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Relationship portfolios and capability development: Cases from the moulds industry

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Abstract

A number of authors within business marketing and purchasing, have stressed that the heterogeneity of relationships in customer and supplier portfolios are a source of managerial problems and opportunities. This paper looks at the use and development of firms' capabilities in the context of relationship portfolios. Two case studies about producers of moulds are used to illustrate how their contrasting trajectories in terms of degree of specialisation can be related to the variety found and sought in their portfolios of relationships. Our study suggests that portfolio interdependencies are best understood in the context of the development of idiosyncratic capabilities, which include interpretations and experiences in using and influencing that variety.

Keywords: Portfolios of relationships; Industrial networks; Capabilities

1. Introduction

The strategic relevance of buyer–supplier relationships can be related to their potential for dealing with the division of labour in industrial systems and the consequent need to integrate knowledge within and across firm boundaries. Richardson (1972) argued that firms are not islands of planned co-ordination in a sea of market relations or atomistic entities operating in a faceless environment, but should be seen as interrelated in a dense network of cooperation. In Richardson's framework, inter-firm relationships emerged as an important coordination mechanism when the focus of analysis moved from products to capabilities and chains of activities within and across conventional firm boundaries. With this perspective in mind, the organisation of industry is concerned with the coordination and development of capabilities (Loasby, 1998a, b), which suggests a relational approach to firms in industrial systems.

Such a relational approach to industrial systems suggests a view of the firm as an actor embedded between two changing portfolios of relationships, a portfolio of customers and a portfolio of suppliers (e.g. Anderson and Narus, 2004; Ford et al., 1998). In these relational contexts what a supplier can do for a customer may be strongly influenced by that customer's previous actions and, likewise, what a customer can do for a supplier may be strongly influenced by that supplier's previous actions (Fredriksson and Araujo, 2003). Also, as different supply chains are combined in the business network of a firm, some authors suggest that the increasingly strategic role of purchasing, in terms of rationalisation and innovativeness, may result in the need to access, influence and reconfigure a dynamic network of suppliers and capabilities (Araujo et al., 2003; Gadde and Håkansson, 2001). Authors

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from the business marketing and purchasing fields often emphasise the need for firms to evaluate and manage their relationships with suppliers and/or customers, which may involve learning about their *producer* and *user* contexts and their capabilities and intentions. This paper addresses a relevant issue in this context, the degree of variety deemed acceptable in the portfolios of relationships of a focal firm. We suggest that this issue can be better understood by looking at the importance of the connectedness of relationships and how it relates with the development of suppliers' and customers' capabilities over time. These questions are relevant for purchasing and supply management, inasmuch as they address the evolution of the roles of specific suppliers or customers on the firm's relationships portfolios over time. For instance, it has recently been suggested that purchasing strategies should be less based on notions of portfolios, largely made of interchangeable suppliers, and more founded on the notion that what makes a supplier a good counterpart "is dependent on its network context in general and on some of its customer and supplier relationships in particular" (Dubois et al., 2004, p. 8). One can much improve one's understanding of how a focal firm fits on a given network by looking at how its suppliers themselves often seek, over time, to influence its portfolio of interdependent relationships.

The notion that relationships between firms can be connected or interdependent has also been explored within the IMP (Industrial Marketing and Purchasing) research tradition.[1] This notion is central to its view of markets as networks (Axelsson and Easton, 1992; Håkansson and Snehota, 1995; Ford et al., 1998). Firms are viewed as embedded in a network of connected relationships since each relationship exists in the context of other relationships. As each relationship is partly counterpart-specific, the heterogeneity of relationships and their specificity are seen as both a source of managerial problems and opportunities (Håkansson and Snehota, 1995).

In addition, connections among a firm's relationships cannot simply be seen as positive or negative and often signs are a matter of interpretation and debate (Anderson et al., 1994; Anderson and Narus, 2004). "Creative visions" of networks may matter for a firm's strategy (Axelsson, 1992) as interdependencies between firms have an irreducibly subjective nature. As Johanson and Mattsson (1992, p. 205) put it: "Actors have intentions, they make interpretations of conditions in the industrial system and they act".

One implication of this approach to business marketing and purchasing is the rejection of the notion of portfolios of relationships with customers and suppliers as being made up of independent dyads (Gadde and Snehota, 2000; Ritter, 2000; Dubois and Pedersen, 2002). A portfolio approach has been applied to the management of customer and supplier relationships by a number of authors over the last 20 years (e.g. Fiocca, 1982; Campbell and Cunningham, 1983; Kraljic, 1983; Bensaou, 1999; Zolkiewski and Turnbull, 2000). These models gave rise to critiques and suggestions for improvement, some aimed at the refinement of the measures used to weigh existing dimensions (Olsen and Ellram, 1997), whilst others sought to add new dimensions such as specification processes (Nellore and Söderquist, 2000) and information about the capabilities or intentions of individual suppliers (Gelderman and Van Weele, 2003). The static nature of portfolio models seems to be particularly unhelpful when new products are being developed, because these models tend to be inflexible with the timing and the extent of involvement of a variety of suppliers in a process (Wynstra and Ten Pierick, 2000).

Portfolio models, besides not considering the suppliers' side of buyer–supplier relationships (Gelderman and Van Weele, 2003), often, like Dubois and Pedersen (2002) stressed, tend to assume that 'given' products are exchanged in dyadic contexts and deal with the allocation of fixed and scarce resources to different categories of suppliers/customers (Kraljic, 1983; Olsen and Ellram, 1997). Thus, portfolio models are unable to address the role of relationships as mechanisms to improve productivity and innovativeness. They also noted that changing the focus from products and firms to relationships and networks might contribute to reveal new possibilities and problems.

