Developing effective customer solutions: An associative learning perspective

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Abstract

Frame of the research: *The intensification of competition has urged the firms to shift from selling products to offering solutions in the search for a more sustainable competitive advantage. However, the difficult-to-master development of effective solutions has been hindering the firms' ability to execute the solution-based competitive strategy and consequently their ability to benefit from the superior rent generation potential that a more sustainable competitive advantage would provide. This circumstance raises the quest for new insights that could guide the managerial actions in the development of effective solutions.*

Purpose of the paper: *Debate the application of the associative learning perspective in the context of customer solution development and provide insights to guide managerial actions.*

Methodology*: Discuss the theoretical premise that learning takes place through association across related knowledge, borrowed from the cognitive and behavioral sciences, providing the rationale for the role of two preconditions-prior knowledge and strength of association-in enabling learning processes. Apply this learning perspective in the context of customer solutions, advocating its role in guiding effective customer solution development practices.*

Findings*: Through the application of the associative learning perspective in the solution development space, it becomes possible to suggest several managerial practices whereby effective customer solutions can be achieved: matching domain ties coupled with contingent hierarchy, multiple-expertise teams, informal narratives and storytelling sharing, customer interactor stability, co-location of assets, and co-creation of boundary objects.*

Research limits: *Since the literature on customer solutions is an emerging, though steadily growing, body of research, multiple theoretical perspectives and extensive empirical investigations are necessary to develop a more comprehensive understanding of the conditions that affect the development of effective customer solutions.*

Practical implications: *This paper discusses several managerial practices that could be employed within a solution development context, which would lead to effective customer solutions.*

Originality of the paper: *Conceptual contribution by advocating the role of the associative learning perspective in guiding effective customer solution development practices.*

Key words: customer solutions; relational exchanges; associative learning; business-to-business marketing

1. Introduction

While an increasing body of research emphasizes the benefits of moving from selling products to offering customer solutions, the empirical evidence shows that the economics of customer solutions often fall short of expectations (e.g., Stanley and Wojcik, 2005). Solutions typically entail a much higher level of complexity than products (Day, 2004). This makes the solution a much more difficult-to-imitate offer compared to the product, and it provides the basis for a more sustainable competitive advantage (Reed and De Filippi, 1990). However, this complexity also raises the challenge to master the development of effective solutions (Tuli, Kohli, and Bharadwaj, 2007). This hinders the firms' ability to execute the solution-based competitive strategy effectively and consequently it hinders their ability to benefit from the superior rent generation potential that a more sustainable competitive advantage would guarantee. This circumstance raises an intriguing paradox. In fact, firms shift increasingly from selling products to offering solutions in order to escape from the intensification of competition across numerous industries, which they seek to achieve by better differentiating themselves from their rivals (Wise and Baumgartner, 1999; Court *et al.*, 2006). Yet, the difficult-to-master development of effective solutions may prevent the firms from executing this solution-based differentiation strategy effectively, causing the economics of the solution to fall short of expectations. The solution's complexity is therefore at the same time both the rationale for the benefits of the firms' transition into the solutions' competitive space and the source of the firms' failure to achieve these benefits due to the challenges that this complexity raises in the development of effective solutions. Clearly, deepening our understanding of how firms could develop effective solutions is paramount to help them better exploit the opportunities of employing a customer solution approach.

Though understanding the circumstances that affect the development of effective customer solutions is a very relevant topic that has sparkled a great deal of interest among marketing scientists in the last couple of decades, research on this topic is still in its infancy. Some studies have employed the dyad as unit of analysis, investigating both sides of the relationship (Tuli *et al.*, 2007), or alternatively deepening either the provider (Powers, Sheng and Li, 2016) or the customer point of view of the dyad (Petri and Jacob, 2016, Elgeti *et al.*, 2020) in the search for the managerial processes and mechanisms that enable the development of effective solutions. Other studies have employed a network perspective and investigated business networks, i.e., multiple suppliers involved in the co-creation of customer solutions, in an attempt to explore the network-specific capabilities for the development of customer solutions (Hakanen and Jaakkola, 2012, Gebauer *et al.*, 2013). Although these studies greatly contribute to set an avenue of research bound to understand the factors that affect the development of effective solutions, they are banded together by their lack of an overarching theoretical frame that could indeed guide them systematically in the understanding of these factors. Consequently,

the research results thus far have been fragmented and have provided only little insights to guide managerial actions.

