitization, by conducting a pilot case study. I will subsequently try to describe and understand the underlying mechanisms. After developing potential models of change I will see which one explains the situation best, considering the contextual characteristics. I will do the same for the other cases, but this time having the potential models of explanation already in mind. In the end I might be able to establish a regularity across the cases or, very possibly, that every case is unique. This will also very much depend on the industries I select to look at.

6) The role of language

The subjects of my study can give answers to my questions; however their sayings have to be triangulated and are open to correction as they cannot be regarded as totally reliable. This is mainly because, very likely, they will have to think in retrospect and report what in their opinion happened in the process or servitization. Also, motives such as efforts to over-emphasize their firm's influence on the configuration of the network may exist in my subjects' minds. Therefore, in line with Bhaskar (1983), if I have got an adequate theory showing that a particular belief is false and why it is believed, then I will offer a critique of it. This implies an element of ethnographic interpretation on my part, as I will have to adequately understand the context and culture in which the subjects live and operate. However, I distinguish between *lay* everyday language and the social scientist's *technical* language (by Winch 1958), and I believe that my research has to be done from the context of the investigation. Thus, as an interviewer I am not planning to use "foreign" concepts such as SCM terms (leanness/agility, supply chain integration, supply chain configuration, etc), but common-sense, everyday words.

8) Overall philosophical approach

Although I tend to acquire a different ontological stance towards different life issues, when it comes to my current work I embrace the *depth realist* perspective (by Blakie 2008). This is, in short, because I seek to describe and explain an observable phenomenon with reference to its underlying structures and mechanisms. As far as the epistemology is concerned, I believe that my topic requires a *neo-realism* approach. '*Scientific theory is a description of structures and mechanisms which causally generate the observable phenomena, a description which enables us to explain them*' (Keat and Urry 1975 p.5), while knowledge is tentative rather than absolute. This fits very well with the nature and purpose of my research. In summary, Bhaskar's (1998) *critical realism*, or more precisely the "version" of *critical realism* that Van de Ven (2007) acquires, is my philosophical approach towards my research.

9) Thoughts regarding the research design

As already mentioned, by Partington (2002), the purpose of the research, the theoretical perspective, research question and design have to be aligned in every management research topic. Moreover, philosophy is implicit in these elements. After making some points regarding the three of the four elements, I am now able to present a consistent provisional research design. Of course, all four elements will be subject to change depending on consultation, the outcome of my systematic literature review and access to primary data.

It follows from all the above that I will conduct a process study, in order to generate a process model of how the network changes in servitization. However, I embrace Van de Ven's (2007) argument that variance data complement a process model (and vice versa).

First, as it has been mentioned before, I would like to conduct a pilot case study to explore whether the network actually changes, and with respect to what elements (elements of supply chain strategy, configuration and design)? Interviews with key employees of the focal company and probably some of its network partners, together with historical data will be the data collection methods.

The second stage will be the main case study work. I hope I will be able to have a sample of at least four manufacturers. Interviews as above, company documentation and

probably observation in a quasi-longitudinal manner will provide data collection triangulation. By Van de Ven (2007), Yin's research design fits well with process theory when the number of cases is small, irrespective of the number of events being examined. Also, if the number of events is big, various time series analytical methods can be used for data analysis, an option to be considered. Additionally, Van De Ven presents alternative types of progression of events and four different theories of process (i.e how a process unfolds over time). Based on my data, and having Van de Ven as a guiding reference, I will develop different process models. This action requires *abductive* thinking, while *deductive* logic will be implemented to see which one fits best, and accordingly, *inductive* reasoning to rectify and generalize (analytical generalization see Buchanan 1999) it over the four (or more) cases. It also has to be mentioned that there are different ways of sense-making and theorizing from process data (see Langley 1999). She distinguishes between *grounding*, *organizing* and *replicating* strategies and I believe that a combination of them would serve my purpose.

Finally, the last stage of the research design will be a cross-industry survey amongst servitized manufacturers, to determine whether any of the network elements are believed to have enhanced the process of servitization.

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