

**Strategic Organization in Mature Industries:  
Boundary Architecture as a Source of competitive  
Advantage**

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# *Strategic organization in mature industries: Boundary architecture as a source of competitive advantage*

## **ABSTRACT**

This paper explores the concept of boundary architecture as a combination of firm-level decisions about the scope, permeability, and modularity of a firm's activities. We develop a new analytical tool to track boundary changes over time and use it to study how boundary architecture impacts the long-term performance of firms operating in a mature and competitive industry. The findings suggest that an architecture of boundaries that involves extending the scope of activities, increasing their permeability to markets, and improving the modularity of internal units leads to high performance. We discuss the advantages and limitations of these three characteristics of boundaries and their implication for the strategic organization of firms.

**Key-Words:** organizational boundaries, boundary architecture, footwear industry, firm scope

## INTRODUCTION

The firm-level design of organizational boundaries is a topic of renewed attention in the strategy and organizations literature (Meyer and Lu 2004; Scott 2004; Santos and Eisenhardt 2005; Jacobides and Billinger 2006). This stream of work explores the architecture of organizational boundaries and its impact on the overall performance of firms. It aims to address the knowledge gap created by the dominant focus of empirical research on boundaries on the transaction as the unit of analysis (Williamson 1975; Williamson 1991). In fact, while the “make or buy” literature has given us considerable understanding about the drivers of individual boundary decisions (Argyres 1996; Poppo and Zenger 1998; Nickerson and Silverman 2003; Jacobides and Hitt 2005), its micro-analytical focus has obscured the firm-level effects of organizational boundaries on issues like innovation and competitive advantage. As Jacobides and Billinger (2006: p.2) argue: “Surprisingly though, little, if any research has looked at how the overall boundaries of *a given firm* are set, how they evolve, and how they affect that firm’s prospects”. This paper addresses this gap by exploring how the architecture of organizational boundaries can become a source of competitive advantage.

This topic is important since a micro-analytical focus on the discrete boundary choices of *make versus buy* (Williamson 1991) or even *make versus buy versus ally* (White 2000) has difficulties in explaining firm-level evolution. For example, although empirical research has confirmed that asset specificity is associated with internalization (Shelanski and Klein 1995), there are arguments that asset specificity may be a result of internalization and not its cause (Kogut and Zander 1996). In addition, although there are arguments that firm level capabilities drive the choices of activities and markets, thus driving firm boundaries (Argyres 1996; Argyres 1996a), these capabilities may originate from prior boundary decisions thus suggesting a co-evolutionary process that has not been explored in prior work (Poppo and

Zenger 1998; Santos and Eisenhardt 2005). These controversies cannot be resolved with the traditional focus on discrete transactions at a single point in time. Finally, although managers are supposed to align governance choices with transaction characteristics to minimize transaction costs (Williamson 1991), there is suggestive evidence that managers often decide to both make and buy for the same transactions (Harrigan 1985; He and Nickerson 2006; Jacobides and Billinger 2006), which seems inconsistent with current theories.

A more holistic and longitudinal study of boundaries may be needed to shed light on these issues. Indeed, recent work has started to explore the architecture of boundaries at a firm level. This work has focused on both nascent markets and mature markets. Santos and Eisenhardt (2006) studied how entrepreneurs addressing nascent markets manage the boundaries of their ventures over time and found that a logic of power drives boundary formation. The goal of entrepreneurs is to define, bound and defend a distinct and viable new market. In this process entrepreneurs effectively construct a new market that overlaps with their venture boundaries. Boundary management, enacted through co-optation alliances with established firms in adjacent areas is a central strategic process in nascent markets. In a related paper, Santos (2006) studied the co-evolution of boundaries and capabilities and found that initial power-driven boundary choices drive the development of organizational capabilities which, in turn, shape the structure of transactions in the nascent market: stronger capabilities lead to a re-definition of the structure of transactions with the goal of releasing bottlenecks for growth. This may lead to the unexpected outcome of increasing the use of outsourcing in areas of strong capability. This work suggests that transactions are not technologically determined but rather a result of capability development and bottlenecks to growth, a theme which is also echoed by others (Jacobides 2005). This implies that in order to understand the evolution and performance implications of boundaries we may need to look

beyond the transaction as the unit of analysis in order to avoid “losing sight of the forest for the trees” (Jacobides and Hitt 2005).

A recent paper by Jacobides and Billinger (2006) also looked beyond the transaction and studied the firm-level boundary architecture in mature markets. The authors developed an in-depth study of the boundary transformation at a large, established European firm in the garment industry. Their findings suggest that shaping boundaries involves more than defining the *scope* of the firm. It also involves choosing the *permeability* of boundaries to markets at different stages in the value system. While other authors have highlighted the importance of the concept of permeability to the study of boundaries, they defined permeability in terms of flexibility of employment arrangements and inter-firm collaboration (Scott 2004), or in terms of the ambiguity in ownership (Meyer and Lu 2004). Jacobides and Billinger (2006) focus on permeability as defined in terms of market interfaces in the input and output side: managers may decide to both *make and buy inputs*. In addition they may decide to both *sell to markets and transfer internally the outputs* of different activity steps in the value chain. Their analysis suggests that a boundary architecture that includes a *broad scope* and *highly permeable* boundaries may be important for the ability of firms in mature industries to survive an intensifying competition. While this concept of boundary architecture is novel and intriguing, their study was based on a single case study and the performance implications of the new boundary architecture were suggested but not tested.

In order to address these gaps and explore how the firm-level design of firm boundaries affects firm-level outcomes we ask: *How does the architecture of boundaries impacts the ability of firms to compete in mature, competitive industries?* To address this research question we track the evolution of organizational boundaries of three medium-sized Portuguese footwear firms over a 15 years period. The footwear industry is a good example

of a mature industry with increasing competition. The basis of competitive advantage in this industry has been shifting away from developed economies, such as the US and Southern European countries, towards emerging economies, such as China, India and Eastern European countries (especially Romania and Poland). These countries have joined the world economy in the last decade of the 20th century and have benefited from an abundance of low cost labor, improving infrastructure and better access to world markets. For example, in 2003, the Asian countries' share of the world footwear exports was 80%. China's share was 60% (SATRA, 2005). How can established firms in developed countries compete in such an environment when their source of competitive advantage is being slowly but inexorably eroded? While some attention has been devoted to this topic by researchers using an industry-level of analysis (Schmitz and Knorrninga 2000; Rabellotti 1995), little work has explored the issue of how firm level strategies, such as the architecture of boundaries, may affect competitive advantage.

Our findings suggest that boundary architecture is a particularly powerful source of competitive advantage in this industry. The data suggest that exemplar firms, that were pioneers in the co-development and introduction of new technologies and whose leaders are centrally connected within the industry may be sideswiped by competition when their executives fail to change the architecture of their firm boundaries. In contrast, firms in initial weaker competitive positions, but whose executives re-design their boundary architecture to better match the organizational activities to changing market opportunities may thrive despite increasing competition.

The boundary architecture adopted by the high-performing firms in the sample was surprising. Rather than following the conventional wisdom of focusing on core competencies and specializing in narrow activity clusters to improve their competitive position (the

approach adopted by the low-performing firm), managers in high performance firms augmented the firms' vertical scope within the value system by entering new activities both downstream and upstream. Rather than trying to buffer their internal core from outside pressures (Thompson 1967; Pfeffer and Salancik 1978), managers increased the permeability of different activity clusters to market pressures by opening up many of these clusters to markets in both the input and output sides. Finally, rather than developing a tight coupling of internal activities to improve efficiency and better serve a particular market need (Siggelkow, 2002), managers organized activities in increasingly modular ways, with more autonomy to internal units, thus creating a more loosely-coupled activity system. This combination of *vertical scope extension*, *increased permeability* and *modularity* allowed these firms to become more responsive to market opportunities and thrive despite challenging competitive environments. These benefits seem to outweigh the coordination costs and potential loss of focus brought about by this seemingly complicated organizational structure.

Our study contributes to the boundaries literature by validating the novel concept of boundary architecture (Jacobides and Billinger 2006) as a combination of firm-level decisions about scope, permeability, and modularity of activities. In particular, we contrast the boundary architecture adopted by both low and high performance firms and offer strong evidence for the performance implication of different boundary architectures. We explore the links between scope, permeability and modularity and explain why and when certain architectures of boundaries are effective. Methodologically, we contribute by proposing a new analytical tool to track firm-level boundary changes over time.

Our findings also contribute to the emerging field at the intersection of strategy and organizations. The particular boundary architecture described in this paper represents an organizational structure that enables managers to morph their firm's strategy over time and

achieve a dynamic fit between organizational capabilities and market opportunities. In fact, managers did not have a focused strategy for competing in a particular market nor adopted a single business model. Rather, their organizational structure, in the form of the chosen boundary architecture, was their strategy (Brown and Eisenhardt 1997).

Finally, our findings also inform management practice and public policy. Given the heated debate in Europe and the USA about if and how traditional manufacturing sectors can survive a global and free-trade economy, our study provides compelling suggestions on how firms in traditional sectors may thrive despite a challenging environment. In addition, although most work in strategy focuses on either new ventures in high-technology sectors or “Fortune 500” type firms, our research analyzes small and medium-sized firms in mature markets. These firms are considerably understudied in the organizations and strategy literature in comparison to their prevalence and economic importance.

## **METHODS**

The research design is an inductive multiple case study. Multiple cases enable a replication logic in which the set of cases is treated as a series of experiments, with each case serving to confirm or disconfirm the inferences drawn from the others (Yin 1994). A multiple case study typically results in better-grounded and more general theory than single cases (Eisenhardt 1989). Inductive research builds on data to explore a phenomenon of interest for which prior theory is lacking or does not seem to adhere to the phenomenon as observed. The phenomenon of interest in this study is the dynamics of boundary change at the firm level and its performance implications.