Against this background, we have a few exceptions. For instance, Ulaga and Reinartz (2011) took a resource-based perspective (Barney, 1991; Peteraf, 1993) and investigated the resources and capabilities responsible for the development of "hybrid offers", i.e., offers that combine industrial goods and services in business markets. Yet, these offers are broader in their scope compared to customer solutions and, consequently, they cannot efficiently guide the search for solution-specific effective processes. Ulaga and Kohli (2018) built on three streams of literature, i.e., organizational buying behavior, industrial marketing, and project marketing, to investigate the role of the sales function and individual salespersons in the development of effective solutions. Yet, their findings shed light on a specific part of the relational processes involved in the development of customer solutions, while providing relevant insights on the sales activity that is in the forefront of the customer-solution way of doing business. Building on the governance literature, Colm, Ordanini, and Bornemann (2020) investigated the tensions arising from the potential risk of opportunism that the development of customer solutions may entail (Hartmann *et al.*, 2018), and explored the role of the governance mechanisms in solving these tensions and enabling the parts to collaborate for the effective development of the solutions. Though relevant for the development of effective solutions, the governance mechanisms are more concerned with the willingness to cooperate rather than with the ability to develop effective solutions.

This paper aims to make a step forward in this field of studies. It seeks to achieve this by suggesting an overarching theoretical umbrella to clarify effective managerial practices that shape the ability to develop customer solutions. In this vein, the paper provides a conceptual contribution on the best practices conducive to effective customer solutions. To this purpose, the paper relies on McInnis's (2011) framework for conceptual contributions in the marketing field, which suggests multiple ways whereby conceptual advances can be provided, depending on the type of contribution (envisioning, relating, explicating, and debating) and their level of application (constructs, relationships/theories, procedures, domains, disciplines, and science). The type of conceptual contribution advanced in this paper is that of debating through advocacy. This is because the present study endorses the *associative learning perspective* in guiding the search for effective customer solution development practices, i.e., the study speaks in support of a particular view, which is the typical trait of conceptual papers that emphasize advocacy (McInnis, 2011, p. 147). This type of conceptual contribution is consistent with the limitations this paper aims to overcome. In fact, most of the extant studies are data-driven and lack an overarching theoretical perspective that could validate the practices suggested thus far, and that could guide a systematic search for new effective practices. Furthermore, this paper debates the learning perspective at the procedure level. This is because the paper aims to provide insights on the managerial practices that work well in the context of customer solution development. Indeed, conceptual contributions at the procedure level are

very valuable as far as the search for insights on best practices is concerned (McInnis, 2011, p. 142).

2. The relevance of learning in relational exchanges and customer solution offerings

The relevance of learning that takes place in supply relationships has long dominated the literature on business-to-business marketing. Dating back to the early emergence of the relational perspective of market exchanges (e.g., Richardson, 1972; Hakansson and Ostberg, 1975; Arndt, 1979; Macneil, 1980), the business-to-business marketing literature has emphasized the relevance of engaging in extensive information exchanges and mutual adaptation processes in supply relationships (e.g., Hakansson, 1982; Hakansson and Snehota, 1995; Turnbull, Ford and Cunningham, 1996). Learning in buyer-seller relationships has been acknowledged to be conducive to governance benefits-in the form of increasing levels of commitment and trust (e.g., Dwyer *et al.*, 1987; Anderson and Weitz, 1992; Morgan and Hunt, 1994)-and to more effective offerings in the form of higher product quality (Emshwiller, 1991), new product development (Magnet, 1994), and effective solutions to customer business problems (Sharma and Molloy, 1999).