This paper suggests that the issue of connectedness in a portfolio of interdependent relationships can be addressed by relating the level of variety in the firm's portfolio of relationships with the strategies the firm adopts in using and developing its capabilities. In particular, we seek to contribute to a better understanding of how a firm acts on its relationship portfolios in order to open new routes for the development of its own capabilities and thus improve its strategic position. More specifically, we focus on how variety within a portfolio of connected relationships may be related to a firm's specialisation in terms of the products it develops and produces. This is done in the next section by combining the view of firms as embedded in networks of relationships with the notion that products and activities are manifestations of underlying capabilities (Richardson, 1972; Loasby, 1998a; Dubois and Pedersen, 2002).

[1]The IMP (Industrial Marketing and Purchasing) Group was formed in 1976. It has now developed into an informal network of international researchers from European, American and Australasian Universities. Research carried out under the IMP banner is broadly based on the idea that within industrial markets, both buyers and sellers are active parties interacting within the context of continuing business relationships. Other details about the group's research and publications can be found at the group's web site at www.impgroup.org.

Sections 3 and 4 introduce the contrasting cases of two co-located firms operating in the industry of moulds for the injection of plastics. Both cases are discussed in Section 5, in order to illustrate how the variety found in their respective portfolios of relationships affected and were affected by their capabilities and their efforts to manage these. Our study supports the notion that the degree and kind of variety found in a particular portfolio of relationships should be seen as an enabling (or constraining) factor for the development of firm-specific, idiosyncratic capabilities which, in turn, include interpretations and experiences in using and influencing that same variety. In that respect, buyers' understanding of how their relationship fits in their supplier relationships portfolio may be crucial, both to keep their access to that supplier's capabilities and to influence its development, according to their perceptions of the issues at stake.

2. Portfolios of relationships and capabilities

The notions of capabilities, relationships and connectedness amongst relationships are interrelated and make sense only within a dynamic context. When the temporal dimension is considered, learning matters because actors must contend with limited and incomplete knowledge about activities, resources and relationships (Håkansson, 1987). As Dubois (1998, p. 121) put it, "…neither firms, activities nor resources can be regard as 'givens' when firms interact" (sic).

A dynamic approach has major implications for the analysis of portfolios of relationships. First, since actors' knowledge and interpretations change over time, so too can the dimensions deemed relevant to evaluate the connections between the relationships that make up the portfolio. Secondly, because each connected relationship involves actors with incomplete knowledge about each other's intentions and specific contexts, the consequences from actions aimed at changing the portfolio may lag, be uncertain or create unintended consequences. Uncertainty and ambiguity may be irreducible, both in specifying the desired outcomes and in the processes deemed adequate to reach them. This may happen not only at the level of products or production processes but also at the level of relationships in which firms are embedded. Firms need to balance the exploitation of "old certainties" and the exploration of "new possibilities". As March (1991, p. 85) put it: "The essence of exploitation is the refinement and extension of existing competences, technologies, and paradigms. Its returns are positive, proximate, and predictable. The essence of exploration is experimentation with new alternatives. Its returns are uncertain, distant, and often negative. Thus, the distance in time and space between the locus of learning and the locus for the realisation of returns is generally greater in the case of exploration than in the case of exploitation, as is the uncertainty."

The network of relationships in which each firm is embedded is a source of inertia, binding the firm to a specific trajectory since the establishment and development of relationships with other firms involves various kinds of investments, including the development of mutual knowledge about the intentions and capabilities of counterparts (Araujo and Easton, 1996; Gelderman and Van Weele, 2003). Also, some counterparts may be treated in a unique way, involving specific investments and adaptations (Ford, 1982; Anderson and Narus, 2004). In extreme cases, the relationship between two firms can be so central to one of them that its trajectory to a great extent reflects the history and the dynamics of that relationship (Håkansson and Snehota, 1995). Still, trajectories are not predetermined and a firm may use the experience gained in some relationships to attempt to change other relationships (Araujo and Easton, 1996). Hence, the extent to which knowledge, acquired in some relationships, may be re-used and redeployed in other relationships is relevant to portfolio analysis.

At a dyadic level, stability on some dimensions of the relationship may enable or create room for change in other dimensions (Mattsson, 1985). Likewise, at the portfolio level, firms need to combine homogeneity with variety. As Dubois (1994, p. 136) argues: "…if the whole operation of a firm is seen as encompassing an activity and a counterpart/relationship dimension, specialisation can also be carried out in the relationship dimension". The notion that the firm evolves in time along two interrelated dimensions, that of its activities and that of its relationships, suggests that homogeneity and variety (besides specialisation) should be dealt with on both dimensions (Johansson and Mattsson, 1992; Dubois, 1994, 1998). For example, specialisation within the relationship dimension "implies that concentration to a few counterparts, with a high degree of similarity in their requirements, which may entail possibilities to obtain a high degree of resource sharing, may enhance the firm's efficiency both in terms of cost reductions and of values that can be created for its customers" (Dubois, 1994, p. 137). This may include processes in which suppliers confront the need to adapt products to the user's context. Then, the nature of products as 'network entities' becomes increasingly visible by directing attention to the interdependencies among products and relationships (Dubois and Pedersen, 2002).