The research employs an embedded design with three levels of analysis: *organization*, *industry* and *activity area*. An embedded design enables richer, more accurate theory by uncovering aspects of a phenomenon that occur at multiple levels. The *organization* is the

central unit of analysis and our research approach tracks the evolution of organizational boundaries over time and assesses their performance implications. Smaller units of analysis such as *activity areas* focus data collection by addressing well-defined organizational events or decisions. Larger units of analysis, such as the *industry*, allow a better understanding of the connections between environmental changes and organizational phenomena.

**Setting and Sampling:** The research setting is the global footwear industry from 1990 to 2005 with a focus on how Portuguese leather footwear firms adapted to the transformations that occurred in this period. This was a period when a conjunction of supply and demand-based changes led to the erosion of the factors on which the competitive basis of the Portuguese industry had been established. The research sample is drawn from Portuguese SMEs that were already in existence in 1995 (a time when the global industry landscape started to change dramatically), and had survived until 2004, the time when data collection started. We focused on SMEs since these constitute about 75% of the employment in this industry and the bulk of its sales (APICCAPS 2003). It should be noted that the weight of SMEs in this sector is similar to the overall structure of European industry. In 2001, SMEs' represented 76% of the industry value-added in EU25 (Eurostat 2004).

We selected three cases based on a theoretical logic. Given our goal of understanding how firm boundaries may impact performance, we selected cases that exhibited a strong variance in performance. We chose a firm that was in an excellent strategic position in 1995 and, yet, exhibited a very weak performance ten years after, at the end of 2004. We choose another firm which was weakly positioned in 1995 and, yet, had exhibited a much stronger performance by 2004. We also selected the firm that was considered by industry experts as the best performer in the period of 1995-2004. Choosing extreme cases is beneficial for grounded theory development since it may make the phenomenon of interest more visible

(Yin 1994). This sampling strategy is appropriate for our research goal of developing an in-depth understanding of how boundary architecture may be related to long-term performance. Table 1 presents an overview of the sample firms. The performance of these firms was validated by experts at the Footwear Technology Center in Portugal, who have worked alongside these and other footwear firms throughout the period under analysis.

*Insert table 1 about here*

Given our research goal, we necessarily employ a longitudinal design, collecting data that covers 15 years of the firms' existence from 1990 to 2005. We collected data that goes back to 1990, and not 1995, in order to avoid left censoring since the architecture of boundaries in 1995 is likely a result of prior decisions that are important to understand. In addition, although our firms may be longer-lived than other footwear firms, having sufficient history for each firm was necessary to understand the temporal dynamics of boundary decisions and its impact on firm performance. This requirement outweighed the implications of not having a random sample, especially in a descriptive and theory-building study such as ours.

**Analytical Tools:** In order to study the architecture of organizational boundaries at the firm-level we needed to develop a new analytical apparatus. We start by adopting the view of firms as *activity systems* aimed at creating value in particular markets (Porter 1991; Siggelkow 2001) Thus, we track firm boundaries by looking at the scope of activities that firms engage in over time. However, we take into account that firm boundaries may exhibit a certain level of permeability (Scott 2004). In fact, in contrast to the canonical make-or-buy choice typically portrayed in the boundaries literature, evidence suggests that firms frequently make and buy for the same activity (Jacobides and Billinger 2006). We thus analyze the extent to which each activity is open to markets in both input and output sides. In this

conception, the market is not best represented by the industry end-customers or by a firm's clients, but rather surrounds firms and can interpenetrate them in different activity areas.

In addition, we propose the concept of *value system* to represent the set of interconnected activities that are required to create value in a market. The value system thus defines the established scope and structure of activities for a particular market. For the purpose of this analysis we focus on the central activities that add value to customers and ignore more generic support activities. We refer to the term *value system* and not value chain or value network because we are agnostic about the structure that this set of activities and linkages can take. In some occasions, particularly for tangible products, the set of value-creating activities is better characterized as a sequence or chain connected to other value chains downstream and upstream to form the industry value system (Porter 1985). Other times, it may be better characterized by a network of activities with no clear sequence and where knowledge flows are paramount (Allee 2000). Most frequently, it will be a structure in-between a chain and a network, which is why we prefer to use the more general term "value system". While in nascent markets the value system may be incipient and will be shaped over time by entrepreneurial actors (Santos and Eisenhardt 2006), in more mature markets the value system is likely to be well established and more stable over time. The value system for the leather footwear industry, the particular focus of our study, is depicted in figure 1, representing all the value creating activities necessary to fulfill the end-users need for footwear. This figure was developed and validated through extensive consultation with industry experts and footwear executives.

*Insert figure 1 about here*

In general, a new collection of shoes starts with a brand concept that informs the creative design of the shoe. Then, there is the need to transform that design into a technical model that

can be mass-produced, a process that is usually based on a CAD-CAM software system. The key components for the shoe manufacturing process are the leather and the soles, both of which need to be processed from raw materials (animal leather and rubber respectively). The main stages of shoe production are the cutting of the leather, the stitching of the cut leather to form the uppers, and the assembly of the uppers to the sole to complete the shoe. Then the shoes need to be distributed to retail stores, supported by marketing activities, followed by the final sales (online retail of shoes is still a marginal activity). Naturally, there are feedback loops on several stages of the process, such as from end-customers or distributors to design or quality control. For simplicity, these feedback loops are not depicted in the figure.

We track the architecture of organizational boundaries by analyzing both the scope and permeability of a firm's activities in the context of the value system of the market. Scope is defined by the extent to which the activity system of the firm covers the activities in the value system. Permeability is defined, following Jacobides and Billinger (2006), by the extent to which each distinct activity is open to the market on the input side (meaning the firm acquires input from other companies) and open to the market on the output side (meaning that it sells the output of the activity to the market). By overlapping the activity system of the firm with the value system of the industry, and identifying permeability as arrows that link each activity to the market, one can visualize the architecture of boundaries of a firm.

Figure 2 shows the architecture of boundaries for the three firms in our sample in 1990. Comparing the firms, their architecture of boundaries seems roughly similar and consistent with the dominant focus of Portuguese firms during this period on manufacturing activities.

*Insert Figure 2 about here*

By applying this analytical tool for different periods over time we can track the changing architecture of boundaries. In particular we chose the years of 1990, 1995, 1999, 2002 and 2005 since these represent important milestones in industry evolution, as described next.

**The Portuguese Footwear Industry:** Portugal is a country specialized in the production of leather footwear of medium quality. The country is the third largest leather footwear exporter in Europe and the fourth exporter worldwide, which is remarkable for a small country of 10 million inhabitants (APICCAPS 2003). During the period of 1986-1990, the Portuguese footwear industry grew at a fast rate due to Portugal's membership of the European Union at a time when its labor costs were much lower than the European average. Portuguese companies started to receive important manufacturing orders from European agents of global buyers (large retailers and brand-named merchandisers) who used Portugal as a manufacturing base for footwear.

However, in the early **1990s**, the industry started to see signs of change in the global competitive environment, due to both demand and supply-based changes. The supply-side changes were caused by the appearance of new countries in the global economy with much lower labor costs, threatening the traditional competitive basis of the Portuguese industry. As a consequence, throughout the 90s many foreign buyers of footwear moved their operations and orders from Mediterranean Europe to countries in Eastern Europe and Asia.

In addition, demand-side changes throughout the 1990s have transformed shoes from a product considered as a basic consumption item to a lifestyle purchase. This shift in demand led to a changing demand structure, with an increase in orders for urgent and small sized batches of fashionable products (with higher variety in models and colors), and a decrease of orders for large batches of standardized shoes with long lead times.

Recognizing the need for change, Portuguese firms started around **1995** a movement of technological innovation to meet the new supply and demand requirements. The Footwear Technological Centre played an important catalytic role in this process, introducing innovations in manufacturing and promoting an endogenous equipment sector (Santos 2006).

However, the pressures on demand and supply side continued to aggravate and, by **1999**, the sector started to suffer greatly from the loss of its cost advantage, which led to the relocation of almost all the global buyers operating in Portugal. By **2002**, many footwear firms had closed down, reducing the number of firms from 1645 in 1999 to 1350 in 2003 (APICCAPS 2003). The industry downturn has aggravated by **2005** and is expected to continue.

**Data Collection:** We collected data over a two year period during 2004 and 2005. There are three main data sources: archival sources, interviews and observations. The extensive archival data include both internal and external sources. The internal sources include financial data, historical data, and press releases. The external sources include media articles about each firm and industry studies.

The second data source is semi-structured interviews with internal and external informants. Internal informants include top and middle managers, and line workers. We complemented these data with interviews with external informants: business partners, competitors, and industry experts. The use of multiple informants serves two main purposes. First, multiple informants mitigate the potential biases of any individual respondent by allowing information to be confirmed across several sources (Golden 1992; Miller, Cardinal *et al.* 1997). Second, multiple informants can lead to a richer and more elaborated model since different individuals typically focus on complementary aspects of a major decision (Schwenk 1985; Dougherty 1990). The interviews ranged from 1 to 3 hours. We took detailed interview notes immediately after each interview, generating about 900 pages of notes. We followed up with

clarifying emails and phone calls as needed.

The third data source is direct observation of the firms' activities. We spent an average of 50 hours in observation in each firm in the period of 2004-2005. These included participation in business meetings with outside partners such as suppliers, distributors, retailers, and designers. It also included internal management meetings regarding topics such as the strategy of the company and production quality. In addition, two of the co-authors spent one day in the production line of one of the studied firms, working along side the operators and gaining an in-depth understanding of the different stages in the footwear production process. We also did observations in industry fairs, both national and international, where footwear companies promote and sell their products. Table 2 details the data sources for each firm and also the industry-level data gathered.

*Insert table 2 about here*

Using the extensive data we developed chronological case histories for each firm. Each case was about 25 pages in length. We organized the cases by time period, detailing the boundary changes that occurred in each period, including an analysis of their context, implementation and impact on the company. Overall, this combination of extensive archival sources, interview data from multiple internal and external informants, and direct observation enabled a rich, triangulated, and accurate understanding of the phenomenon (Kumar, Stern et al. 1993). For example, media articles and industry interviews clarified the industry context affecting the boundary changes, while interviews with internal informants revealed the actions of managers, their decision drivers, and the alternatives not chosen.