Even though the early insights on the role of learning in buyer-seller relationships can be traced back to several decades ago, its emphasis has blossomed in the latest couple of decades, especially with regard to the effect of learning in guaranteeing more effective offerings. Accordingly, a renewal of interest in the search for a managerial response to these learning requirements has sparkled across several streams of literature within the business-to-business domain, from the selling-purchasing interface (Capon, 2011; Jones *et al.*, 2005; Stanley and Wojcik, 2005; Murtha *et al.*, 2014) through to product development and innovation (e.g., Srivastava, Shervani and Fahey, 1999), and project marketing (Cova *et al.*, 2002), and has culminated with the emergence of the customer solutions avenue of research (Sharma and Molloy, 1999; Brady *et al.*, 2005; Davies *et al.*, 2006; Sawhney, 2006; Tuli *et al.*, 2007; Matthyssens and Vandenbempt, 2008). In these more recent contributions, learning is definitively the core component of the selling proposition. In fact, learning is emphasized, because it enables suppliers to better address their customers' ever-changing needs within ongoing supply relationships, to expand the scope of their offerings from products to solutions, and, in this way, to better differentiate from their competitors (e.g., Wise and Baumgartner, 1999; Court *et al.*, 2006; Ulaga and Kohli, 2018). Furthermore, since customer solutions are indeed acknowledged as a relational, co-creation process (Tuli *et al.*, 2007; Hakanen and Jaakkola, 2012; Petri and Jacob, 2016; Powers *et al.*, 2016; Vargo and Lusch, 2016; Colm *et al.*, 2020), learning is the underlying process throughout the whole development of customer solutions and, consequently, is ultimately responsible for the extent to which the solution meets customer needs. Clearly, the underlying learning processes taking

place throughout the development of the solution strongly influences the effectiveness of a customer solution.

Although both the academic and practitioner literature has provided several definitions of customer solutions, all these definitions explicitly or implicitly characterize a solution on the basis of the following three distinguishing features. First, the solution provision is *output oriented*, i.e., it is bound to improve the business outcomes of a customer. Second, the core content of a solution is a customized, integrated combination of products and services, i.e., it aims at addressing a customer's particular requirements and is designed such that each good and service in a solution are engineered not only to work well together, but also to work well with the customer-side operational context where the solution is put to work. Third, the solution is a relational process, i.e., it entails processes directed at understanding the customers' needs, customizing and integrating goods and services, deploying while fine-tuning them in the customer operational context, and supporting the customers' evolving needs over time.

Being *output oriented*, solution providers need to develop a deep knowledge of the customers' business problems in order to design an effective solution to those problems. This means that effective solutions go beyond matching technical requirements. Indeed, they entail an extensive search behavior aimed at developing a deep understanding of the customers' current business situation and relevant trends, and aimed at engaging in problem-solving activities bound to find effective solutions to a complete customer problem. In this way, effective solutions help customers strengthen their business outcomes. Hilti, a world-leading manufacturer of power tools and fastening and protection systems, mostly for the construction industry, moved from selling products to providing solutions when it designed the fleet management offering aimed at helping their customers be more productive and focus on their core business while reducing their financial and operational risk exposure (Michel, 2013). The fleet management system points the way to services that could complement the core products, since it would allow the customers to use a defined set of tools (i.e., a tool fleet) for a fixed period of three to five years at a fixed monthly rate, and an integrated service platform tightly interconnecting customers and suppliers for assistance in any step of the life cycle of a tool fleet. Since a solution moves beyond the product to assist the customers in their business problems, understanding the customers' needs is not a straightforward process. Tuli, Kohli, and Bharadwaj (2007) suggested three reasons that raise the challenge in the solution providers' effort to define the customer requirements. First, customers may not be fully cognizant of their needs; understanding customers' needs therefore results from a discovery process jointly undertaken by both customers and solution providers. Second, solutions imply an understanding of the broader business needs, including the customers' internal operating processes, their labor situation, and their business models. Third, assisting the customers in better facing their business problems entails understanding customers' current needs as well as grasping their future development. Being *output oriented* means that understanding customers' needs in a solution perspective is a discovery process that involves an extensive learning activity.

The core content of a solution is a customized, integrated combination of goods and services. A solution can involve different degrees of customization, ranging from a completely new offering entirely designed to fit into a customer's environment, to a replication of a previously developed offering modified to work well in a specific customer's context. The problem contexts for any two customers are rarely completely identical (Sawhney, 2006), such that a certain, though varying, degree of customization is always necessary for an offering whose ultimate purpose is to solve a customer's complete business problem. Integration entails that the solution's components are engineered to work well together, and optimized to work well in the customer's operating context. When 3M, a multinational conglomerate corporation, decided to enter the special vehicle market to offer an assembly system that could substitute the mechanical-based, traditional assembly system, it needed to enhance its previous technology. 3M therefore engaged in a research and development (R&D) effort that produced an enhanced special glue-i.e., Scotch-Weld EXP-and then had its team work closely with the customer's team to adapt and integrate its solution to the specific customer context. In fact, in this specific industry, customers may vary from one another when it comes to their production chain. Therefore, a customization and integration effort had to be accomplished to decide what (i.e., the detailed technical specifications), when (i.e., in which specific stage of the production chain), and how to introduce the liquid adhesive in the assembly system in order to have a workable solution for any customer in this industry. Consequently, this characterization of customer solutions entails that solutions require an effort to understand the customer's specific problem context and to engage in problem-solving activities in order to work out how to adapt and embed the offering in the operating customer context for the customer to obtain the most value out of the solution. Of course, this implies extensive learning activities for the offering to result in an effective solution to the customer's needs.