This perspective about the relevance of connectedness in terms of firms' abilities to explore similarities and connections among relationships is consistent with a view of firms and inter-firm relationships as mechanisms to coordinate closely complementary activities. The

notion of products as a manifestation of capabilities or "variable network entities" (Dubois and Pedersen, 2002), de-emphasises the firm boundary and highlights instead the interdependences among firms' capabilities, which are developed over time and are partly tacit and idiosyncratic (Richardson, 1972; Langlois and Robertson, 1995; Loasby, 1998a). As Loasby (1998a) suggests, it is expected that the involvement of the firm in new activities should be associated with a real or perceived similarity of such activities to those it already carries out, similarity being defined with relation to the evolution of the firm itself and the variety of its experience over time. Still, this does not exclude surprises, for example, the firm's involvement in new activities may result from these being wrongly perceived to require capabilities similar to those it already holds, leading to disillusionment and failure.

Firms may differ in terms of their attitudes and capabilities to deal with variety in their portfolios of relationships. Firms' previous experiences may influence their interpretations of which interdependencies among relationships are relevant at any point in time. This includes, for example, the firm's perceived ability to mobilise diverse suppliers in order to cope with heterogeneity found in their customer portfolio (Easton and Araujo, 1997). More generally, it includes the firm's experience in using relationships to access capabilities held by third parties (Dubois and Pedersen, 2002). The diversity of relationships can thus be related to the different ways in which firms seek to access and combine their own resources with the resources of their suppliers and customers. Thus an important issue concerns the ways firms seek to integrate what gets segmented in the management of complex portfolios of relationships with the long-term development of capabilities and strategic positioning.

We sought to try the explanation ability of this broad framework by applying it to the contrasting cases of two co-located firms operating in the industry of moulds for injecting plastics. This is an interesting context because moulds are made-to-order, unique and often complex artefacts. The activities involved in designing and producing moulds are often customer and order specific. At the dyadic level there is a need to coordinate production activities in terms of mould design and production and to consider these decisions in the light of connected relationships. For example, some plastic components can only be tested in real-life conditions, and therefore the design of a mould may have to anticipate the possibility that, ahead in the process, it may require significant but a priori un-specifiable re-working for corrections and/or changes, which will then absorb scarce capacity and attention and create (or increase) difficulties in fulfilling delivery dates for other orders.

3. Two cases from the moulds industry

The literature review supports the notion that the level and type of variety found in the portfolio of relationships of a focal firm can be better understood by focusing on how the connectedness of its relationships has been articulated with the development of specific capabilities. This requires a detailed description of the evolving connections over time between, on the one hand, the development of the suppliers' activities and capabilities and, on the other hand, the variety found on the demands from its customers. Thus this section will look first at some aspects of the production of moulds deemed relevant for understanding some of the interdependences between a firm's activities and its portfolio of relationships. We will explore, as an illustrative example, the impact of corrections to moulds and design changes on the relation between the portfolio of relationships and the development of firms' capabilities. Corrections to an existing mould and changes in its basic design are manifestations of uncertainty or insufficient knowledge because they result from the unpredictable interactions between the characteristics of the plastic components including their usage contexts, and the processes and capabilities needed to design and manufacture the moulds to inject those components. Therefore, both suppliers and customers are likely to appreciate efforts aimed at reducing the sources of uncertainty that are likely to lead to corrections and changes, and those efforts often include actions directed at "managing" the composition of their portfolios of relationships.

The focal firms studied, *SOMOLTEC* (SOM) and *FAMOLDE* (FAM), and the analysis of their cases, can be seen as a structured focused comparison (George and Bennett, 2004), since this comparison is based on the perceived theoretical relevance of the evolution of their capabilities and their empirical context, during a given period. The contrast between the two cases allows us to illustrate the dynamics in the evolution of firms' capabilities by focusing on the development of their portfolios of relationships with customers and suppliers. The same selective theoretical focus guided the analysis for both cases. Data about the two focal firms and the industry were collected from various sources, including published documents, participation in industry conferences and events as well as informal meetings. The Managing Directors and the key staff of both firms, SOM and FAM, were interviewed between 1996 and 1998 as part of a broader study of the industry. Four interviews were held at SOM and two at FAM, lasting several hours each. Given our interest in the dynamics of relationships with other firms, we adopted a longitudinal, partly real-time and partly retrospective stance. This approach was particularly useful for the follow up of some events that were taking place during that

period. The interviews were semi-structured and followed a generic outline, an approach that is considered particularly useful when "… highly sensitive and subtle matters need to be covered, and where long and detailed responses are required to understand the matters the respondent is reporting on" (Ackroyd and Hughes, 1992, p. 104). The interviews were taped and subsequently transcribed *verbatim*.

3.1. The mould as a unique, customer-specific product

Moulds for the injection of plastics (henceforth referred to as moulds), are made to order for specific customers. Each mould is generally unique, or rather a unique combination of standard components like injectors, heating and cooling systems, and non-standard components like moulding surfaces. The production of moulds involves complex interdependencies among several sequential activities for their design and manufacture. Given its uniqueness, the design and building of a mould is often considered as a challenge. In this context, the relationship between a supplier and a customer may depend critically on the customers' assessments of the supplier's capability not only to design and produce certain kinds of moulds but also to control costs and fulfil delivery deadlines. As one of our interviewees put it:

> Problems can always arise when building a mould and an activity, which is expected to take 20 h, may take up to 40 h. Timely control of the evolution of all steps in production is fundamental to ensure credibility [with the customer], to fulfil the delivery schedule and, in the end to justify the trust the customer placed on us when he decided to buy from us.

Moulds vary widely in aspects such as dimensions, tolerances, components interchange ability, production cycle, etc. Likewise, the final components obtained from the injection of plastics into moulds also vary in terms of quantities to produce (from some hundreds to millions of units), usage context (including light and heat exposure, thermal variations, physical and chemical resistance required), functional and technical characteristics. These plastic components can be combined with other components to make up more complex systems. Some of the characteristics of the components to be moulded are taken as given, but others are the subject of complex discussions and negotiations. To the heterogeneity of moulds, one may add an extra layer of complexity in the shape of the capabilities required to anticipate problems and explore alternative solutions for mould design and production as well as consider adjustments in the specifications of the moulds and resulting components.