**Data Analysis:** As is typical in inductive research, we began with in-depth analysis of each case from the perspective of our research question (Eisenhardt 1989). Tables and graphs were used to facilitate the analysis (Miles and Huberman 1994). In particular, we used the

analytical tool previously described to track the scope and permeability of the firm boundaries over time. The goal of this within-case analysis was to identify theoretical constructs, relationships, and longitudinal patterns within each case independently and in relation to the research question. For example, the data alerted us to the important role of modular structures for a more complete understanding of boundary architecture (in addition to scope and permeability), which became a key element of our theory.

Consistent with the multiple case method, we then turned to cross-case analysis in which the insights that emerged from each case were compared with those from the other cases to identify consistent patterns and themes (Eisenhardt 1989). We first contrasted Basilius to Sampaio to understand the reasons for the performance difference in these firms. As patterns emerged, Sampaio was also compared to Investvar for replication purposes, enabling the development of more robust and refined theoretical concepts. We relied on an iterative process of cycling among theory, data, and literature to induct a theoretical framework of how managers organize firm boundaries in mature industries.

## **FINDINGS**

Our research goal was to explore how the architecture of organizational boundaries affects the long-term performance of firms. In particular, we wanted to understand how decisions about boundaries may help firms adapt to highly competitive environments such as the one that characterized the Portuguese footwear industry during the period of analysis. To study this phenomenon we started by analyzing the case of Basilius.

**Basilius** is widely regarded by industry experts as the star of the Portuguese footwear industry throughout the mid-late 1990s. This family-based company was founded in 1973 through the merger of three existing shoe manufacturing companies. Its founder and general

manager was a highly charismatic and well-connected individual. He was the president of the Industry Association, and had a good reputation and contacts with key industry leaders and clients. In 1990 the company had 176 employees, 5.8M euros in annual sales and exported about 90% of its production. Its business model was centered on being a contract manufacturer for international clients with large sized orders. Basilius had a small modeling unit and often offered design ideas to clients. The company supplied its own *Basilius* brand for the domestic market, although these sales represented less than 5% of revenues.

The company developed throughout the 1990s a reputation for high quality production and technological innovation. Basilius implemented as early as 1988 an innovative software design system for footwear developed by a French company. In early 1990, Basilius was the first Portuguese company and the second in the world to acquire a water-jet cutting system for leather. The need to better integrate the cutting stage with the technical modeling stage of production led to the development, together with a Portuguese software R&D center, of a custom-made CAD system that later became an industry standard. In addition, a research collaboration with a new venture led to the development of a more effective water-jet cutting system than the foreign model initially acquired. This new system also became an industry standard. Another research project with a Portuguese R&D center and a manufacturing equipment provider led to the development of a highly automated warehousing and transportation system that further improved Basilius's productive efficiency. Basilius was recognized as the most prestigious Portuguese shoe manufacturing company in the years 1994, 1995 and 1996. This period coincided with its production peak with sales of 15.4M euros and net profits of 508K euros. In 1997, Basilius won an award for one the most successful manufacturing SMEs in Portugal.

However, the company was not able to withstand the crisis that hit the industry in the late 1990s. Basilius started a slow decay after 1997 with lower revenues that forced capacity reductions. By the end of 2004 the company was unprofitable, it had substantially reduced its workforce to 105 employees and its sales were 75% lower at 3.76M euros. In 2005 Basilius went through a process of further restructuring and downsizing, when it laid-off half of its remaining workforce, a process that was expected to continue in 2006 with the closing down of all manufacturing activities.

What can explain such a weak performance in a once so successful and innovative company? We used the lens of boundary architecture to analyze the evolution of the company. We analyzed the scope and permeability of the firm's activities in the industry value system at different points in time from 1990 to 2005, as depicted in figure 3. The analysis reveals that despite all the technological innovation and its strong firm reputation, the boundaries of Basilius remained remarkably stable throughout the period under analysis.

*Insert figure 3 about here*

In 1990 Basilius had internal activities in the three main manufacturing areas and in technical modeling. Despite having its own footwear brand for the domestic market, this brand mainly imitated the designs brought by international clients and had very small sales. The Basilius brand was discontinued shortly thereafter since the company was focused on international clients in a private label business model. By 1995 the major change in boundaries was the beginning of subcontracting in production so that Basilius could address demand peaks without incurring too many fixed costs. Throughout the next ten years until 2005 there were no other significant changes to the organizational boundaries. Interestingly, the greatest concern of the company management throughout this period, particularly between 1995 and 2000, was investing in a tighter coupling between activity areas through a better integration

of the different systems. As explained by Basilius director: “*given that the systems were being developed by different providers at different points in time, our CAD software does not communicate well with water-jet cutting software and with the automatic warehousing software*”. The company then made significant investments by hiring R&D teams to develop software patches to better link the different activity stages. In essence, the company was trying to develop a more tightly coupled activity system while maintaining its narrow scope of boundaries.

In 2005, at a time when Basilius was already facing financial difficulties and had just transitioned the leadership to the second generation in the family, the activities of cutting and stitching were abandoned and subcontracted to India to take advantage of lower labor and leather costs. The company suffered a round of lay-offs in that year due to the decrease in sales, which was expected to continue in 2006. Our analysis thus suggests that Basilius, despite being a highly innovative and pro-active firm in many areas, exhibited a static approach to managing the architecture of its boundaries. The key decisions at Basilius from 1990 to 2005 are summarized in table 3.

*Insert table 3 about here*

During this period of fifteen years, Basilius did not substantially change the scope of its activities or how it interfaced with markets. Its efforts were geared towards improving what the company traditionally did (serving large international clients as a footwear contract manufacturer), a business model that was under pressure due to a fundamental change in the basis of competition.

An alternative explanation for the weak performance of Basilius is that the footwear industry in Portugal is condemned and even the best companies in the industry will inevitable fail. However, the case of the company J.Sampaio&Irmão (Sampaio) suggests that firms may

prosper despite a tough competitive context if they transform the architecture of their organizational boundaries.

**Sampaio** was founded in 1981 by two brothers with the goal of producing and commercializing shoes and started operations with just 3 employees. In 2005 the company was thriving, with an average sales growth of 16% since 1999, selling approximately 10M euros of shoes of which more than 90% were for the European export markets. Given that Sampaio had a similar origin as Basilius (founders originally from the footwear industry, family owned and family run firm), served the same type of clients, had a similar boundary architecture in 1990, but was smaller, exhibited lower levels of technological innovation and had a worse reputation in the industry, what factors can explain its much higher performance?

A striking difference when compared to Basilius, is the extent to which Sampaio managers transformed the architecture of the firm's boundaries during the period of analysis. Sampaio extended the scope of its activities and made different activity areas more permeable to markets. Figure 4 tracks the evolution of boundaries at Sampaio from 1990 to 2005.

*Insert figure 4 about here*

Sampaio in the early 1990s, similarly to most other companies in the footwear industry, worked essentially as a contract manufacturer for international clients, with a focus on the French, Dutch, Belgium and German markets. Given the variability in demand, the company already subcontracted some of its manufacturing activities to other Portuguese companies during peak times. Although Sampaio had its own brand, called Calafe, all of Sampaio's shoes received their client's brand under a private label business model. Sampaio's design capability was very incipient, mostly based on imitation and client suggestions. The commercial area was not well-developed and the company director dealt directly with clients.

However, the architecture of boundaries at Sampaio was changed by 1995. In 1994 the company hired an Italian designer to add creative design to its own branded products, working in close coordination with the company's director. Sampaio's managing director considered this hiring a very important step since it meant that the company would be able to add more value to its clients: *"the decisions taken in 1994 shaped our path of development...I started to sell more of my own designs, although often not associated with the brand Calafe"*. Often the design suggestions were accepted by clients, other times they were accepted after minor modifications that provided the company with a better sense of client requirements.

The decision to start developing design activities had the goal of reducing the dependence of the company from the large distributors who were its main clients. These clients brought their own designs but were becoming very demanding in terms of prices and often requested samples of shoes that did not result in orders. In fact, this situation led to a crisis in 1996 when the company lost two very important clients, one which went bankrupt and the other which shifted the orders to China after Sampaio refused to keep supplying small batches of sample shoes for free. These two clients represented 70% of annual sales. Although the company was able to survive due to a large order received the year after, this crisis led to a deep rethinking of Sampaio's business model. The company management realized that it had to stop targeting the traditional customer base of global buyers and focus on a new segment that was less price sensitive and operated at a smaller scale. This segment was composed of small and medium sized retail chains which demanded smaller order sizes and faster response times. These stores were themselves trying to adapt to the transformation in demand patterns that privileged higher diversity of models and colors to address fast changing tastes.

This new focus required significant investments since Sampaio's productive process was not optimized for small orders and fast response times. The company undertook several

investments between 1996 and 1999, including implementing a new CAD system shoe design and a new enterprise management software system. Sampaio also introduced a water-jet cut system for leather that reduced the cost of producing smaller batches of shoes. These investments amounted to 2.8M over three years and allowed the company to start fulfilling the small sized, urgent orders that before were not economically viable. Sampaio also reinforced its technical modeling and commercial areas through new hires. Throughout this period the company director had a strong role in coordinating the relations between design, technical modeling and manufacturing, articulating it with the choice of soles and leather supplies. For example, the company started acquiring raw leather and contracting out the processing of the materials according to the specific needs of their new collections. These strategic changes are reflected in the 1999 architecture of boundaries. Sampaio added branding and distribution activities (although still incipient), reinforced its technical modeling area and controlled the processing of leather. The percentage of shoe sales associated with the company's creative designs started to increase.

