

NETWORK CAPABILITY CONFIGURATIONS FOR SERVICE OFFERINGS IN SERVICISED ENVIRONMENTS

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Abstract

The aim of the paper is analysis the linkages between the types of services (product-centric and knowledge-centric services) that manufacturers deliver to their customers and their (manufacturers) network capabilities configurations. The present study intends to contribute to the logistics and servitisation literature by drawing from the resource-based view and configuration theory to investigate which components of network capabilities are most important to enable manufacturers to develop and deliver services. Manufacturers are moving from selling products to providing solutions, offering innovative combinations of products and services. In the literature, this phenomena has been referred to as “servitisation”. Literature begin to highlight importance of different capabilities for product-service provision such as operational capabilities, digitalization capabilities, dynamic capabilities, network management capability and service innovation capability. The present study concentrates on network capabilities because of their strategic importance. Buyer-supplier relationships are critical for successfully providing services. Nonetheless, buyer-supplier relationships in servitised contexts have received little research attention until recently. Furthermore, many researchers study the abovementioned capabilities and their sub-components in isolation from one another. To explore the causal relationships a DEMATEL technique is adopted. Using sample data from nine Polish manufacturers (buyers and suppliers), this study contributes to the literature of servitisation in several ways. First, it must be concluded that not all industrial services require the same configurations of network capabilities. Second, when moving from product-centric to knowledge-centric services, the establishment of relationship-specific adaptations and cooperative norms increases.

Keywords: Network capability, servitisation, DEMATEL method, resource-based view, dynamic-based view

1. INTRODUCTICION

Competition is no longer solely based on products or services. Since the late 1990s, a range of researchers has studied the adoption, development and implications of servitisation as a competitive strategy. [1] The literature classified the transformation from product to solutions provision under diverse topics. This phenomena in the literature is regarding as servitisation, service-dominant logic, product-service systems, hybrid offerings, and solutions. [2] All of them lead to a common problem of understanding how manufacturing companies achieve successful transformation. Literature begin to highlight importance of different capabilities for product-service provision such as operational capabilities, digitalization capabilities, dynamic capabilities, network management capability and service innovation capability.[3]

The present study concentrates on network capabilities because of their strategic importance. Network capability refers to the ability to build, handle, and exploit relationships. In order to gain competitiveness from selling products to selling an integrated product and service, service suppliers require processes, guidelines and strategies for their production and operations that differ from those associated with traditional manufacturing. [4] Effective value creation in customer service interactions requires improved relational capabilities and customer relationship management, which facilitates effective cooperation. [5] According to Capaldo and Petruzzelli (2011) the concept of inter-organizational relational capabilities needs to be developed further. [6] Raddats et. al (2015), state that buyer-supplier relationships in servitised contexts have received

little research attention until recently. [7] In particular, research to date has not investigated how buyer-supplier relationships are linked with the types of services. [8] Prior studies present some evidence of the role of network capabilities in producing positive relational outcomes, whether functional [9, 10, 11] or financial [5, 9, 10].

A number of exploratory studies have discussed the resources and capabilities that enable the development and delivery of successful services. For example, based on 22 case studies, Ulaga and Reinartz (2011) concluded that there were four critical resources and five capabilities which were important for success. [12] Other studies have developed theoretical frameworks. Thornton et al. (2013) conceptualize organizational networking as four sets of anticipated outcome-driven behaviours, specifically information acquisition, opportunity enabling, strong-tie resource mobilization and weak-tie resource mobilization. [13] The current literature has focused heavily on factors such as trust, commitment, coordination, formalization, and social ties that are now acknowledged as helping firms develop effective collaboration with suppliers and customers to enhance financial performance. [14] However, many researchers study the abovementioned sub-capabilities in isolation from one another. Those lead to the question about interdependencies and interplay among the identified capabilities for advanced service offering. [3] Thus, researchers need to study the capabilities' configurations to offer services. To address this knowledge gap, the present study intends to contribute to the servitisation literature by drawing from the resource-based view, dynamic-based resource view and configuration theory to investigate which components of network capabilities are most important to enable manufacturers to develop and deliver services. More specifically, the purpose of this study is to identify and explain capability configurations for two different types of services (product-centric and knowledge-centric services) offerings in manufacturing firms. To achieve this purpose, the present study applies a DEMATEL technique. Sample data was gathered from nine Polish manufactures, included a range of manufacturing industries, mechanical equipment, electronic equipment, and steel service centers. Empirical evidence suggests that not all industrial services require the same configurations of network capabilities. When moving from product-centric to knowledge-centric services, the establishment of relationship-specific adaptations and cooperative norms increases. The paper is organised as follows: Section 2 provides a literature review on components of network capability and service types. The sample was described in Section 3. Section 4 illustrates the research methodology. Section 5 describes the empirical findings, which are then discussed in Conclusion in the light of the extant literature. Implications for research and practice as well as the limitations of this research are discussed in Conclusion, too.