3.2. Processes for the design and manufacture of moulds

In general, the production process is triggered by a customer enquiry, requesting a quote for a mould, specifying the characteristics and final material composition of the components that the mould will be expected to produce, the type of steels to be used, the characteristics of the injection equipment to which the mould will be coupled and to and the desired delivery date. The supplier will reply to that request with a technical solution in terms of a sketch, a delivery time and a price. In some situations these aspects are discussed extensively by representatives of both parties, in the search for alternative technical solutions, and the duration and depth of these discussions may have a significant impact on subsequent interactions. These interactions often involve direct contact between technical staff from both firms and exchanges of technical information and experiences.

In the project phase, technical processes and machining options are looked at and considered in the light of several factors (e.g. the characteristics of the steels, the functions of components). Those options affect the sequence and nature of the activities that follow (e.g. thermal treatments, polishing and finishing of moulding surfaces). After the assembly of the mould, which allows a first integrated evaluation of the quality of the preceding activities, the mould is coupled to the injection equipment and tested, either in the premises of the producer or elsewhere. Testing allows the fine-tuning of the mould and the injection equipment operational parameters, the collection of data about the behaviour of plastics during injection, and so on.

3.3. Corrections and changes

The results of mould testing are often inconclusive. Existing knowledge may be insufficient to anticipate the behaviour of the mould and the plastics injected into it. Despite the recent development of simulation software, it is still difficult to predict exactly how injected molten plastic will behave against the mould internal surfaces, flow inside moulding cavities, contract on cooling, etc. Hence, tests may be the point of departure for a redesign of the mould and further machining. If a mould is unable to produce the plastic components with the desired specifications or at the rate required by the customer, this starts a process of search by trial and error. The parlance of the industry distinguishes corrections from changes, both involving additional operations on the moulds—see Fig. 1. Non-conformity with the specifications set by the customer will result in additional operations for corrections. Whenever corrections are needed, the additional costs will be borne by the producer, the delivery date may be extended and the customer may postpone the payment. Thus an adequate

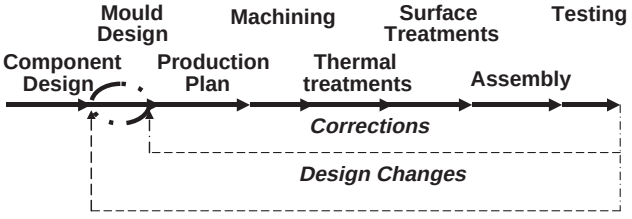

Fig. 1. Manufacturers' corrections vs. clients changes.

evaluation of existing capabilities is critical. Of course, capabilities developed in previous projects showing similarities with the current one may help to reduce the chance of unexpected results, i.e. the need for corrections. In extreme cases, a deficient evaluation of existing capabilities, relative to the specifications of a desired component, may lead to the late conclusion that the component simply cannot be obtained by moulding.

Otherwise, the results of the tests may induce the customer to make changes in the components desired. In short, there is some uncertainty on the part of the customer regarding the aesthetic or functionality characteristics that the components should have or how they should operate. This can happen immediately after the customer receives the test components produced by the mould, or after the test components are tried for a period of time under real operating conditions. When changes are requested, the additional costs from redesigning and reprocessing the moulds are charged to the customer.

Corrections and changes can significantly affect the production schedules, in some cases involving several firms, directly or indirectly connected. For example, they can increase or create additional difficulties in fulfilling the delivery dates for moulds ordered by other customers. It should then be expected that both producers and customers appreciate efforts aimed at reducing the sources of uncertainty that lead to corrections and changes. Corrections and changes are but one of the motives for the co-ordination of closely complementary activities (Richardson, 1972). An order from a customer can include several moulds, which may be technically interdependent if the resulting plastic components are also interdependent. Besides, all or nearly all production activities may involve various manufacturers, either due to customer demands or to the initiative of the producer itself, when confronted with the need to fulfil strict deadlines and/or access specific capabilities like the polishing of mould surfaces. Thus an order can involve various firms, beside the producer and the final customer, for example, other producers, engineering or machining firms, trading firms or even the local technological centre. Thus the consequences of corrections and changes can propagate to other connected relationships beyond the dyad.

4. The Famolde (FAM) and Somoltec (SOM) cases

FAM and SOM were created as moulds manufacturers in 1982 and 1979, respectively, in the district of Marinha Grande (henceforth referred to as MG) in Portugal. Both firms, like most others in the locality, started out designing and producing a diverse set of moulds for a variety of final customers largely mediated by engineering or marketing firms. In 1997, FAM and SOM, employed 60–70 workers each, both had nearly the same volume of sales (about €3 million in 1997 and about €3.5 million in 2001), and both exported more than 90% of their production.

Still, FAM and SOM differ in several aspects, most obviously in their degree of specialisation in terms of product. FAM can be seen as one of a small group of specialised manufacturers with capabilities for the design and production of very small sized technical moulds. In contrast, SOM, like most local firms, is seen as a generalist firm, able to produce a wide range of moulds, mostly of average size but diverse in terms of technical complexity.[2] As it might be expected, both firms show important differences in terms of their tangible resources, the most visible being the size and precision capability of their equipment.