After 1999, the large international clients accelerated the relocation of their orders to lower cost countries, a trend that harmed companies such as Basilius. However, Sampaio managers saw this as a signal that they should make a stronger bet in developing their own brand, as opposed to the traditional private label business. Since the brand Calafe was too tied to the private label business, Sampaio managers decided to create a new brand called Eject that aggregated the firm's more innovative designs. The brand concept was defined as "a brand for the young at heart from 8 to 88 years old". In late 2001, Sampaio started to produce small batches of Eject shoes to sell directly to international retail stores and distributors. This shift was facilitated by all the investments described above for the 1996-1999 period. The Director of Sampaio acknowledges: *"creating a brand requires time and a consistent strategy... If we had the traditional equipment we would not be able to deliver the quick response times,*

*production flexibility and small batches required to create a branded collection of shoes for the retail market”*. As a consequence of these changes, the company in 2002 was also present in the activities of branding and distribution for the international retail market, either directly or through country distributors.

By **2005**, there were additional changes in the firm’s architecture of boundaries. These included creating a formal department of marketing to support the Eject brand and initiating direct distribution to domestic retail stores. Sampaio also increased its presence in international distribution through direct sales to retail and by working in closer contact with its distributors. However the greatest change occurred in the design and modeling unit. While Sampaio had traditionally used a combination of outside and internal designers to support its shoe designs, it decided to internalize all design for the Eject brand since this became highly specific to the company. Despite closing its boundaries on the input side, Sampaio managers then decided to open them on the output side. The company created a new unit aggregating the activities of creative design and technical modeling. This unit was provided with new machines and a new manufacturing lay-out that allowed it to produce small samples of new shoe collections in a cost-effective way. The company started selling shoe collection services to clients that then mass-produce those shoes in low cost countries. This means that the company effectively modularized some of its activities and opened them to the market. This is an area where the company wants to invest further by hiring new designers and modelers. In addition, the company reinforced its activities in the area of quality control in order to better coordinate its subcontracting activities. A summary of all the decisions and how they impacted the architecture of boundaries is summarized in table 4.

*Insert table 4 about here*

As a result of these changes, the company kept growing despite a very difficult industry context. Its sales grew 15% per year in the period of 1999 to 2003. Sales continued to grow and increased 30% in 2004 for a total of 8.6M euros. Two thirds of this growth was due to Eject branded shoes. The company estimates sales of 10M euros for 2005 and again a strong growth of the Eject brand which by now constitutes 25% of Sampaio's sales and occupies most of its manufacturing capacity, making Sampaio less reliant on large global buyers.

In summary, in contrast to Basilius which kept its boundaries static, Sampaio transformed its boundary architecture in the last 10 years by extending its scope in the industry value system (now covering all activity steps in the value system except retail), increasing its permeability to markets in different activities steps and starting to modularize certain activity clusters. This boundary architecture allowed Sampaio managers to gain more information about market opportunities in different areas of the value system and understand better where their competencies are, compared to other organizations. It thus provided more options for growth and allowed the company to maintain multiple business models (e.g., private label business, selling branded shoes, providing design/modeling services).

In order to confirm if this process of boundary change was replicated in other high-performing companies, we analyzed Investvar, a company widely recognized as the greatest success story in the Portuguese footwear industry throughout this period.

**Investvar:** from its origins in 1987 as a small company with founders originally from the footwear components area, the Investvar group reached 161M euros in sales in 2004, most of it directed to international markets. Investvar is currently responsible for 5% of Portugal's footwear exports and is one of the largest companies in the industry. What can explain this remarkable performance in a company which was very similar to the average Portuguese footwear firm in 1990?

We analyzed the company's evolution throughout this period through the lens of boundary architecture. In 1990, the architecture of boundaries at Investvar was similar to Basilius and to Sampaio in terms of scope and permeability of boundaries, as shown in figure 2. Investvar produced shoes for a major US client which owned the brand Aerosoles. All creative design, technical modeling and distribution activities were developed by the American client, in what constituted a typical outsourcing relation in the Portuguese footwear industry. The only difference was that Investvar also provided quality control and logistic services for this client by monitoring other Portuguese suppliers of footwear. However, this typical boundary architecture was radically transformed by 2005, as shown in figure 5.

*Insert figure 5 about here*

In 1992, after five years manufacturing shoes for this American client, Investvar negotiated a 20 year license to become the exclusive commercial representative of the Aerosoles brand for the EMEA regions (Europe, Middle-East and Africa). This was a cornerstone moment in the life and independence of Investvar as explained by its CEO: *"Being only a manufacturer is too risky, because we totally depend on international brands and large clients"*.

Investvar then started to internally develop creative designs and technical modeling of shoes in an autonomous unit in Italy which also sold design and technical modeling services to other clients. This unit was fully owned by one of Investvar founding partners. The Investvar holding company also created a separate unit for developing distribution activities.

During this period, the European market started to exhibit strong growth and the company decided to open its boundaries on the input side by subcontracting the production of shoes. It also opened its boundaries on the output side since it developed and produced shoes for other clients other than their own Aerosoles brand. This permeability of the manufacturing unit allowed dealing with capacity constraints and demand fluctuations, while allocating

production time to the most valuable activities. Due to these changes, by 1995 Investvar exhibited important changes in its boundary architecture, with an extended scope of activities (branding, design, modeling, manufacturing, and distribution), more permeability in both the input and output sides in several of these activities, and an increasingly modular structure with several autonomous units along the value system.

As a result of its design competence and permeable manufacturing boundaries on the output side, Investvar gained in 1996 a large contract from Marks & Spencer (M&S) for the exclusive production of M&S FootGlove brand. In essence, this agreement represented a branching out of the Aerosoles shoes to the UK market in an exclusive private label deal with M&S. This relationship led the firm to improve its internal processes, add enterprise-wide IT systems, adopt M&S “Ethical Code”, and force their own subcontractors to adopt the same level of standards. The M&S contract represented 50% of the group’s revenues by 1999.

The commercial unit of Investvar expanded its geographical reach to cover the EMEA region with the Aerosoles brand, either finding new country distributors or acquiring an equity stake in the distributors. In 1998 the group launched a new retail unit, Aeroshoes, with the goal of commercializing the Aerosoles brand directly to end customers. This unit is responsible for the Aerosoles chain of own retail stores and also a network of franchisees, again revealing increased scope and permeability of its boundaries. The CEO of Investvar explains these changes: *“The creation of a chain of retail stores gives more visibility to the brand and allows a better control of the value chain”*. Thus, the boundary architecture in 1999 included activities in all areas of the value system, from design and branding to retail, with an organizational structure characterized by autonomous units open to the market on both the input and output sides. The CEO of Investvar says: *“our main goal is to control all value chain phases, including design, distribution and retail”*.

Between 1999 and 2002, the major changes in the boundaries architecture were the creation of a marketing department to support the brand development and retail expansion activities. The company also created a JV with an Italian firm to produce a new type of flexible soles for the Aerosoles shoes and for other clients, further expanding its scope into the upstream activities of components. A high-quality, flexible sole was a key differentiator for the Aerosoles brand whose main attributes are “stylish and flexible”. This partnership is an example of how Aerosoles managers develop new internal activities in close partnership with companies with a strong competence in the respective area. José Alberto, head of manufacturing explains: *“we seek to establish this type of strategic partnerships so that we can acquire the know-how and get help in launching this new project. Then it’s important to invest in the relationship with the partner since this also commits them to the relation”*.

In 2003 Investvar initiated and led a consortium called Frontshoes of six Portuguese footwear companies together with two government-led private equity firms. Frontshoes acquired a retail chain in France with 64 stores, in order to develop new retail channels for Portuguese-branded shoes. Through this acquisition, Investvar started providing retail services by selling footwear from other companies to end-customers. In addition, the company continued to expand its own Aerosoles retail brand (which comprised 90 retail units in 2005) with plans to have 140 retail units by 2009. Furthermore, the group created a new design unit (IN-IT) to internalize all Aerosoles designs while selling design services to other companies. The technical modeling of Aerosoles shoes produced in Europe is made by Investvar while the technical modeling of Aerosoles shoes produced in China, Vietnam, India and Brazil is carried out separately in each of these countries due to differences in their labor and manufacturing environment. Aerosoles also started to develop new brands of shoes addressing new market segments and a new line of leather accessories to sell through the Frontshoes consortium and through other retail venues.

At the end of 2004, M&S decided to end their exclusive agreement with Investvar, and use the company's manufacturing services in competition with other footwear manufacturers. As a response, Investvar created a new company to sell the Aerosoles brand in the UK in direct competition with M&S Foot Glove brand.

By 2005, the Investvar holding was involved in the production of 5 millions pairs of shoes per year, 90% of which for international markets. Subcontracting accounted for about 60% of the group's shoe output while in-house production accounted for the remaining 40%. In 2004, Investvar accumulated a turnover of 53,7M euros in the manufacturing unit and 100,6M euros in the commercial unit.

In late 2005, in order to further decouple its activity system, the company increased the modularity of its commercial and manufacturing units by implementing a formal holding structure for each of these units. As José Alberto, head of manufacturing acknowledges: *“Our strategy was to decouple the areas so that if anything goes wrong in one of the areas we don't have consequences for the whole group. If for example we had to close down the manufacturing unit we would continue with the commercial unit”*. Table 5 summarizes the key company decisions and their impact in the architecture of Investvar boundaries.

*Insert table 5 about here*

**The boundary architecture of firms:** In contrast to the low-performing Basilius which kept a static boundary architecture characterized by narrow scope and suffered from a progressive loss of fit with the environment (Siggelkow 2001), both Sampaio and Investvar leaders were very pro-active in managing their organizational boundaries and exhibited a similar pattern in transforming their boundary architecture, as confirmed by figure 6.

*Insert figure 6 about here*

This pattern is characterized by a broad scope of activities in the value system of the industry, an increasing permeability to the market of different activity areas in both the inputs and output sides, and a more refined modularity of activity clusters. This pattern of boundary architecture is largely consistent with Jacobides and Billinger's findings in the European apparel industry (Jacobides and Billinger 2006). However, while these authors studied one deliberate boundary change process for a period of two years, our study found a similar boundary architecture emerging from a 15-year evolution process in two high-performing firms. Given that a third firm that did not adopt this boundary architecture (but was otherwise well positioned) exhibited a low performance, our study supports the contention that this specific boundary architecture leads to high firm performance in mature industries.

