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Market leadership in Brazil's ICT sector: The cases of Totvs and Positivo

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DISCUSSION PAPER

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Bruno César Araújo
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Brasília, January 2015

MARKET LEADERSHIP IN BRAZIL'S ICT SECTOR: THE CASES OF TOTVS AND POSITIVO¹

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DISCUSSION PAPER

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ABSTRACT

The purpose of this paper is to examine the explaining factors of the market leadership of two Brazilian companies in specialized fields of the Information and Communication Technologies (ICT) sector. Whilst Totvs is a software house, dedicated to the Enterprise Resource Planning (ERP) segment since its foundation, Positivo is an assembly line of personal computers (PCs), which emerged as a spin-off from an economic group originally focused in educational services. Throughout the paper, case studies of both companies are performed, based on literature review, financial statements, press articles and in-depth interviews. In both cases, national idiosyncrasies have supported the emergence and consolidation of each company as a market leader. Notwithstanding economies of scale and scope are essential sources of competitive advantages in the ICT sector in general, both cases exhibit a combination of two other factors that counterbalance their initial disadvantages with respect to their international competitors. First, governmental support has been crucial, although using different approaches. Totvs' leading position has been reinforced by financial support from the Brazilian National Development Bank (BNDES), while Positivo has benefited from trade protectionism, under the "infant industry" argument. Second, both companies have achieved market leadership through the development of customized products and solutions to specific market segments that have not been properly addressed by world industry leaders, combining some technological capabilities with marketing capabilities. Recently, both companies have made efforts to enter the global market. Up to now, they both have focused on Latin America, in order to explore cultural, idiomatic and institutional similarities with Brazil.

Keywords: Totvs; Positivo Informática; market leadership; information and communication technology (ICT).

SINOPSE

O objetivo deste trabalho é analisar os fatores que explicam a liderança de mercado de duas empresas brasileiras em campos especializados das tecnologias de informação e comunicação (TICs). Enquanto a Totvs é uma empresa de *software*, dedicada ao segmento de sistemas de gestão empresarial (*enterprise resource planning* – ERPs) desde sua fundação, a Positivo Informática S/A concentra-se na montagem de computadores pessoais (*personal computers* – PCs), tendo surgido como empresa derivada (*spin-off*) de um grupo econômico originalmente focado em serviços educacionais. Este trabalho efetua um estudo de caso de ambas as empresas, com base em revisão da literatura e entrevistas semiestruturadas. Em ambas as situações, supõe-se que as idiossincrasias nacionais foram responsáveis pelo surgimento e pela consolidação de cada empresa como líder de mercado. Não obstante que economias de escala e escopo sejam fontes essenciais de vantagens competitivas no setor das TICs, os dois casos estudados apresentam combinação de dois outros fatores que contrabalançam suas desvantagens em relação aos seus concorrentes internacionais. Em primeiro lugar, o apoio governamental tem sido crucial, embora tenha sido realizado por meio de abordagens diferentes. A Totvs foi fortalecida pelo suporte financeiro do Banco Nacional de Desenvolvimento Econômico e Social (BNDES), enquanto a Positivo se beneficiou de protecionismo comercial, com base no argumento da “indústria nascente”. Em segundo lugar, ambas as empresas alcançaram a liderança do mercado por meio do desenvolvimento de produtos customizados e soluções para segmentos de mercado específicos – que não haviam sido devidamente atendidos pelos respectivos líderes mundiais –, ao combinar competências tecnológicas e mercadológicas. Recentemente, as duas empresas têm realizado esforços para entrar no mercado global. Até agora, ambas têm foco na América Latina, com o objetivo de aproveitar as similaridades culturais, idiomáticas e institucionais com o Brasil.

Palavras-chave: Totvs; Positivo Informática S/A; liderança de mercado; tecnologia de informação e comunicação (TICs).

1 INTRODUCTION

Since the early 2000's, the potential of emerging countries to transform the dynamics of world economy in an unanticipated way within a near future has been extensively discussed. Two stylized facts illustrate such increasing interest. First, developing nations have achieved consistently higher rates of economic growth than the developed countries, especially after the financial crisis that arose in 2008. Second, developing nations have been progressively growing participation in the global market. Currently, an increasing number of world largest companies have been originally established in emerging countries, and many of them are from Brazil, India and China.

Along with the expected changes in the regional distribution of world's wealth, technical progress is a key factor to understand the transformation of economic transactions. In this perspective, Information and Communication Technologies (ICTs) exhibit a large and profound potential to transform social and economic relationships. Not only they are at the core of the globalization process, but they also generate positive externalities on overall productivity. Furthermore, ICTs firms are usually very intensive in Research and Development (R&D) activities, which produce innovations that reinforce positive effects all over the economy.