Finally, both firms differ substantially regarding the number of customers in their respective portfolios, six for FAM and about 30 for SOM, and their level of subcontracting to other local firms, both mould manufacturers and specialists in specific stages of the production process. However, a clearer view of both firms' trajectories and the differences between them can be obtained if we take into account the evolution of their portfolios of relationships and the interdependencies between that evolution and their capabilities.

4.1. FAM: Evolving specialisation with focused customer portfolio

FAM's trajectory and in particular its specialisation in the production of high technology small sized moulds evolved in intimate association with a small number of relationships. In 1997 FAM had only six customers with whom it established relationships in its early years. The firm started its activity working with a few customers and some engineering and marketing firms. However, one of its initial (and still current) customers had from the start very specific product requirements, namely components intended for cosmetics cases. The design and manufacture of the moulds for these cases were subject to very restrictive demands, especially regarding

[2]Technical complexity is generally seen in the industry to depend on the number and types of components in the mould, articulations among components and their interchangeability, dimensional tolerances and geometrical shapes.

the finishing of surfaces and strict tolerances for the articulation of very small components. The capabilities that FAM developed in the design and production of those moulds were critical for gaining a first trial order from a German firm (DL) in 1987, when one of its managers was visiting mould producers in MG. DL needed moulds to produce minute components for the electronics industry, much smaller than those FAM was used to. The customer demanded, among other things, interchangeability of parts within very strict tolerances. The relationship with DL developed over time, reflecting a high degree of mutuality. FAM became DL's only mould supplier and pledged not to sell moulds to any of DL's competitors. One of the most notable aspects of this mutual commitment concerned the acquisition of equipment in an early phase of the relationship. As the Managing Director (MD) of FAM put it:

> We had made those [first] moulds with great difficulty because we did not have exactly the right equipment. But we had to make a choice… so [we acquired] Swiss machinery, small and very accurate, a bit like watchmakers' equipment, to do things with great precision, and we grew used to it… the components [required by the customers] were always changing and we kept following those changes.

One of the consequences of the developments in this relationship was that some of FAM's existing clients, especially engineering and marketing firms, became less attractive:

> We no longer had the methods or means to do the work they asked. Also, they did not look for these [precision moulds] markets because there was no tradition for these in Portugal. Later they came up with [orders for] this kind of components but we no longer had [spare] capacity to respond, because I had a customer [DL] who kept us busy (MD of FAM)

FAM's growth was associated with DL's growth. DL has set up new factories and it currently has facilities in Germany, Switzerland, India and China, in order to supply electronic modules to firms like Siemens, Philips and Gründig.

There are such tight links between the activities of these two firms that any quality or delivery date problem, concerning either moulds or components, can have significant consequences on the relationships between DL and its own customers. Despite the high cost of moulds, FAM normally designs and manufactures three identical moulds for each order, two of which will operate inserted in two lines of production and assembly, while the third mould is kept as a spare lest problems arise. The relevance of these interdependencies is also patent on FAM's high availability to do all the necessary changes to deal with unexpected requirements from its customer. Sometimes it is necessary to deliver new components at very short notice to DL's customers or to some industry exhibition. In these cases, before it produces the triplicate moulds, FAM designs and manufactures prototype moulds in order to produce itself a number of components, on injection equipment it acquired on DL's advice.

Besides DL, who fills up 60% of its installed capacity, FAM has lasting relationships with five other customers, perceived as sharing several of DL's characteristics. The relevance of these relationships for FAM also shows up on its careful assessment of potential customers. It seeks to keep the degree of diversity in its portfolio of relationships at a level considered adequate for the maintenance and development of its current relationships and the capabilities required to service them. In addition to being receptive only to orders at least as sophisticated and demanding as those that it already executes for its current customers, FAM also seeks to minimise the disruption to its existing practices and routines. Equally important is its perceived need to keep its customer portfolio small and homogeneous.

When considering the possibility of new relationships, it gives particular importance to informality in the contacts and the processes for the design and development of components. FAM is unwilling to provide formal guarantees, to sign very elaborate contracts or to engage in intricate price negotiations. Another important aspect is the requirement that potential customers be able to provide clear specifications for the components they need. Processes of successive changes are regarded as disturbances to tight manufacturing schedules, with potentially negative impacts on the relationships with current customers. Its unwillingness to cater for unexpected changes was illustrated by the failure to develop a relationship with an automotive customer. The MD of FAM explained:

> The moulds [for this customer] are made fast. But then they start to ask for this and that. Small changes keep on coming and they keep us busy… [Relationships with these firms] are distractions. I am not interested [in them]. You see, for these moulds I went four times to Barcelona and had to send a technician there twice.

Most demands from FAM's six major customers are catered for internally. FAM very seldom resorts to subcontracting, and mostly just for a first hewing of the steels or to fulfil tight delivery schedules. In this event, it gives preference to firms created by former FAM workers perceived to have capabilities similar to those of FAM itself, critical for the high levels of precision required.

4.2. SOM: Seeking to manage variety in the customer portfolio

SOM is a full-cycle manufacturer, such as FAM. Except for Hasbro, one of the largest toy manufacturers in the world, its other three initial customers were engineering and marketing firms located in MG, who performed the role of intermediaries on behalf of final customers. Up to 1985 a great deal of its moulds were supplied to American clients but, since then, an increasingly larger number of its customers are located in Europe, which has had important consequences for SOM's practices. Currently, SOM produces a wide range of moulds for some 30 clients, most of them from a variety of industries in the European Union. The MD of SOM explained:

> The proximity of the European customer brings with it the habit and obligation to work as if the customer is always here. The American customer, despite being demanding in relation to delivery times, accepted longer terms. We began working with very short terms, the [European] customer started showing up with many more demands than the American customers used to. American customers bought mainly moulds for toys. They were [technically] less demanding.