Interestingly, this pattern of architecture of boundaries is stronger at Investvar, the star performer of the industry, when compared to Sampaio. By the end of 2005 Investvar was present in the entire value system, including areas such as retail stores and components. Investvar executives explain that *"It is critical to have the capabilities to do everything in the value system so that we don't depend on anyone else. We need autonomy and the capability to do everything"*. In addition, Investvar has a broader set of market interfaces in both the inputs and outputs areas. Investvar sells not only Aerosoles shoes, but also components, design and technical modeling services, quality control services, manufacturing services, distribution services, and retail services. It also buys components, technical modeling services, manufacturing services, distribution services and retail services. Finally, Investvar also exhibits a strong modularity of activities that includes organizing different units as independent companies within a holding structure and adjusting the ownership of each company to guarantee the inclusion of necessary competencies. Investvar leaders seem to have been proficient at leveraging other's resources and skills, namely brand (Aerosoles), design (Italian unit), quality control processes (M&S), and funding (PE Investors).

Despite similar boundary architectures, it is interesting to note how much the strategy of these two high-performing companies differs in both content and process. Sampaio managers identified the market of smaller retail chains as the one less likely to be de-localized. They then transformed the firm's production process (including substantial investments in new technology) in order to be able to fulfill small orders at a low cost and offer quick response times. Sampaio managers pursued multiple business models consistent with these requirements, including serving their own Eject niche brand, serving the private label business, and focus on providing collection development services by becoming a supplier of sample shoe collections. However, our data suggests that their strategy was more emergent than deliberate. The director of Sampaio explains: "*Things started to happen... I started to sell more of my own designs and that implied also smaller orders since these were niche products for specific retail chains...*". In contrast, Investvar's strategy and the way they transformed the architecture of boundaries was much more deliberate and inspired by a rationale of controlling the entire value system and exploring new business opportunities over time. Investvar decided to keep operating in the larger order business by targeting a new segment of "comfort and fashion" shoes. To remain competitive given the external demand and supply trends, the company needed to control a major global brand and expand into design services, distribution and retail. This explains why the company acquired the rights to the EMEA market for a well-known U.S. brand. Investvar also adopted multiple business models, including serving their own brand, developing a private label business, producing large shoe batches for others, and producing innovative components such as the shoe sole.

Our findings thus suggest that similar boundary architectures can enable very different strategic approaches, each one with multiple business models. This implies that the firm's boundary architecture is distinct from a firm's specific strategy (Porter 1991) and from a

firm's business model (Amit and Zott 2001). These are different and independent concepts and all three have a place in strategy and organization theory.

## DISCUSSION

We set out to explore how the architecture of boundaries impacts the long-term performance of firms. We found that the low-performing company in our sample kept a boundary architecture characterized by narrow scope and little permeability to markets. In contrast, the two high performing companies transformed their boundaries through a pattern of changes that included three main characteristics: scope extension, increased permeability and more refined modularity of units. Why did this specific boundary architecture lead to high performance? We discuss each of these three characteristics next, highlighting their advantages and limitations, and how their combination may constitute a very effective way of organizing the boundaries of the firm.

**Scope extension:** In contrast to the conventional wisdom that firms should focus on a few areas where they have core competencies in order to increase efficiency and reap the benefits of specialization (Schilling and Steensma 2001), we find that high-performing footwear firms greatly increased the scope of their activities and became more vertically integrated. What can explain this finding?

The adoption of a broad scope of activities through vertical integration has been considered by some authors as the *old system* (Jarillo 1995; Schilling and Steensma 2001) because of important inefficiency and flexibility losses. Vertical integration can insulate the organization and its management from the market by reducing information and knowledge sharing across input and outputs markets (Harrigan 1983). This can generate over time what we call the "curse of the weakest link" – the value-creating potential of an integrated organization will be limited by the weakest link in the chain. Since it is difficult for organizations to develop

strong and homogeneous capabilities across the value system, they are better off focusing on activity areas where they have a comparative advantage and use the market for the other areas (Jacobides 2005). In fact, during the 80s and the 90s there was a general trend towards the des-integration of activities along the value chain, coupled with the specialization on activities that require competencies for which firms already have an advantage. This movement of concentration on core competencies was expected to be the end of hierarchical capitalism in the form of the large, vertically integrated firm (Dunning 1995), leading to a new organizational paradigm formed by networks of specialized firms (Achrol 1997).

However, there have been some contrarian voices in favor of vertical integration. Being vertically integrated in changing industries may lead to coordination and informational advantages (Harrigan 1983) and may enable a strategy of rapid response that has been shown to provide competitive advantage in volatile industries such as fashion apparel (Richardson 1996). Richardson's study is particularly relevant given the similarity of the fashion apparel industry and the footwear industry, and the fact that both industries went through similar transformations in the last decade. According to Richardson, the advantages of vertical integration (in particular forward integration) include superior market knowledge, faster response to customer needs and lower risks of product introductions. However, the author did not resolve the "curse of the weakest link". He just assumed that attentive managers would be able to overcome the problems of being insulated from the market. He writes that "as the integrated firms have demonstrated, these drawbacks are more a result of management than ownership" (p.410). This argument is not entirely satisfactory.

Another argument in favor of vertical integration ties to the literature on innovation and technological change (Henderson and Clark 1990). In a recent study in the communications industry, Raynor and Christensen (2002) suggest that increased vertical integration may be

required for firms to develop complex technological innovations that depend on knowledge bases with complex interdependencies. Other authors call these interdependencies “synergy effects” (Schilling and Steensma 2001). However this explanation for vertical integration does not seem to fit our findings since the footwear market is a relatively mature market that does not use advanced, specialized technologies with strong interdependencies.

In fact, vertical integration in footwear firms was essentially a response to changing market conditions. First, it was a way of reducing the firms’ dependence on the few global buyers that would inevitably move their business to emergent markets with low cost labor. Second, it served as a mean to service new market segments (retailers and small distributors) for whom response time, innovative design, and diversity of models were more important than price. Contrary to the large global clients, retailers and small distributors usually have no design and technical modeling capabilities so the two firms in our study developed these capabilities and expanded into new activities, often associated with their own brand. Third, expanding the scope in the value system was important to generate new business opportunities by opening up new markets and developing unexpected business models.

Despite the advantages noted above, we have not yet resolved the “curse of the weakest link”. For example a firm with a highly efficient manufacturing unit but a weak design unit or badly merchandised stores would be unable to sell its products. How did the firms in our study address the issues that insulating activities from the market is likely to cause deterioration in capabilities and that a tightly integrated system of activities is only as strong as the weakest links in the system? The answer is that *scope* and *permeability* are independent constructs in the architecture of boundaries. Our high-performing firms were vertically integrated but were not insulated from the market. On the contrary, they interfaced with the market in both inputs and outputs in almost every stage in the value system, thus creating permeable boundaries.

**Permeable boundaries:** In contrast to the conventional wisdom that managers should make or buy for each activity according to transaction characteristics (Williamson 1991) to improve efficiency, and that managers should try to buffer their internal core from outside pressures (Thompson 1967; Pfeffer and Salancik 1978), we found that managers increased the permeability of different activity clusters to market forces by opening up many of these clusters to markets in both the input and output sides. What can explain this finding?

A widely recognized advantage of being permeable to inputs (making and buying for the same activity) is the ability to address demand fluctuations (Richardson 1996). While we found that this was a powerful reason for subcontracting activities for which the firm had some capacity, this reason alone cannot explain the extent of permeability evident in the data and the fact that it occurred in both inputs and outputs.

A more compelling reason is the learning and informational advantages. Opening a firm's activities to market interfaces and engaging in regular processes of buying inputs that are also produced internally, and selling outputs that are also transferred internally, allows managers to benchmark their level of competency for different activities. A manager of a unit that deals with both internal and external suppliers or with both internal and external clients will generate many insights about best practices, policies, and client needs, which can be shared with the relevant internal unit to improve performance. As a consequence, managers learn how valuable their competences really are, in which areas they are falling behind, and how to correct any weaknesses.

The greatest advantage of permeability, however, is its impact on internal resource allocation processes to foster growth. By interfacing with the market in different stages of the value chain, managers become more aware of their areas of comparative advantage. If, by engaging with the market, managers realize that they have weaker capabilities in a particular area of the

value chain and if the required investments to grow capacity and improve quality are significant, managers may allocate fewer internal resources to these activities and will preferably buy those services from the market (Jacobides 2005) or try to leverage partners' installed capacity (Santos 2006). If one of their activities is highly valued by the market and opens up new (and sometimes unexpected) market opportunities, then the firm will allocate more resources for capacity expansion in this area and it will sell its outputs to the market, independently from transferring a portion of the output downstream through the firm's own activity system. This ability to "have the market as a safety valve" (Jacobides 2005) eliminates "the curse of the weakest link" and serves as a natural selection mechanism for the firms activities. These findings thus suggest that the value of permeability will rise with the scope of the firm's activities, since it is harder to assess comparative advantage and allocate resources by managerial fiat across many activity areas. This dynamic adaptation benefits may compensate for the increased transaction and coordination costs of dealing with multiple buyers and clients along the value system.

Nevertheless, there may be limits to permeability. As we observed in the cases of Sampaio and Investvar, certain activities were insulated from the market after being permeable in earlier periods. This is the case for the design activities in both firms for which the firm ceased to buy from the market. A key concern in this case seems to be the avoidance of strategic knowledge spillovers. By purchasing design services externally, firms need to communicate their view on what the market wants and may inadvertently help the development of a design capability outside the firm which can then be sold to their competitors as well. This example shows that, as the risk of imitation due to knowledge spillovers becomes too high, firms may insulate activities considered strategic, therefore stopping external purchasing for those activities and becoming less permeable (Fey and Birkinshaw 2004).