2. THE COMPONENTS OF NETWORK CAPABILITY AND SERVICE TYPES

The main idea for a supplier and customer firm engaging in a relationship is to work together in a way that creates value for them. [15, 16] Value can be regarded as a trade-off between benefits and sacrifices. [17] marketing literature has developed two distinct research streams: the value of (augmented) goods and services, and the value of relationships. [18] Network capability (NC) includes the adoption of a long-term relationship, fostering of collaborative communication, design and use of cross-functional teams, and involvement of supply-chain partners, plays a key role in creating customer value [e.g. 19]. Network capability can help to develop collaborative business relationships. [15] According to Mitrega et al. (2012) creation of value needs mutual learning in order to be able to develop and exploit shared resource configuration in the focal dyad. [14] NC can be viewed as all firm-level activities to increase mutual understanding, coordination, and adaptation, such as resource as well competence adjustments between cooperating companies. [14] Johnsen et al. (2000) and Walter et al. (2006) distinguished the following activities: information sharing, communication between partners, joint decision making, risk and benefit sharing, as well as knowledge sharing, coordination, managing relationship conflict.[20,21]

Cannon and Perreault's (1999, p.441) well-known model of business relationships presents a set of connectors, which the authors define as the "dimensions that reflect the behaviors and expectations of behaviour in a particular buyer-seller relationship". [22] The authors specify five dimensions of buyer-supplier

relationships: information exchange, operational linkages, legal bonds, cooperative norms and buyer-supplier adaptations. They assume, like the others (e.g. [23]) that the source of a company's competitiveness lies partly outside the company (in its relationships with other business actors). More specifically, inter-organizational relationships consist of various dimensions, such as technical, social and knowledge-related aspects.[14] Walter et al. (2006) conceptualize and operationalize network competence and capabilities.[21] According to Ritter et al. (2002, p. 120), network competence is "the degree of network management task execution and the degree of network management qualification possessed by the people handling a company's relationships".[24] Walter et al. (2006, p. 546) defined network capabilities as "abilities to initiate, maintain, and utilize relationships with various external partners".[21] They distinguished four types of capabilities: coordination, relational skill, partner knowledge, and internal communication. Dyer and Singh (Dyer and Singh 1998) defining relational capabilities, they stressed that are the strategic activities which provide common benefits for all involved partners.[25] Similarly, Johnsen et al. (2000) suggest targeting mutual benefits as the factor distinguishing networking from other activities.[20] In the present study was assumed, according to Mitrega et al. (2012, p.741), that network capabilities are the set of activities and organizational routines which are implemented at the organizational level of the focal company to develop business relationships for the benefit of the company. [14] This study conceptualizes NC from the perspective of a focal company with regard to its set of direct business relationships with their customers.

The importance to which customers perceive value depend on the type of service. Service value creation is examined by structural factors such as operant or operand resources, asset specificity or collaboration dynamics, organizational leadership, and information systems. [17] According to Saccani et al. (2014), it is possible to outline four different service categories that may be included in servitized firms offerings: product support services, customer support services, process related services, process delegation services. [8] Beuren et al. (2013) distinguished two other service types: product-centre and knowledge-centre services, which were considered in this paper. [26] For the purpose of this study is assumed that: (1) product-centric services, aims at ensuring a product's functioning, include processing standardized raw materials to the specific sizes, shapes and tolerances required by customers, engineering and construction services, stockholding, logistics services and (2) knowledge-centric services, aims at improving and / or optimising the customer's processes and includes business consulting, consulting over process optimization, product and process design, process-oriented R&D services, consultancy and professional services for process engineering, test, simulation, design and construction services, process-related training services, help desk for remote support, a website hosting product-related forums, FAQs and chats.