In the meantime two of the initial three local engineering and marketing intermediaries became less attractive, due to the types of moulds they ordered and their excessive concern with price. Still, SOM's trajectory since 1985 can be characterised by its struggle to handle, and more recently to lessen, the excessive diversity found in its customer portfolio. In fact its customers differ from each other in several aspects with important consequences for their demands on SOM: delivery times, mould sizes and complexity, processes for the design and development of the plastic components, willingness to involve SOM technicians in those processes, price sensitivity, and regularity in order sizes. Corrections are frequently needed, with disruptive consequences on production schedules and delivery times. This is blamed on the excessive variety in the orders accepted in terms of the technical specifications of the moulds.

> If a technician, who is trained to do smaller moulds requiring more precision, has to alternate with larger moulds of less precision, he ends up losing his sensitivity for precision. [MD of SOM]

SOM managers feel they are doing corrections too often. Moreover, the iterative processes of design and development of components adopted by some other customers, in particular from the automotive industry, require willingness on SOM's part to deal with frequent changes both to components and moulds as a pre-requisite for maintaining those relationships.

The industry faced a period of a low demand when price sensitive customers often switched suppliers, in particular in the 1990–1995 period, and SOM's managers took this opportunity to attempt to decrease diversity in their customer portfolio. They sought to reduce product heterogeneity and especially to lessen the variety of sizes, tolerances and technical complexity in the moulds produced. The reductions sought in the rate of recurrence and scope of corrections and changes were seen to depend on the portfolio composition and the firm's capabilities. SOM's managers sought to deepen the relationships with some customers and exit other relationships whilst, at the same time, increasing the firm's capabilities in the design and manufacture of a narrower range of moulds. However, pursuing this strategy did not prove easy. The time and resources invested on experiments with new customers proved fruitless:

> … During all this process we will see what does work and what doesn't… We have to see how the customer talks with us, what we can expect in technical terms about the way he can contribute to the development of the mould, whether he answers our questions, whether he understands the process, whether there are chances for more work or it is just a couple of orders we won because of price (…) we give a suggestion and [some customers], for lack of knowledge—it does not mean we are always right—do not take it on board. But then, we will have to introduce changes to the mould and go back to square one. We find out that they are not competent enough to hold technical discussions and that does not give us any guarantee of continuity […] and we will still take the blame for delaying their mould!" [MD of SOM]

Also, the volume and rate of orders can fluctuate considerably, either because the relationships are not sufficiently developed or because some customers change significantly their investments in moulds: a customer may order 40 moulds in any one year, and only five in the following year or even suspend orders for a period of time. This situation forced SOM to maintain relationships with customers whose orders run counter to its intentions of restricting diversity in the order book:

> Sometimes we recognise that a particular order is not ideal for us but possibly there are no others waiting, so we have to chase it. [MD of SOM]

In any case, the firm has sought to develop its relationships with customers with a perceived potential to order moulds on a regular basis. These efforts included trying to persuade customers to accept a more active involvement of SOM's technicians in the design of the components to be moulded, in an attempt to reduce requests for changes to the moulds.

SOM also sought reductions in mould corrections, beyond those expected to follow from a decrease in the heterogeneity of orders. In 1996 it started a project with a technological centre to exchange and create knowledge about the behaviour of plastics and steels during injection. A better understanding of the behaviour of injected materials would justify a greater involvement of SOM's technicians with customers, in setting the specifications for plastic components. Thus, it was hoped that SOM's technicians would be able to anticipate problems and lessen the need for corrections later. Similar benefits were also expected to accrue from a better knowledge of steels. Some of the expected benefits would result from changes in internal practices, such as over-engineering of components to allow for later corrections, or over-specification of quality to reduce the chances of moulds failure in the testing and operation phases.

SOM's efforts resulted in a growing concentration in a portfolio of 15 customers who operate mostly in the automotive and appliances industries. Nevertheless, requests can be very diverse even from customers in the same industry. In some cases, component projects arrive fully specified. In other cases, SOM participates in the design process, for example, by building three-dimensional models of components. Making prototypes reduces but does not eliminate the need for changes. Often the moulds are used to produce components for the client for relatively long periods (while kept at SOM's facilities), until the specifications of the components they are meant to produce are finalised. Meanwhile, SOM will work as a components producer for the customers concerned. Changes may also disrupt the patterns of interaction amongst components, but this is regarded as part and parcel of co-design with certain types of customers.

SOM has been using some long-standing subcontracting relationships with a small number of other manufacturers, as a means to cope with heterogeneity. These supplier relationships have been important in dealing with the consequences of diversity in its customer portfolio, especially in accommodating changes and corrections. Some 15–20% of SOM's volume of trade is subcontracted to third parties, mostly involving manufacturing activities such as polishing or milling, and even the fabrication of whole moulds. The subcontracted suppliers are perceived to have capabilities similar to SOM's own ("at our technical level") and all similar to each other. This facilitated exchanges and the sharing of experience in mould design.

5. Analysis of the cases

So far we have suggested that firms might differ in the degree of variety deemed acceptable within a portfolio of relationships and that the relevance of the interdependences found among the relationships of a focal firm might be analysed with relation to its evolving capabilities and intentions. Both cases support the notion that the trajectory of each firm can only be understood by considering the dynamics of its portfolio of customer relationships. The cases also illustrate how the trajectory of each firm is intimately associated with the ways it articulates diversity at the level of the customer portfolio with the development of specific capabilities over a relatively long period of time.