The above-mentioned features ultimately lead to acknowledge that a solution is indeed a relational process (Tuli *et al.*, 2007). The buying cycle of a solution is typically longer than the cycle of the product sale. This is because solution providers first need to delve into the customer's business problems and objectives. That is, the solution providers need to obtain a deep and extensive understanding of the customer's internal and external environment, which requires an intensive, relational exchange process with the customer. Furthermore, this understanding aims at designing customized, integrated combinations of goods and services, which require intensive interactions between the actors who participate in the design of the solution from the supplier side, and also between the supplier team and the customer team. Moreover, the deployment of the solution is not a one-off delivery of a product; instead, it entails the installation of the offering into the customer's context, which raises additional needs for intensive interactions between customer and supplier-for several reasons. In this stage, new requirements may surface, which might call for a *fine-tuning* process whereby the offering is subject to additional adjustments to better fit with the customer's problem context. The deployment of the

offering may also entail supporting the customer in the development of the proper competence to obtain the most of value out of the solution. The latter can be achieved, for example, by providing appropriate information or some training activities. Effective solutions providers are also expected to assist the customers even after the offering's deployment. This assistance is meant to go beyond the traditional maintenance service and is intended to guarantee assistance in the solution to the customer's ever-evolving needs. The relational nature of a solution clearly emphasizes that offering solutions to customers implies intensive interactions and extensive learning processes throughout the whole solution cycle. Furthermore, it also implies a never-ending learning activity that extends beyond the deploying of a given solution and prompts the supplier to assist the customers in solving their ever-changing business problems.

3. The theoretical underpinnings of learning in relational exchanges and customer solution offerings: An associative learning perspective

This paper's investigation of the role of learning in the development of effective solutions is based on the premise that firms learn through *association across related knowledge* (Simon, 1991). This learning principle is borrowed from the cognitive and behavioral sciences, and provides the foundation for the general wisdom about organizational learning in the evolutionary as well as the organizational theories (e.g., Nelson and Winter, 1982; Cohen and Levinthal, 1990).

3.1 The processes of learning: understanding and problem solving

This paper's notion of learning acknowledges two processes through which learning takes place across buyer-seller relationships. The first process is *understanding*, i.e., grasping the information flowing between the two sides of the relationship as well as the tacit knowledge incorporated in the context-both internal and external-in which the firms operate. In this study's context, this process leads to learn about the customer requirements both at the outset of the solution development and along the journey of the designing, deploying, and post-deploying processes. Furthermore, this process can occur both directly and indirectly through learning about the customer's business model, its organizational and political context, its competitive context, and, more generally, its environmental context. Since the core content of a solution is a complex set of customized, well integrated goods and services, understanding is also involved when firms detect issues in their effort to optimize the combination of goods and services such that the solution components are well integrated among each other and well embedded in the customers' operational context. Understanding is also involved when the firms who participate in the relationship are exposed to each other's feedback and suggestions about the assessment of alternative courses of action along all stages of the solution provision and post-provision.

The second process is *problem solving*, i.e., responding to a given problem or requirement by providing a proper solution. Problem solving is a matter of creativity and innovation; hence, it is tightly coupled with learning. A solution provider is engaged in a problem-solving activity to be able to envision a possible course of action to respond to a customer's business problem, and to accordingly renew its resources and competences to execute those actions effectively. Furthermore, the customer engages in a problem-solving activity to the extent that it actively participates in envisioning a proper solution to its business problem, and is compelled to adapt its routines, processes, and resources to ensure that the solution envisioned delivers effectively on its needs once implemented. Problem solving is involved when firms figure out how to shed light on the issues incurred in their effort to achieve an effective, well integrated solution, optimized for the customer's operational context.