In Brazil, the largest firms in software and hardware segments are, respectively, Totvs and Positivo Informática. The former specialized in developing Enterprise Resource Planning (ERP) systems, while the latter focused on personal computer (PC) manufacturing. Moreover, both are nationally-owned groups and have recently adventured in the global markets. What factors explain the leadership of these Brazilian enterprises in so competitive markets, in which Brazil is not a traditional player? To answer this question, we develop two case studies, combining information from previous studies, annual reports and financial statements, sector analysis made by specialized consulting companies and other relevant documents, as well as in-depth interviews with company's executives as well as with sector specialists from the Brazilian National Development Bank (BNDES).

In both cases, though, it is likely that national idiosyncrasies – such as public policies and institutional framework – supported the emergence of each company as a *market leader*. From this point onwards, strong marketing capabilities helped to

forge the business model and consolidate the leadership of these companies in their market segments, but the leading position in Brazil has not been enough to put these companies technologically ahead of their competitors. This concept of *market leadership*, developed in Cavalcante and Araújo (2013), is an adaptation of the idea of *industrial leadership*, defined by Mowery and Nelson (1999), and seems to be more applicable to the situation in hand.

Notwithstanding that economies of scale and scope are essential sources of competitive advantages in the ICT sector, both cases indicate a combination of two factors that could counterbalance initial scale and scope advantages of foreign-owned firms. First, governmental support has been crucial, although using different approaches. Totvs' leading position was reinforced by financial support from BNDES, while Positivo benefited from trade protectionism, under the "infant industry" argument. Second, both companies have achieved market leadership through the development of customized products and solutions to specific market segments that have not been properly addressed by world industry leaders.

Besides this introduction, the paper is structured in four additional sections. In section 2, a theoretical review on the dynamics of the ICT sector is presented. In sections 3 and 4, the case studies of Totvs' and Positivo's market leadership in its respective segments are examined. Finally, in section 5, the main findings of the paper are highlighted.

2 THE DYNAMICS OF THE ICT SECTOR

Since the late 1990's, the dynamics of the ICT sector has been going through rapid transformation, in a process usually designated as *convergence*. Convergence between economic sectors occurs when structural changes combine markets previously regarded as distinct. With respect to ICT, these structural changes have converged industries, such as semiconductor, hardware equipment, telecommunication services, computer software and applications. In 1998, Duysters and Hagedoorn (1998) have already discussed the reasons behind the convergence of these industries. Although, at that moment, convergence was still at an initial stage, they have predicted that it would form an economic sector combining information and entertainment – also called as *infotainment*.

Social and economic benefits from ICTs arise from, at least, two different sources: expressive volume of investments in R&D and transversal effects over productivity of other economic activities. With respect to the first factor, the participation of ICT firms in total R&D investments is very significant. Turlea *et al.* (2011) reveal that, among 1,350 world's largest companies, 34% of their R&D investment is carried out by ICT firms. Moreover, these investments may foster innovations that may positively affect the economy as whole.

Concerning transversal effects of ICTs, some authors (Atkinson, 2009; Guerrieri and Padoan, 2007) state that their large transforming potential in the economy results from their characteristics as a general purpose technology (GPT). Such technologies have in common three distinguishing features: *i*) widespread use; *ii*) price and performance improvement over time; and *iii*) facilitation to introduce innovative products, processes, and business models. ICTs, for instance, are at the core of current process of globalization, as they provide tighter and broader integration of product, service, financial, and labour markets. Moreover, they are also responsible for remodelling internal processes of organizations, reducing transaction costs and increasing productivity of different economic activities. The reasons behind these capabilities may be summarized as collapsing prices, soaring performance, and enhanced usability, which allowed companies to rearrange their demand for inputs, workers, and capital.

The ICT sector includes a wide range of activities, from equipment manufacturers to software developers. Each segment, at some extent, has its own dynamics. Following Fransman's (2007) analytical framework, ICT sector may be regarded as an ecosystem, consisting of four modularized layers: *i*) equipment manufacturers; *ii*) network operators; *iii*) platform, content and application providers; and *iv*) consumers. By *ecosystem*, it is meant to refer to a number of organisms that interact with each other within a given environment. Box 1 presents the simplified version of Fransman's Ecosystem Layer Model (ELM).