In the case of FAM, its specialisation at the product level reflects a learning process, which occurred in the context of a single, high priority relationship. To some extent, the development of this relationship resulted in the setting of a stable framework that helped the firm define the diversity that it was prepared to accept in terms of orders and customers, and to link that diversity to the process of developing specific capabilities. The relationship with its key customer resulted in an increased commitment, leading to progressive and mutually specific adaptations. Moreover, the relationship itself became a benchmark for assessing other existing or potential relationships, given the firm's desire to develop capabilities in very specific areas.

The diversity in the customer portfolio that FAM deemed acceptable (shown in its efforts to preserve its ability to re-use the knowledge acquired in some relationships, in other specific relationships) can be analysed along two interrelated dimensions: (1) the nature of its product specifications (and production related activities) and (2) the nature of its relationship practices. The first one points towards a relative homogeneity in terms of sizes and tolerances, allowing a specialisation in terms of product categories. This strategy seems to contribute to the consolidation of its internal routines and capabilities, which can be assessed through the reduction in corrections needed. The second dimension, besides aspects such as regularity and size of orders, includes the ability of customers to specify the components they need to mould. This specification ability is aimed at preventing customer interactions from being dominated by changes to components, and can be monitored through the frequency and magnitude of those changes when they are required. In this respect, and in contrast to SOM, FAM does not avail itself to deal with the consequences of inadequate customer specifications for the desired final components. The benefits for FAM and its customers that result from its specialisation at product level are thus intimately associated with its deliberate efforts to control the composition of its portfolio of relationships. Thus, potential customers and their purchasing practices are subject to a careful, albeit fallible, assessment of their likely impact on existing relationships and the capabilities required to service them. For example, an

automotive customer has been discarded after a short experience confirmed the supplier's early perception that the benefits from this relationship would not pay the costs from the disruption that it was likely to bring to routines and capabilities deemed critical for other relationships.

The FAM case illustrates well how specialisation at the product level can be articulated with specialisation at the relationship level. At this level some specific connections were perceived to be useful and to contribute to the development of a particular framework or 'network vision'. It should be stressed that this process was accompanied by the development, over a period of time, of a benchmark for the evaluation of the customer portfolio and the desirable characteristics of new customers. The relationships currently in the portfolio seem to have generated the required stability in certain dimensions to allow for variations in other dimensions, e.g. they allowed the firm to deepen its capabilities in specific areas while benefiting from the similarity of the requirements from its customers. In this respect, the SOM case stands in stark contrast to the FAM case, despite SOM's deliberate efforts to develop its capabilities by promoting changes in its portfolio of relationships. The capabilities that initially made possible SOM's willingness to perform corrections and changes did not help the firm acquire a satisfactory stream of orders. The realisation of this fact led the firm to re-assess the relationship between variety in its customer portfolio and the level of its own capabilities. The firm became aware of the need for a reduction of variety in its customer portfolio, but the dimensions of variety thought relevant changed over time. The simultaneous pursuit of fewer corrections and fewer changes required the development of specific capabilities as well as changes in the composition of the customer portfolio. SOM tried to limit the need for corrections by seeking to reduce the heterogeneity of specifications, seen as a source of disturbance for its routines and manufacturing practices. This process occurred in parallel with efforts to seek greater participation in the design of the components and, provided customers could be persuaded, it was expected that the need for changes in the moulds would decline. This development was supported by the shifting of the interaction between SOM and its customers upstream to the earlier design phases, and the development by SOM of capabilities to produce three-dimensional prototypes. In other words, interdependencies between activities and firms are no longer seen as 'given', but rather as negotiable and dynamic in the process of exploring new possibilities (Dubois, 1998; Dubois and Pedersen, 2002).

Thus co-design for SOM will be an essential development to promote and deepen relationships with specific customers. This case contains two other related and interesting aspects. One aspect has to do with SOM's relationship with the local technological centre. The requirements for the development of the relationships with some of its customers seem to have contributed to reinforce the need to develop knowledge about plastics and other materials. It must be noted that this knowledge will not by itself, eliminate the need for changes or corrections, but will hopefully generate more stability in other dimensions of relationships, namely regularity and volume of orders.

The other aspect concerns the possibility of redeploying resources that have been created over time through subcontracting relationships with local firms. In a sense, customer and supplier portfolios were combined in novel ways, reflecting SOM's experiences and perceptions of new possibilities for development. SOM's relationships with specific suppliers are now seen as supportive of the developments intended for its customer portfolio. Some plastic components produced for some of SOM's customers can only be tested in real operating conditions. This means that it may always be necessary to make changes in the moulds where they are injected. Some of this work can be subcontracted to local firms. Besides, the volume of orders can occasionally exceed SOM's capacity. In this context the ripple effects on relationships with other customers can be avoided by accessing the capabilities of the subcontractors on its supplier portfolio.

Finally, because buyer–supplier relationships are two-sided and may be connected in specific ways with other relationships, the choice of supplying firms can seldom be reduced to mere combining and recombining of interchangeable suppliers. Our cases illustrate how the improvement of the capabilities that underlie the design and production of moulds depends critically from some of their relationships with other client and suppliers (Dubois et al., 2004). The suppliers intentions and efforts to influence their own portfolios of relationships were variedly accommodated by the clients (Gelderman and Van Weele, 2003), namely in their availability to adapt purchasing practices and frameworks. The contrast between both cases is rather illuminating in this respect, especially concerning the interdependencies between those activities related to the participation of the suppliers' in the specification of the final plastic parts. FAM demands from its costumers a clear and stable set of technical specifications, and so it reduces the need for further interactions. In contrast, SOM seeks from some of its customers a greater willingness to accept its own participation, as supplier of the mould, in the initial design of the parts that the mould will produce. Therefore, the clients of either firm confronted diverse perspectives about how to combine the capabilities of supplier and purchaser (Araujo et al., 1999). Those clients which showed willingness to introduce changes in their operating practices (in line with their supplier's intentions), could assure their own access and

also supported the development of the supplier's capabilities.