Conceptualization of NC proposed by Mitrega et al. (2012), Cannon et al. (1999) and Raddats et al. (2015) was adopted in this study. Measurement model of NC included five components and some subcomponents: (1) leaders and personnel: my company's senior management are committed to growing the services business, my company's senior management have an intimate understanding of our customers' business challenges, my company's services staff are technical experts in their field, my company is able to retain its best services staff, (2) collaborative approach: organize social events, motivate employees to create close social ties with business partners, socialize at networking events, establish relationships with multiple stakeholders (across functional areas), (3) information exchange: my company uses knowledge management to share best service practice, my company uses proven methodologies to enhance its services, my company's service business uses IT tools to enhance performance, (4) conflict management: formalised procedure on how to deal with conflict with business partner and across functional areas, train employees on how to handle conflict with business partner, (5) Relationship-specific adaptations (by the buyer or the supplier): supplier / buyer changed its product's features, supplier / buyer changed its personnel, supplier / buyer changed its inventory and distribution, supplier / buyer changed its marketing, supplier / buyer changed its capital equipment and tools.

3. THE SAMPLE

In this study the case selection was purposive. Companies were selected on conceptual grounds [27] following a two-step process: first, the suppliers were selected and subsequently the buyers. Exactly, set of suppliers was formed according to three criteria: variety, relevance and access to data. The sample included a range of manufacturing industries, including mechanical equipment, electronic equipment, and steel service center. The selected suppliers operate in different industries and maintain relationships with different buyers, deliver different types of services. Referring to relevance, companies were selected that are acknowledged as high performers in their industries. The average turnover from service is 21%, which, following Fang et al. (2008), is in the range of 20-30%, at which a company reaches the critical mass required to obtain a sustainable pay-off from service. [28] Finally, regarding access, companies were selected for which you could be done interview with high-level managers as well as in the buyers companies. The experts were representing several different and distinct organizational functions within the firms: chief executives, finance directors, production directors, R&D managers, business sector managers, senior market managers, technical sales managers, and those responsible for quality control. Each of them had at least five years of experience in design, development and managing of services.

For each suppliers, one or more buyers were chosen. The selection was carried out in a way that it was possible to investigate at least one buyer-supplier relationship in correspondence with the delivery of each service type (product-centric and knowledge-centric services). When supplier provided a service type to more than one buyer, a highly representative buyer was selected (in terms of size, service volumes). In this study was analysed well-established relationship between buyer and supplier. Each supplier was involved in a long-term (at least five years) relationship with the buyer. The research was conducted among employees of nine manufactures located in south part of Poland. Each of the manufacturers offer a wide range of services to its customers including manufacturing, assembling, supply-chain-management, consulting, technical customer support, seminars, tailored packaging and transport solutions, consultancy and professional services for process engineering, test, simulation, design and construction services, process-related training services, installation and commissioning, repair services, provision of spare parts and consumables, decommissioning and disposal service.

4. THE RESEARCH METHOD

The research process consisted of five phases: (1) framework development - identified network capabilities and service types based on literature reviewed, (2) conducted expert interviews to obtain the direct-influence matrix derived from the pair comparisons, (3) assessed the competence of informants with respect to their knowledge, (4) analysed the in-depth of the interrelation among the network capabilities configurations and relation between network capabilities and service types by utilizing the DEMATEL method, and (5) result interpretation. Following O'Cass, Heirati, and Ngo (2014), was assessed the competence of informants with respect to their knowledge about the questions asked and their confidence in their ability to answer questions on a seven-point Likert-type scale, anchored at "1 = not at all" to "7 = very much so". [29] Respondent who scored below four on any of the two items was rejected. At the end of the survey respondents were asked to indicate, using a seven point scale (1 = "very limited" to 7 = "very substantial"), how knowledgeable they were about issues covered by the survey. Four respondents indicating a knowledge level of three or below were deleted from the study, resulting in 26 remaining respondents. The analysis is done on data from 4 manufacturers-suppliers and 5 manufacturers-buyers that engage in business-to-business selling.