The principle that learning takes place through *association across related knowledge* stands for both learning processes. Indeed, based on the *associative learning* perspective, the effectiveness of *understanding* as well as the effectiveness of *problem solving*-hence the effectiveness of their learning outcomes-depend on the extent to which the incoming information as well as the task upon which a problem-solving activity is being accomplished are related to previously obtained information and previously performed tasks, respectively.

3.2 The preconditions of learning: prior knowledge and strength of association

Two preconditions are implicit in the *associative learning* perspective, which apply in a similar way to both *understanding* and *problem solving*. The first precondition is the existence of *prior knowledge*. Research on memory development within the social and behavioral sciences suggests that accumulated prior knowledge increases both the ability to put new knowledge into memory as well as the ability to recall and use it (Bower and Hilgard, 1981). The notion that prior knowledge facilitates the learning of new related knowledge is also key in the literature on organizational evolution and learning as demonstrated by the concepts of absorptive capacity (Cohen and Levinthal, 1990) and local search (March and Simon, 1958; Nelson and Winter, 1982). The second precondition is the *strength of association.* For instance, in the context of learning a language within the cognitive and behavioral sciences, Lindsay and Norman (1977:517) suggested that the problems in learning words is not a result of a lack of exposure to them, but that "to understand complex phrases, much more is needed than exposure to the words […] a word is simply a label for a set of structures within the memory system, so the structure must exist before the word can be considered learned." As per these studies, an appropriate contextual knowledge is required for making new knowledge intelligible. In the same vein, Cohen and Levinthal (1990:131) argued that to develop an effective absorptive capacity it is insufficient to merely expose an individual briefly to the relevant prior knowledge. Intensity of effort is critical. The intensity of effort's role for learning purposes is also implicit in the emphasis on learning-by-doing in the evolutionary theories

and organizational learning theories (March and Simon, 1958; Nelson and Winter, 1982).

Moving more specifically to *problem solving*, in the cognitive and behavioral sciences, experience on one learning task is believed to influence and improve performance on other subsequent, similar learning tasks (Ellis, 1965). In these studies, problem-solving methods and heuristics typically constitute the previous knowledge that permits individuals to acquire related problem-solving capabilities (Harlow, 1959). Bradshaw, Langley, and Simon (1983) and Simon (1985) suggested that prior possession of relevant knowledge is what gives rise to effective problem solving and creativity, as it allows the sort of associations and linkages that might not have been considered before. Furthermore, also for problem solving, intensity of efforts is critical. Lindsay and Norman (1977:355) noted that the more deeply the material is processed-i.e., the more effort used, the more processing makes use of associations between the items to be learned and knowledge already in the memory-the better will be the retrieval of the item. Similarly, Harlow (1949, 1959) argued that important aspects of learning how to solve problems are built up over many practice trials on related problems. Indeed, Harlow (1959) suggested that if practice with a particular type of problem is discontinued before it is reliably learned, then little transfer will occur to the next series of problems.

4. Associative learning: in search for effective customer solution offerings

4.1 The role of prior knowledge on the development of effective customer solutions

Understanding the development of a customer solution as a relational, knowledge-intensive process, may prompt to postulate that the factors responsible for effective learning to take place also explains the effectiveness of the customer solutions. Based on the first precondition of learning discussed above, the solutions' effectiveness depends on the extent to which the knowledge flowing across the inter-organizational boundaries (i.e., across the relationship between the solution provider and the customer) finds some points of contact with the knowledge residing in the recipient organization. Adopting a contingent hierarchy, where the superior-subordinate relationship between the different units of the supplier organization shifts over time to ensure that the unit with the greater expertise in a customer need is in charge with the development of a solution (Tuli *et al.*, 2007), can be interpreted as an organizational mechanism that responds to this requirement. That is, it helps ensure that the information and knowledge flowing from the customer organization finds related knowledge within the supplying organization. When experts are in charge, the solution provider is in a better position to accurately identify a customer's recognized, unrecognized, and future requirements (Bunderson, 2003). Besides favoring the understanding of the customer's needs, this organizational arrangement also favors the development of

a proper response to the customer's business problem. Being experts in a given customer's business problem, they are also depositories of the relevant problem-solving methods and heuristics, i.e., the relevant prior knowledge, that they can recall, use, and upgrade with related problem-solving capacities to provide an effective solution to that business problem.