6. Conclusions

There is an increasing recognition of the strategic potential of relationships with suppliers and customers. In the business purchasing and marketing fields, the need to evaluate and manage firms' relationships with suppliers and/or customers has been often emphasised. Thus, firms in both their roles as buyers and suppliers need to cope with the complexity of managing their relationships with active and often diverse counterparts. Portfolio models have delivered useful tools to simplify and deal with these complex empirical contexts but not without shortcomings. Thus many of the contributions and critiques to portfolio models proposed refinements and extensions to the existing models, namely new variables and analytical categories (Nellore and Söderquist, 2000; Gelderman and Van Weele, 2003). The contribution of this paper lies at a different level. We sought to relate the development of capabilities to deliberate efforts to affect the composition of portfolios of relationships. We also suggested that, in face of connectedness or interdependence amongst relationships, efforts directed at changing one relationship can affect other relationships in the portfolio as well as being affected by them. The relevance of these processes was explored by seeking to relate the diversity in firms' customer portfolios to their specialisation at the product level. The cases presented here illustrate how differences on the degree of specialisation at the product level, which reflect both learning and the use of firm-specific capabilities, can be seen to result from their different strategies to influence the diversity of their customer (and supplier) portfolios over a period of time.

The context in which firms operate may involve complex interdependencies among relationships. However, connectedness amongst relationships is neither given nor transparent and can only become evident over time. Often, it may be difficult for a supplier or a customer to comprehend and anticipate the nature and scope of those interdependencies. Firms may also differ in their network 'visions' and the buying firm and its suppliers may frame the network differently (Holmen et al., 2003). In this context there can be no simple prescriptions for the "optimisation" of a portfolio of relationships, but this does not signify that they should not be used. In a recent study on how purchasing portfolio models are currently used Gelderman and Van Weele (2003, p. 215) suggest that "…there is no simple, standardised blue print for the application of the portfolio analysis. It requires critical thinking and sophistication of purchasing management".

Portfolio models can certainly be useful as frameworks to make sense of and simplify complex contexts. But like all frameworks they are fallible representations based partly on conjectures. Recognizing this inherent limitation may create conditions to explore new possibilities of conceptualising and acting on portfolios of relationships. Despite focusing on only two small companies, the contrasting nature of the cases has allowed us to draw insights that we believe to be relevant and useful in other contexts. By focusing on the development of capabilities through deliberate efforts aimed at influencing the composition of a portfolio, one of the implications of our study is the need for an integrated view on what has been divided through the application of portfolio models. Put differently, a portfolio model is likely to encourage the segmentation and allocation of customers and suppliers to different cells in a matrix with a view to allocate resources differentially to each cell. What is lost in this process is an integrated perspective on the long-term development of capabilities through business relationships and strategic positioning of the focal firm.

An emphasis on the allocation of static resources amongst different categories of customers or suppliers leads to a focus on the "exploitation of old certainties" and constrains the "exploration of new possibilities" (March, 1991). Three implications emerge from this discussion. First, critical thinking may be necessary for evaluating the extent to which products, interdependencies amongst activities, and firms can be seen as "given" or as subjects for manipulation and change. Our empirical cases support the notion that as firms' capabilities develop and become better understood, what was often seen as fixed becomes dynamic and variable. Secondly, some combination of variety and standardisation seems to be relevant for balancing exploitation and exploration (March, 1991) both at dyadic and portfolio levels. This consideration suggests the need for balancing the use and development of idiosyncratic firm capabilities with access to a network of complementary capabilities. As far as the development of idiosyncratic firm capabilities is concerned, history matters and relationships with specific customers or suppliers may acquire strategic relevance for their role in integrating and supporting the development of capabilities over time. Neglecting the temporal dimension and the role of perceptions in assessing relationship connectedness may lead to inadequate evaluations of their possibilities and constraints. Thus, instead of given portfolios of interchangeable suppliers, the development capabilities deemed important for being a good supplier for a particular customer may be contingent on some of its other customer and supplier relationships. For any given client, this amounts to a joint evaluation with its supplier of how the relationship between both fits with the supplier's other relationships, namely in terms of the level of diversity, or variety, seen as adequate at this level.

Finally, what constitutes appropriate variety at the portfolio level is dependent on how firms evaluate their capabilities in relation to dealing with existing customers (suppliers) and assess new possibilities. In the two contrasting cases presented in this paper, experiences with automotive customers were regarded as very positive in one case and an experience not to be repeated in the other. These experiences were framed through rather different lenses, consistent with contrasting views on what constituted appropriate variety vis-à-vis the customer portfolio and the firm's capabilities. The relevance of this perspective is increased if we accept that buyer–supplier relationships are two-sided and may be connected in specific ways with other relationships. In this context, our cases illustrated that a customer's availability to adapt its purchasing practices and frameworks in line with the suppliers intentions and frames can be critical to maintain not only the customer's access to 'given' capabilities but also to support the development of specific capabilities. Further, because suppliers views about the appropriate variety in their portfolios may differ, customers should consider (and not necessarily passively) how each supplier evaluates its portfolio of relationships, including its experience and availability to deal with the, sometimes complex, interdependencies between activities and capabilities within and across firms' boundaries. Also, each supplier's network is partly specific and it may be well worth the while to develop a good understanding of the network in which the supplier is embedded, in order to explore new possibilities for benefits from cost reductions and value creation.

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