The DEMATEL method is used to solve the complicated and intertwined problem group. It is a sophisticated method for establishing a structural model involving causal relationships among complex factors. [30] It is one of the methods which can identify the interdependence among the variables / attributes of a system. DEMATEL has been successfully applied to many research fields with the purpose to render sophisticated problems and

transform complex systems into structurally causal and effect relationships. [30] Therefore, DEMATEL can be extended in solving causal relationship issues of core competences of an industry or company, which in turn, provide improvement options. [29] It not only provides a way to visualize causal relationships between criteria through an impact-relationship map but also indicates the degree to which criteria influence each other DEMATEL is also used for identifying critical success factors in a number studies. [e.g. 30, 31] The DEMATEL model construction process consists of four main steps. [30] Step 1: Generating the direct-influence matrix Z . The measurement of the relationship between factors i and j requires construct scales of evaluations using pairwise comparisons of dimensions. The measurement criteria of 0, 1, 2, 3, and 4 are used to illustrate no influence, low influence, medium influence, high influence, and extremely high influence, respectively. The direct-influence matrix is constructed based on the degrees of relative impacts derived from the pair comparisons. The integer score x_{ij}^k is given by the k th expert and indicates the influential level that factor i has on factor j . Step 2: Normalizing the direct-relation matrix. On the basis of the direct-relation matrix Z , the normalized direct-relation matrix X can be obtained by normalizing the direct-relation matrix. The sum of each row j of matrix Z represents the direct effects that factor i gives to the other factors. Step 3: Attaining the total-relation matrix. Once the normalized direct-relation X is obtained, the total-relation matrix T can be calculated. Step 4: Producing a causal diagram. The sum of rows and the sum of columns are separately denoted as vector D and vector R . The vector $(D + R)$, named "Prominence," represents the importance of the criterion. Similarly, the vertical axis $(D - R)$, named "Relation," divides criteria into a causal group and an effect group. The factor belongs to the causal group if $(D - R)$ is positive, and the factor belongs to the effect group when $(D - R)$ is negative.

5. RESULTS AND ANALYSIS OF THE RESULTS

Following step 1 to step 4, the components of network capabilities importance ($d + r$), relations ($d - r$) and types are shown in **Figure 1**. The experts were asked to evaluate the direct impact of any factors using pairwise comparison. The judgments were made in two rounds. The goals of first round were: (1) explained the factors evaluated (the resource configurations), (2) made the judgments by the experts and simultaneously, given explanations of judgments. Twenty six experts were interviewed in this round. The goal of the second round was to confirm / change previous assessments (explaining the reason of change his / her judgments). Twenty one experts were interviewed in the second round. Therefore, five expert judgments from the first round were not taken into account for further research evaluations. In the end, judgments of twenty one experts were the basis to build the direct-relation matrix Z . The impact of one factor to another was assessed using a five-item scale (from 0 to 4). The two types of services were evaluated separately. The row and column sums, d and r , represent the strength of influence that a criterion / dimension has given to and taken from others. The summation ($d + r$) indicates the correlation intensity or prominence of the criterion element. The summation with higher value means stronger effect. The difference ($d - r$) shows the direction of the relationship of one criterion toward other criteria. Positive ($d - r$) means that the criterion is the cause of other criteria while negative value indicates that the criterion is affected by other criteria.

Components	D+R	D-R	Type	Components	D+R	D-R	Type
Information exchange	4.38	0.22	Cause	Information exchange	6.56	-0.14	Effect
Relationship-specific adaptations	4.28	0.28	Cause	Relationship-specific adaptations	6.19	0.07	Cause
Collaborative approach	3.98	0.16	Cause	Collaborative approach	6.15	0.92	Cause
Conflict management	4.39	0.64	Cause	Conflict management	5.87	0.12	Cause
Leaders and personnel	4.69	0.69	Cause	Leaders and personnel	6.63	1.18	Cause
Product-centric service success	3.99	-1.99	Effect	Knowledge-centric service success	4.66	-2.14	Effect

Figure 1 Components of network capabilities importance ($D + R$), relations ($D - R$) and types (product-centric service - left side, knowledge-centric service - right side)

Overall, in both types of services, product-centric and knowledge-centric services, “Leaders and personnel” is the most important factor with influence strength index ($d + r$) of 4.69 and 6.63, respectively. All five components of network capabilities in knowledge-centric service group was higher assessed than in product-centric service group. In knowledge-centric group, “Leaders and personnel” followed by “Information exchange” ($d + r = 6.56$), “Relationship specific adaptation” (6.19), “Collaborative approach” (6.15) and “Conflict management” (5.87). At the same time, “Information exchange”, “Relationship specific adaptation” and “Conflict management” are influenced by “Leaders and personnel” and “Collaborative approach”. The criterion “Information exchange” has the lowest (negative) value of ($d - r$) = -0.14, and is the most easily influenced by other criteria.