Customer solutions are often developed in a business setting characterized by a high degree of uncertainty. In this setting, the first precondition of effective learning is obtained with a diverse knowledge structure. In fact, "a diverse background provides a more robust basis for learning because it increases the prospect that incoming information will be related to what is already known" (Cohen and Levinthal, 1990:131). This diversity can be achieved, for instance, if a solution provider interviews multiple stakeholders from a customer firm, and proves to be beneficial to learn about customer's needs to the extent that understanding customers' requirements is not a straightforward process but is surrounded by a high degree of uncertainty (Tuli *et al.*, 2007). Another way to obtain this knowledge diversity is for a supplier to have a team endowed with multiple expertise work in a coordinated manner with a multiple expertise team from the customer organization. For example, in 3M this diversity was arranged to figure out the *what, how,* and *where*, in the production chain of the customer who manufactures special vehicles, the Scotch-Weld EXP should be deployed in order to maximize the performance of this innovative assembly system. In this case, there is uncertainty, because the special vehicle industry is a new area of application for the special glue that 3M had developed. Consequently, the breadth of the knowledge background provided by the teams composed of multiple expertise from both supplier and customer firms proves beneficial not only for a more effective understanding of the assembly requirements in the production chain of a customer, but also for the development of an effective, innovative response in a novel context of application. This is because diversity enables actors to make novel associations and linkages.

The diverse knowledge structure can also be achieved by favoring organizational mechanisms that encourage knowledge-sharing processes within the firms. The above-mentioned contingent-hierarchy organizational arrangement indirectly favors this circumstance. Since the superior-subordinate relationship between the different units shifts over time and consequently leads to greater power balance among them, the units are more likely to share information among each other and so develop a richer understanding of the customers' needs (Tuli *et al.*, 2007). Furthermore, an organizational culture and leadership style encouraging informal collaboration and the propensity to share experiences on previously developed solutions may play a key role in creating a diverse, collective knowledge structure, beneficial for understanding and solving customers' new business problems. Extant research has acknowledged that this internal collaboration may lead to the emergence of informal communities of practice nurtured by the creation and exchange of stories across community members (Brown and Duguid, 1991). These informal stories and extensive narration function as repositories of accumulated wisdom (Jordan, 1989), an organizational memory of differentiated

knowledge that helps use the knowledge cumulated through solving previously encountered problems in order to understand and solve new related problems. Firms who encourage these practices are in a better position to develop effective solutions. In fact, these practices help form a more varied collective knowledge basis for solution providers to rely on. This helps detect linkages between new information as well as new tasks upon which a problem-solving activity is being accomplished, on one hand, and previously cumulated information and previously performed task, on the other hand.

4.2 The role of the strength of association on the development of effective customer solutions

The second precondition reminds us that learning outcomes depend on the *strength of association* among related knowledge. Social network research has long emphasized the role of strong ties in promoting in-depth, two-way communications, facilitating fine-grained information transfer, and favoring joint problem-solving arrangements between organizations (e.g., Granovetter, 1982; Krackhardt, 1982; Uzzi, 1996). Moreover, the trust that exists when there are strong ties makes it more likely that the organizations connected by these ties are more willing to share valuable information with each other (e.g., Granovetter, 1982; Krackhardt, 1982; Uzzi, 1996). Since the knowledge being exchanged in the context of the development of customer solutions may entail a high degree of uncertainty and tacitness, transfer-specific social ties have been acknowledged to play a key role in overcoming the *stickiness* that these knowledge features bring about (Szulanski, 1996).

In fact, strong social ties have three features (Kraatz, 1998), i.e., frequent interactions, extended history, and intimacy. These features are all suitable to guarantee the intensity of effort and the proximity whereby *strong associations* across the knowledge brought by the partnering firms can be built, and lead to more effective learning outcomes. Customer interactor stability has proved to work as an effective organizational mechanism that enables transfer-specific social ties across the solution provider and the customer (Tuli, Kohli and Bharadwaj, 2007). Indeed, in the customer solution development context, greater stability has proved to lead interactors to develop strong social ties. The development of strong ties proved beneficial for a better understanding of the customers' requirements, for enhancing the ability to customize the supplier offering to better meet the customers' specific requirements, and for providing more effective support in the subsequent stages of the development of the relationship.