In summary, contrasting with an integrated activity system that is as strong as its weakest link, an activity system permeable to the market possesses a greater capacity of adjustment to supply and demand variations. Permeability enables a better benchmarking of internal capabilities with other firms, and, more importantly, a dynamic matching of capabilities with market opportunities. Such permeable architecture of boundaries can guide a firm's growth processes by enabling differential growth in specific areas of the activity system.

However, organizational rigidities, particularly in structures composed of tightly coupled units, may hamper the growth of excellent units by not decoupling them from their mediocre organizational neighbors. Thus, the dynamic growth benefits enabled by broad scope and permeability may only be fully realized if the boundary architecture includes autonomous units in modular structures.

**Modular Structures:** Most research on modularity discusses the advantages of decomposing products into modules with well specified interfaces (Baldwin and Clark 2000) and then reaping the benefits of specialization by arranging the production of many of these modules across organizational boundaries through constellations of alliances, outsourcing work, or developing flexible work arrangements (Schilling 2000; Schilling and Steensma 2001). However we found that the high-performing footwear firms in our sample were developing a distinct form of *intra-organizational modularity*. Both Sampaio and Investvar were modularizing their activity system by creating autonomous units, which became profit centers, and developing common interfaces for transactions across internal and external clients (and suppliers). What can explain this finding?

In fact, our findings are consistent with earlier views of the disaggregation of corporations through a selective intervention process of infusing market discipline into hierarchies (Zenger and Hesterly 1997). They are also consistent with recent work on modularity that contests the

presumed link between product, organizational and ownership modularity, suggesting that their drivers may be different and can lead to heterogeneous outcomes (Puranam and Jacobides 2005). Our findings suggest that organizational modularity does not necessarily come from product modularity nor does it lead to ownership modularity.

In the case of Sampaio, the modularity was still incipient, perhaps due to their smaller scale of operations and the fixed cost of defining interfaces and implementing formal coordinating mechanisms (Puranam and Jacobides 2005). The company had recently set up an autonomous unit (cutting across areas of product modularity) to sell new shoe collections to either the internal manufacturing unit or to outside clients who would then brand, manufacture and retail them. In addition, the company established their traditional manufacturing activities as a separate module that could either serve its own branded collection or serve outside clients in the private label business.

In contrast, the organizational modularity of Investvar was more developed. At the end of 2005 the company was organized in autonomous legal units (services, manufacturing, distribution, components) that were free in their decisions on how to interface with the market and other units. Interestingly, although these units had unified ownership control under the same coalition of partners, each one had a somewhat distinct ownership structure that helped tapping into new partners to gain the scale, capabilities, or outside resources that allowed these units to explore new market opportunities.

Our contribution is thus to connect organizational modularity to the growth processes of firms. Resource allocation processes that reflect the underlying comparative advantages and the available market opportunities are difficult to implement if there is a tight coupling between the different activity areas. For example if a firm's design and modeling unit is forced to use the unused capacity of the manufacturing unit as opposed to buying

manufacturing services from the market, the adaptive capacity of the organization may be hindered if the manufacturing unit under-performs. Thus, a boundary architecture that decouples the stages in the activity system is essential to fully take advantage of scope extension and permeability of boundaries. This may be particularly important in contexts, such as the footwear industry, where demand is increasingly heterogeneous, leading to more heterogeneity in inputs as well. Modular structures such as the one we describe may prove less useful in more homogeneous markets (Schilling and Steensma 2001).

## **CONCLUSION**

The organizations and strategy literature has traditionally considered organizational boundaries as the accumulation of discrete “make or buy” decisions that together define the scope of the firm. In this research we looked at the boundary architecture at a firm level (Jacobides and Billinger 2006) and explored a more refined concept of boundaries that includes decisions about the scope of activities in the value system, the permeability of the activities to the market at the different stages in both inputs and outputs, and the modularity of organizational units.

The *boundary architecture* of a firm is thus defined by how managers set the scope, permeability and modularity of the organization. In contrast to conventional wisdom advocating focus and specialization in areas of core competence, we show that a boundary architecture of broad scope, high permeability, and increasing modularity is associated with high performance for firms in mature markets facing global competition. Such boundary architecture allows a dynamic fit between evolving organizational capabilities and market opportunities, which may compensate for the transaction and coordination costs of adopting this more complex structure. This boundary architecture represents a form of strategic organization since it substitutes for a clear and focused strategy and business model and, in

fact, it affords different strategies and multiple business models without being dependent on extreme forms of managerial foresight.

This paper shows how managers can use the concept of boundary architecture to more effectively compete in mature industries and explains why certain boundary architectures work while others do not. Broad scope without permeability may lead to rigidity and the weakest-link effect. Scope and permeability without modularity do not allow for dynamic growth efficiencies. It is the combination of these three elements that affords the full strategic and adaptation benefits to firms. That is why research on boundaries should go beyond the single construct of scope and focus instead on the multiple characteristics that determine the boundary architecture of firms.

Our research approach has limitations. First, although we show a link between boundary architecture and long-term performance, our multiple case study methodology does not allow for a systematic validation of this causal relation. Nevertheless, it sets the stage for a more systematic analysis in a random sample of firms to test if the presence of these three boundary characteristics is associated with higher performance. Second, our study is limited to a particular industry and it is unclear to what extent our findings can be generalized. However, our study adds to a recent but growing body of evidence that firm-level boundary architectures matter for performance across a range of industries, from mortgage banking to apparel and to telecommunications. Third, our study highlights a specific architecture of boundaries that seems a good fit for the environment of the footwear industry in the last 15 years. Future work should strive to create a more complete view of viable boundary architectures and their fit with particular industry settings and environmental characteristics.

Finally, our study has implications for policy and practice. We provide a compelling illustration that firms in mature manufacturing industries operating in developed countries

can survive and thrive despite low-cost competition from emerging economies. In addition, our study offers a cautionary tale that technological innovation per se may well be worthless in these settings if not coupled with innovations in the strategic organization of firms. This suggests that instead of lobbying policy-makers to close country boundaries to foreign goods or to provide more subsidies for new technologies, managers may be well-advised to take a closer look at the architecture of boundaries of their firms and develop organizational innovations that allow them to exploit new market opportunities.

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**Table 1 – Overview of sample firms and their performance (from 1995 to 2004)**

	<b>Basilus</b>	<b>Sampaio</b>	<b>Investvar</b>
<b>Sampling Criteria</b>	Low-performer	High-Performer	Extreme High Performer
<b>Founding date</b>	1973	1981	1985
<b>1995</b>			
<b>Sales (€)</b>	15,4M	3,8M	17,4M
<b>Profits (€)</b>	508K	20,7K	Not available
<b>Employees</b>	168	91	227
<b>2004</b>			
<b>Sales (€)</b>	3,3M	8,7M	161M
<b>Profits (€)</b>	(468K) *	46,2K	Not available
<b>Employees</b>	65	98	774

**Table 2 – Data sources**

	<b>Basilus</b>	<b>Sampaio</b>	<b>Investvar</b>	<b>Industry-level</b>	<b>Total</b>
Number of visits	6	15	12	21	54
Number of informants	4 founder managing director cutting unit supervisor stitching unit supervisor	8 managing director administrative manager production director marketing director sales director Modeling unit supervisor stitching unit supervisor	9 managing director administrative manager production director marketing director sales director communications director components engineer chemical engineer business unit head	20 industry experts representatives from APICCAPS (the Industry Association) INESC executives (R&D unit) other founders and general managers	41
Hours of observation	10	50	30	30	120
Hours of interviews	30	85	50	120	285
N° pages of interview notes	100	180	200	400	880
Archival sources	Internal financial and historical data	Internal financial and historical data Media articles	Internal financial and historical data media articles press releases Internal magazine	Industry magazine Industry association newsletters Sector studies and statistics	
Visit to industry fairs				3	3

**Table 3 – Key decisions at Basilius and their impact in the architecture of boundaries**

<b>Date</b>	<b>Decision</b>	<b>Rationale</b>	<b>Change in boundaries</b>
1990	Acquisition of a water-jet cutting system for leather	Improve productivity by lowering set-up cost per batch and labor costs	None
1992	Development with Portuguese software R&D center of custom-made CAD-CAM system	Faster response time to clients and linkage to the water-jet cutting system	None (other than tighter coupling with cutting area)
1994	Joint-development with equipment goods company of a automated warehousing and transportation system	Improve productivity and reduce set-up cost for new batches in production line	None
1995	Beginning of subcontracting in production	Cope with increasing demand peaks without incurring too many fixed costs	Permeability to inputs in the manufacturing areas (cutting, stitching, assembly)
2005	Outsourcing cutting and stitching activities to India	Take advantage of lower labor costs	Exit cutting and stitching activities

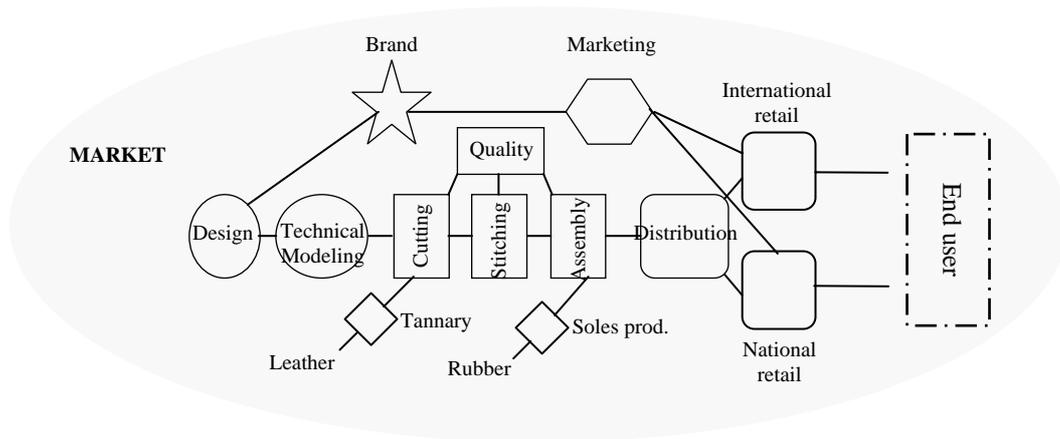
**Table 4 – Key decisions at Sampaio and their impact in the architecture of boundaries**