In product-centric group of services, besides the “Leaders and personnel”, the most important factors are “Conflict management” ($d + r = 4.39$), “Information exchange” (4.38), “Relationship specific adaptation” (4.28) and “Collaborative approach” (3.98). The results show that “Leaders and personnel” and “Collaborative approach” have the strongest effects on other criteria in product-centric services group. On the other hand, “Collaborative approach” and “Information exchange” have the relation index values ($d - r$) of 0.16 and 0.22, respectively.

6. CONCLUSION

Complex, knowledge-centric service provision requires the development of new capabilities [12]. However, few studies attempt to identify the network capability configurations in different types of service offerings require and complex causal interdependencies between them. [32] To further the understanding of these complex patterns of causal interrelationships, this study uses DEMATEL technique to identify and explain the specific combination of network capabilities that enables firms to offer product-centric or knowledge-centric service offerings.

The study contributes to the literature of servitisation in several ways. First, the analysis shows that different types of services require different configurations of network capabilities. Knowledge-centric services are more knowledge-intensive and customised than product-centric services. Moreover, it is more difficult to standardise knowledge-centric service operations and processes. [33] Coordination provide a governance mechanism that may be used to simulate hierarchy in exchange when vertical integration is impractical. [22] However, coordination in knowledge-centric services is not as effective as in the other service types and should be supplemented by informal mechanisms and relational governance. Finally, significant relationship-specific investments are required by both parties. Therefore, it must be concluded that building and maintaining trust, which requires long-term investments, it may be more profitable to offer basic, product-centric services, without investing in development of network capabilities. Offering complex and knowledge-intensive services containing vast information asymmetries is more profitable for firms that are able to build high relational capital in their customer relationships. [5] These services include improving and / or optimising the customer's processes, business consulting, consulting over process optimization, product and process design, test, simulation, project management, among others.

Second, findings suggest that there is no one way to manage buyer-supplier relationships in servitised environments. Instead, you argued that the type of service outsourced acts as a contingent factor influencing the characteristics of these relationships. Therefore, by analysing how network capabilities configurations appear for different type of services, in particular, it is found that when moving from product-centric to knowledge-centric services, the establishment of relationship-specific adaptations and cooperative norms increases. The technical information needed by a supplier should be coupled with an increasing degree of knowledge of customers, of the customer's business processes, and ultimately with thorough knowledge of the whole service offering. This entails an increase in the amount of information exchanged as well as the establishment of relationship-specific adaptations and of cooperative norms.

Third, all of five components of network capabilities in knowledge-centric service group were higher assessed than in product-centric service group, therefore knowledge-centric services are more customer centricity than product-centric services. Business model scholars frequently stress that the customer should be at the centre of the business model and its primary goal is to create value for the customer (e.g. [34]). Frankenberger et al. (2013) conceptualized customer centricity on the basis of three dimensions: (1) customer-oriented values and beliefs guide actions of the organization from the top, (2) the structure of the organization uses dedicated customer-facing units and (3) the focus of the organization is on customer needs discovery and satisfaction. [35] Let us assume that: (1) "Leaders and personnel" reflects customer-oriented values, (2) "Relationship-specific adaptations" reflects the structure of the organization uses dedicated customer-facing units and (3) "Collaborative approach" and "Information exchange" reflect the focus of the organization on customer needs discovery and satisfaction. Moreover, recalling what mentioned above, that general all five components of network capabilities in knowledge-centric service group was higher assessed than in product-centric service group, one can states that knowledge-centric services are more customer centricity than product-centric services. However, according to Frankenberger et al. (2013) knowledge-centric services are labour intensive and require intense face-to-face interaction between a supplier and its customer. [35] Thus, such services are not easy to offer to a wide range of clients. However, knowledge-centric service may be offered to a few key customers, which resonates well with.

This study has limitations that could be addressed in future work. First, the findings were worked on too small sample. Therefore, the generalizability of the results cannot be proven. Second, DEMATEL model is highly dependent on the judgments of the experts. Thus, it is needed statistical analysis on a broader sample to confirm presented results.

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