Direct involvement in the customer's business activities is another way to connect more strongly to the knowledge that the solution provider needs to acquire to develop effective solutions. Abernathy (1978) and Rosenberg (1982) argued that through direct involvement in manufacturing, a firm is better able to recognize and exploit new information relevant to a particular product market. In their study on *absorptive capacity*, Cohen and Levinthal (1990) suggested that production experience helps develop

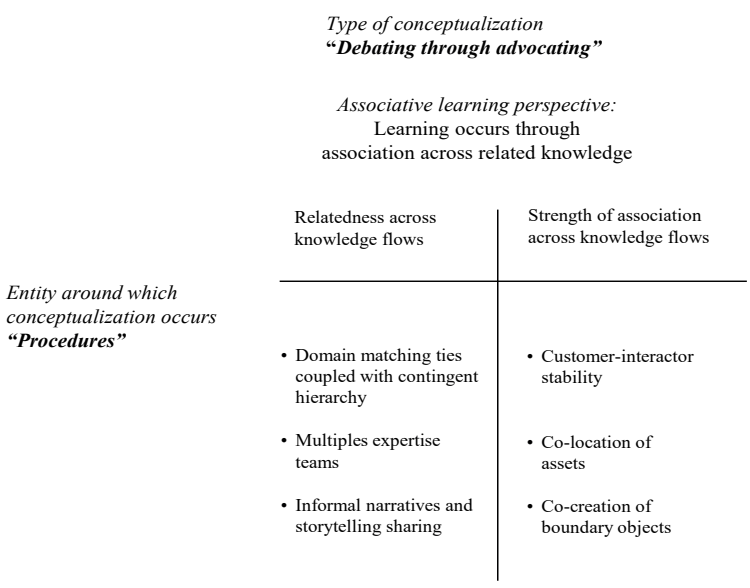
the necessary background to both recognize the value of and implement methods to reorganize manufacturing processes.

Clearly, managerial arrangements that favor the immersion of the supplier's personnel in the customer business context help acquire a more effective understanding of the customer's problems and develop a more effective response to those problems. Transfer of specific equipment-for example, machinery or components-from the customer to the suppliers' premises, or sending the suppliers' personnel to the customers' premises, as well as co-developing "boundary objects" (Colm *et al.*, 2020), such as machines, shared layouts, and trained employees, are managerial practices that could help facilitate the exchange of difficult-to-transfer knowledge and the establishment of shared meanings and, consequently, develop effective customer solutions.

5. Discussion and managerial implications

This paper provides relevant insights that could guide the managerial actions on how to develop effective customer solutions. Building on the premise that firms learn through *association across related knowledge* (Simon, 1991), this paper applies the conditions for effective learning obtained from this theoretical perspective in the context of customer solution development, fostering our understanding of the managerial practices that could lead to effective customer solutions. Figure 1 below summarizes the methodology and outcomes of this study.

Fig. 1: A conceptual contribution on effective customer solution development practices: Methodology and outcomes.



Source: our elaboration

A key best practice is guaranteeing that ties between matching domain experts from customer and supplier firms are established, and that experts are not only included in the solution provider team but are also the owners of the whole process involved in the customer solutions development. Since different customer solution projects may entail different knowledge domains, the adoption of a contingent hierarchy (Tuli *et al.*, 2007) should be guaranteed such that the superior-subordinate relationship between the different units of the solution provider organization shifts from one project to the other one to ensure that the unit with the greater expertise in a customer need is in charge with the development of the solution. Matching ties coupled with contingent hierarchy enable that the knowledge involved in the understanding of customer needs is related to the knowledge domain of the experts from the solution provider organization, which would favor an effective understanding of the customer needs. Furthermore, the experts could also be the repositories of the relevant problem-solving methods and heuristics, i.e., they could possess the relevant prior knowledge to envisage effective solutions to customers' business problems.

Since the development of customer solutions may entail a high degree of uncertainty, arranging for a diverse knowledge structure as a context where solutions come from could prove to be an effective managerial practice. Indeed, "diversity may increase the prospect that incoming information will be related to what is already known" (Cohen and Levinthal, 1990:131) favoring an effective understanding of and an effective response to customers' needs and problems. This diversity could be achieved in different ways. For instance, it can be achieved if a solution provider interviews multiple stakeholders from a customer firm or if people with a diverse knowledge background are involved in the solution team. Another way to achieve this knowledge diversity is via managerial practices that encourage knowledge-sharing processes within a firm's organization. The above-mentioned contingent-hierarchy practice could also prove beneficial for this purpose. In fact, since this practice implies that the superior-subordinate relationship between the different units shifts over time, it leads to greater power balance among them, with the consequence that the units are more likely to share information and cumulated knowledge pertaining to previously solved problems, enabling a richer understanding and more effective response to customers' needs and problems (Tuli *et al.*, 2007). Knowledge sharing can also be encouraged by favoring extensive exchanges of stories and informal narrations on previously developed solutions, giving rise to repositories of cumulated wisdom (Brown and Duguid, 1991) made up of a differentiated knowledge structure that helps use the knowledge cumulated through solving previously encountered problems in order to solve new related problems effectively.