<b>Date</b>	<b>Decision</b>	<b>Rationale</b>	<b>Change in boundaries</b>
1990	Development of Calafe collection for private label business based on design imitation	To improve perceived reputation as contract manufacturer	Starts developing technical modeling
1994	Hire of an Italian designer	Add more value to clients by suggesting new shoe designs Reduce dependency from large distributors	Starts developing creative design
1996	End of commercial relations with major clients who are global buyers	Rethinking business model: target customers who are less price sensitive and value time to market and design	Change target clients
1998	Technological innovation initiatives: implementation of CAD shoe design and enterprise management software system; Implementation of water-jet cut system for leather Hire technical modelers	Ability to fulfill requirements of new target clients: reduce the fixed cost of producing a new shoe design and the cost of setting up the production line for a new order	Start incipient branding activities
1999	Hires salespeople Acquires raw leather and contracts-out the processing of these supplies	Improve connection to market Improve ability to support diverse models of shoes	Starts incipient distribution activities Starts developing activities in leather supplies
2001	Launch own brand called Eject;	Aggregates the firm's innovative designs in an independent collection to improve value added to retail clients	Fully present in branding activities
2002	Sell Eject collections directly to international retail stores and distributors	Distribution strategy to strengthen the Eject presence in the market	Enters international distribution directly and subcontracting to country distributors (permeability to inputs)
2004	Creation of a formal department of marketing	Support the Eject brand;	Starts developing marketing activities;
2004	Initiation of certification process	Improve control of sub-contractors	Starts developing quality control activities
2005	Internalization of all design for the Eject brand	Protect strategic asset	Ends permeability of design activities to outside inputs
2005	Direct distribution to retail stores for the domestic market and reinforcement of the presence in international distribution	More autonomy and control in distribution	Enters national distribution
2005	Aggregation of creative design and technical modeling and separation from manufacturing unit	Sale of shoe collections services	Modularization of creative design/technical modeling activities Modularization of production

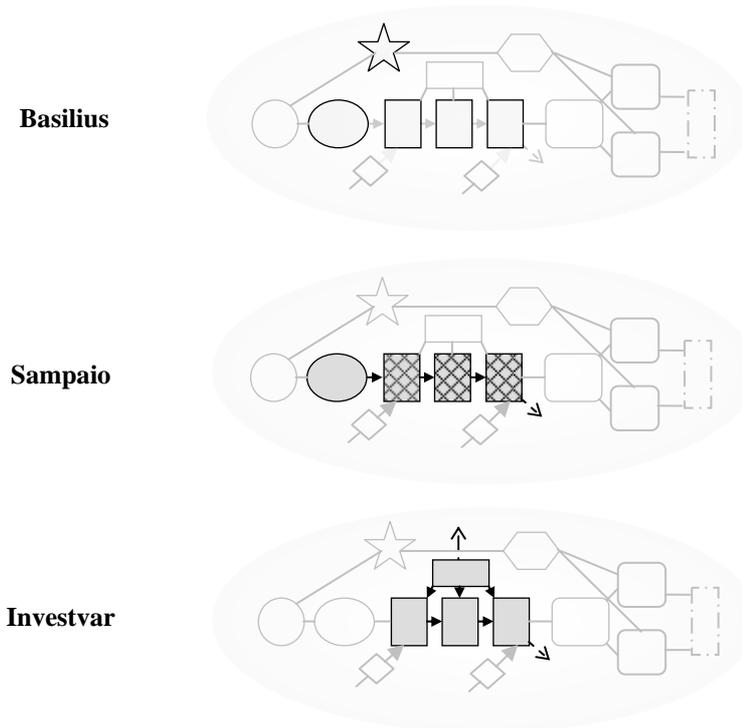
**Table 5 – Key decisions at Investvar and their impact in the architecture of boundaries**

<b>Date</b>	<b>Decision</b>	<b>Rationale</b>	<b>Change in boundaries</b>
1992	Negotiation of 20 year license to become exclusive representative of Aerosoles brand in EMEA	Control entire value system of the industry from branding to retail	Starts developing brand activities
1993	Partnership with Italian unit for design and modeling (owner of unit also co-owner of Investvar)  Creation of a distribution unit with branches or independent agents in different countries	control higher added-value activities  Expand Aerosoles brand/shoes	Starts developing creative design and technical modeling activities in autonomous unit with permeability to inputs and outputs (buys and sells design services)  Starts developing distribution activities in autonomous unit with permeability to inputs
1994	Start buying and selling manufacturing services to the market	Deal with demand fluctuations	Permeability in manufacturing activities to inputs and outputs
1996	Large contract with Marks & Spencer (M&S) for exclusive production of FootGlove brand (private label business)	Branching out of the Aerosoles shoes to the UK market with strong partner/retailer	Semi permeable to outputs of brand
1998	Creation of retail unit  Improvements in manufacturing unit with introduction of regular processes for dealing with internal and external clients and outsourcing to China and Vietnam	More control links to final clients  Take advantage of lower labor costs	Starts developing retail activities in autonomous unit with permeability to inputs (mix of self-owned and franchised stores)  Modularization of manufacturing activities
2000	Creation of marketing department	Support brand development and retail expansion	Starts developing marketing activities
2001	JV with Italian components manufacturer to produce soles	Control development and supply of specialized component (sole)	Starts developing components activities (soles) with permeability to inputs and outputs and modularization
2003	Leads of Frontshoes consortium for acquisition of retail chains in France	Expand retail channels for Portuguese branded shoes	Adds permeability on output to distribution and retail activities (distributes and sells other brands)
2004	Creation of new design unit  Expansion to new market segments (leather accessories, young and high-end segment)	Fully control design activities  Sustain growth	Ends input permeability of design activities  Expand market boundaries
2005	Creation of company to sell Aerosoles shoes in UK: response to end of exclusive M&S agreement  Re-organization of group into three holding units	Retaliation against a co-opetitor	Starts developing retail activities in the UK  Full modularity of commercial, manufacturing and services units;

**Figure 1 – The value system of the footwear industry**



**Figure 2 – Boundary architecture of the sample firms in 1990**

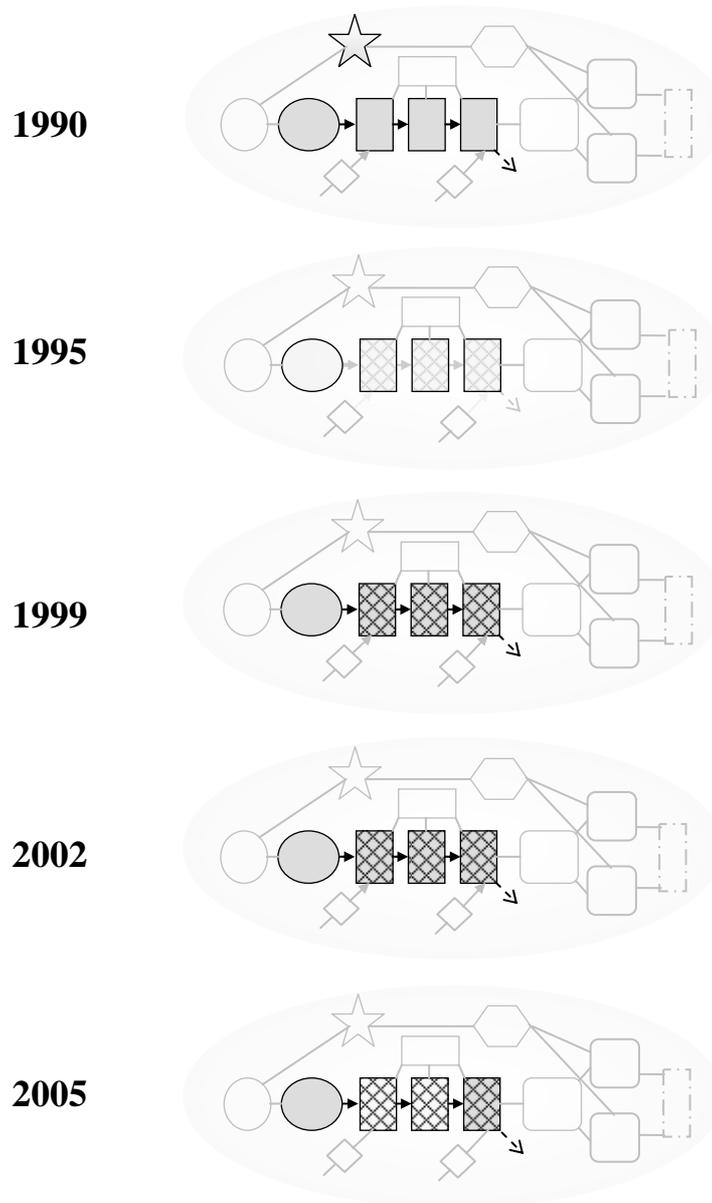


**Boundary architecture**

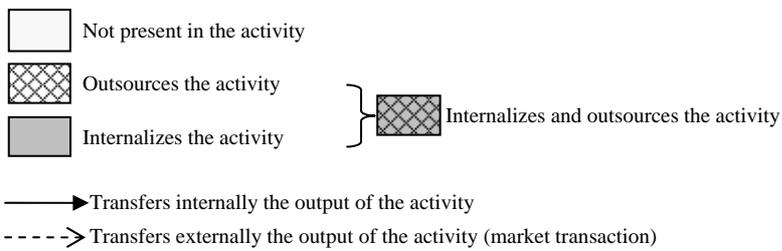
-  Not present in the activity
-  Subcontracts the activity
-  Internalizes the activity
-  Internalizes and subcontracts the activity

-  Transfers internally the output of the activity
-  Transfers externally the output of the activity (market transaction)