Based on our theoretical premises, for effective learning to be obtained it is not sufficient to have a mere exposure to the relevant prior knowledge; intensity of effort is required, such that strong associations across related knowledge are guaranteed (Cohen and Levinthal, 1990). Guaranteeing the stability of the point of contact at the customer-supplier interface is one way to have this learning procedure applied in the context of customer solution development. Indeed, customer interactor stability favors the

development of strong ties between the two organizations (Tuli, Kohli, Bharadwaj, 2007), which facilitates fine-grained information transfer and joint problem-solving arrangements, (Granovetter, 1982; Krackhardt, 1982; Uzzi, 1996), consequently favoring effective customer solution development. Managerial arrangements that favor the immersion of the suppliers' personnel in the customers' business context, and that enable the customer to be more tightly exposed to the suppliers' knowledge background is another way to achieve a stronger connection between customers' and suppliers' respective knowledge flows. Transferring specific equipment-for example, machinery or components-from the customer to the supplier's premises, or sending the supplier's personnel to the customer's premises, as well as co-developing "boundary objects" (Colm *et al.*, 2020), such as machines, shared layouts, and trained employees, are organizational arrangements that could facilitate thick information transfer and more rapid feedback. These managerial arrangements enable the firms to work effectively through problems and to accelerate learning and problem corrections, favoring the development of effective customers solutions.

6. Conclusion

Building on the cognitive and behavioral sciences, this paper debates how the *associative learning perspective* (Simon, 1991) can shed light on the ability to develop customer solutions, thus providing a conceptual contribution on the best practices conducive to effective customer solutions. Effective customer solutions pass through knowledge-intensive management practices (Tuli *et al.*, 2007) that entail extensive search, novel recombination, and mutual adaptation processes, thus defining a context where a learning theoretical perspective could be fruitfully applied in search for effective solution development practices. In fact, practitioners report that the lack of *mutual understanding* is a major hurdle in the development of effective solutions (Stewart, 2018). Empirical studies show that solution development is a co-creation process (e.g., Hakanen and Jaakkola, 2012; Colm *et al.*, 2020) that demands a high degree of mutual adaptation and extensive *problem-solving* activity, challenging the involved organizations in several respects. In this way, this paper aims to contribute to our knowledge on how to develop effective customer solutions, which is a relevant area of research that scholars have not yet fully addressed (Ulaga and Kohli, 2018) and that is of value for marketing practitioners who seek inputs on best practices in this context (Ulaga and Reinartz, 2011).

By debating how the *associative learning perspective* advocated in this study could be applied in the context of customer solutions, this paper results in a conceptual contribution at the procedure level, a methodological choice that can be of value for practitioners (MacInnis, 2011). By advocating the idea that firms learn through *association across related knowledge* (Simon, 1991), this paper not only contribute to validates the best practices suggested thus far by extant studies, but also fosters the development of new best-practice suggestions. Indeed, this paper provides

a theoretical umbrella for a systematic understanding of how effective customer solutions can be developed. In this way, the paper enables to overcome the fragmented nature of the empirical results found thus far in this field of study and provides a theoretical line of inquiry that could give a unifying perspective of the managerial systems leading to effective solutions. Future research could continue along this line of inquiry and could embrace additional theoretical lenses for a more comprehensive understanding of what works and what does not work in the search for the best practices conducive to effective customer solutions.

This paper has limitations, though. A major limitation is that this study does not explicitly consider any contingent that could be at the industry, dyad, and firm level. For instance, differences in the level of uncertainty or complexity in the knowledge basis of an industry, or differences in the history of supplier-customer relationships or in the firm's familiarity with the solution approach may have an impact on the effectiveness of the suggested practices and may also involve the suggestion of different practices. Although we acknowledge these limitations, we believe in the relevance of this study to the extent that it suggests a way of conducting research that can foster conceptual contributions in the context of customer solutions where conceptual advances have been so slow thus far.

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