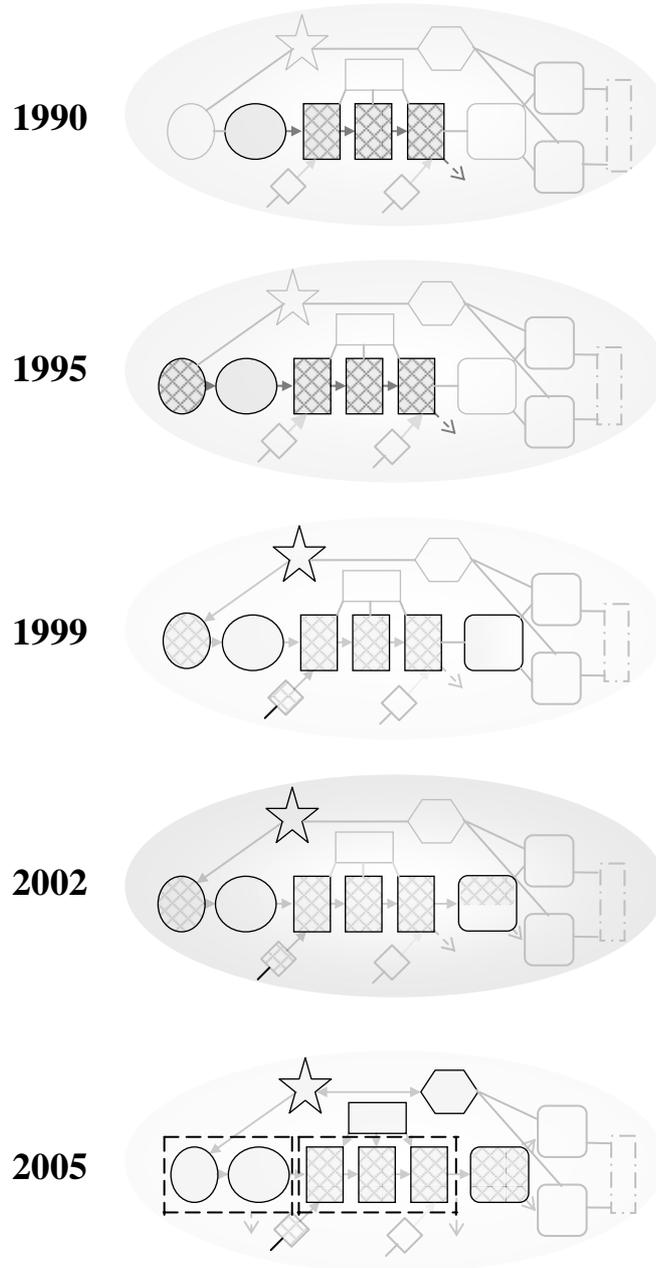
**Figure 3 – Evolution of boundary architecture at Basilius**



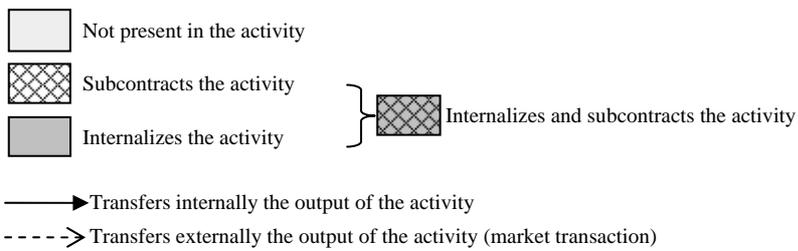
**Boundary architecture**



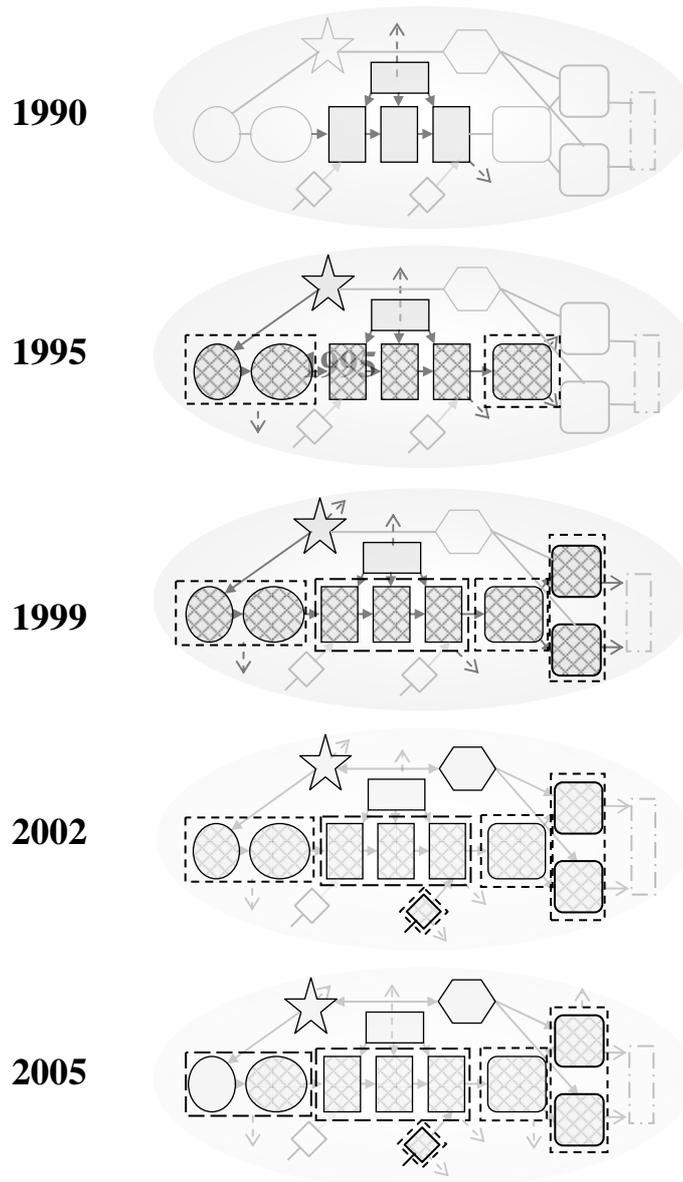
**Figure 4 - Evolution of boundary architecture at Sampaio**



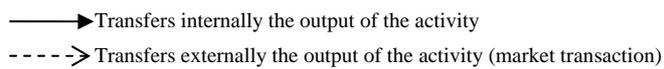
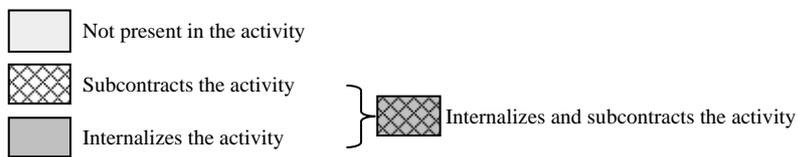
**Boundary architecture**



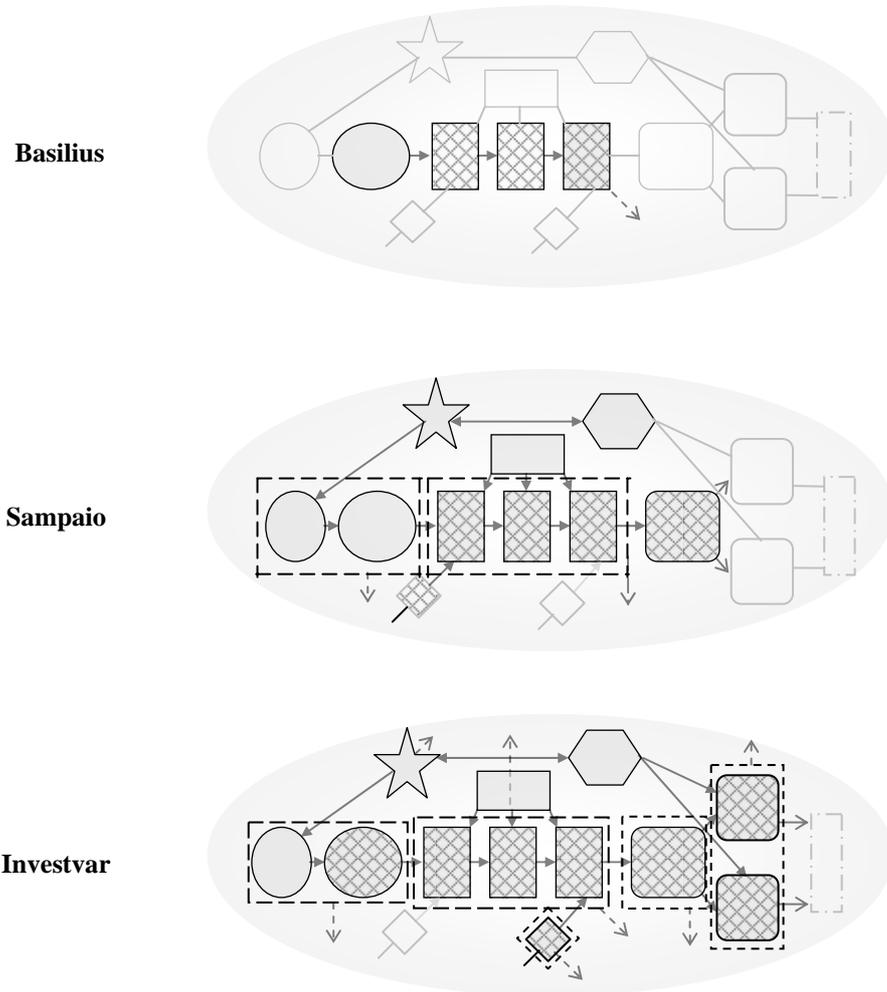
**Figure 5 - Evolution of boundary architecture at Investvar**



**Boundary architecture**



**Figure 6 – Boundary architecture of sample firms in 2005**



**Boundary architecture**

-  Not present in the activity
-  Subcontracts the activity
-  Internalizes the activity
-  Internalizes and subcontracts the activity
-  Transfers internally the output of the activity
-  Transfers externally the output of the activity (market transaction)