CHARD 1

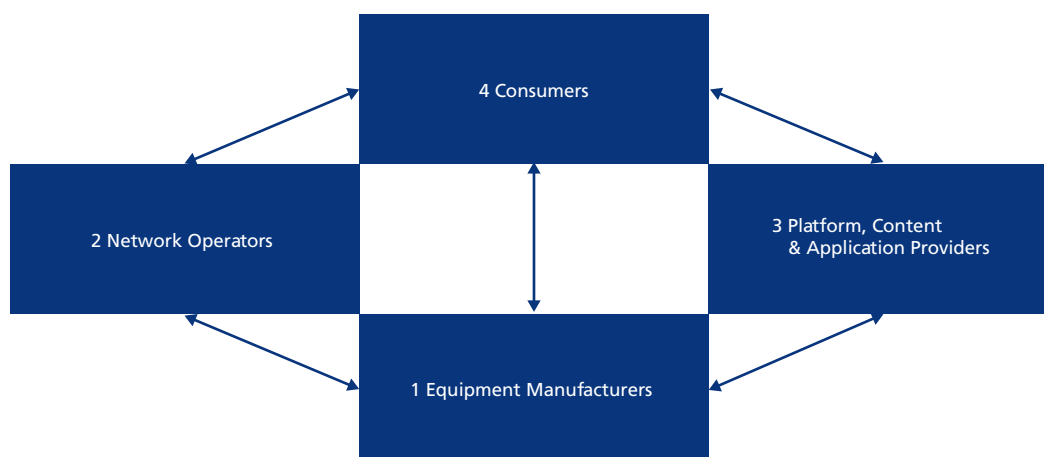
Simplified version of Fransman's ecosystem layer model (ELM)

LAYER 4 – CONSUMERS Composed by final consumers that purchase both goods and services
LAYER 3 – PLATFORM, CONTENT and APPLICATION PROVIDERS Firms that provide information, software, entertainment, and other services
LAYER 2 – NETWORK OPERATORS Firms that provide telecom services, using wireless, wireline, cable TV, and satellite technologies
LAYER 1 – EQUIPMENT MANUFACTURERS Firms that produce telecom equipment, computers, and consumer electronics

Source: adapted from Fransman (2007).

Economic agents of each layer interact with others within an environment shaped by the existing institutional framework, which define rules and norms that influence agents' behaviour. Institutional framework is composed by financial institutions, regulators, standardization forums, universities and other entities. Diagram 1 exhibits the relationships between agents of each layer.

DIAGRAM 1
Relationships between layers



Source: adapted from Fransman (2007).

In figure 1, arrows represent bidirectional relationships between layers, which refer to possible interaction between agents. In total, there are six classes of mutual relationships. Each one occurs in four distinct dimensions.

1. Financial.
2. Material (products and services).
3. Information.
4. Innovation (creation and diffusion).

For instance, the purchase of equipment by a consumer would involve all dimensions of the relationship. Dimension 1 is related to the payment made by the purchaser to the seller, while dimension 2 concerns the delivery of the good in the opposite direction. Dimension 3 is addressed when information considering consumers' preferences is gathered. Finally, dimension 4 reflects the use of available resources (financial, material, and information) to create and diffuse new or improved products.

Fransman (2007) recognizes that innovation is at the core of the ICT ecosystem, and follows a schumpeterian/evolutionary approach to explain the different forms to generate it. According to the model, innovation denotes the creation of internationally competitive output in at least one of four possibilities:

- new or improved products or services;
- new or improved processes;
- new or improved forms of organizations; and
- new markets.

In a competitive environment, the variety of innovations that were generated in the previous phase passes through a selection process, and only a few survive. So, firm performance varies according to internal capabilities and systems factors¹. Although not detailing the nature of internal capabilities, Fransman (2007) segments system factors in four sets of influences:

- intensity of competition and/or cooperation between firms (also known as “copetition” process);
- financing (facility and costs of loans and/or equity funds);
- sector regulation and anti-trust legislation;
- other institutions, such as universities, standardisation forums, and intellectual property protection.

Using a very similar approach, Mowery and Nelson (1999) and Malerba and Mani (2009) also classify the sources of industrial leadership into internal capabilities and system factors. With respect to internal capability building, the authors identify two possible sources: *i*) internal; and *ii*) external². Regarding system factors, government support is added to the system factors identified in Fransman's model.

1. In Fransman (2007), internal capabilities are described as embedded capabilities, and system factors are mentioned as the environment, or the national context.

2. According to Malerba and Mani (2009), internal sources are categorized in: *i*) human resources; *ii*) learning by doing; *iii*) marketing production; and *iv*) R&D. External sources are divided in: *i*) consulting; joint ventures and alliances; *ii*) mergers and acquisitions (M&A); *iii*) purchase of technology; and *iv*) clusters and spillovers.

Innovation is an important aspect behind the superiority of a firm within a sector, but it is not the only one. In the late 1990s, Mowery and Nelson (1999) have proposed the expression *industrial leadership* to designate an analytical model that evaluates which factors explain superior firm performance.

Mowery and Nelson (1999) explore the explaining factors of industrial leadership, which may be summarized as: *i)* resources; *ii)* institutions; *iii)* markets; and *iv)* technology. According to the authors, the locus of industrial leadership may be the nation-state, the firm, the region, the network, and the sectoral support system. Compared to Fransman's model, the concept of industrial leadership unveils a more general approach, which is applicable not only to ICTs but also to any other sector.

Following Mowery and Nelson's methodology, three works related to ICT sector are worthy to mention. First, Langlois and Steinmuller (1999) examined the evolution of worldwide semiconductor industry and perceived three factors that elucidated the leadership of North-American firms. These factors were the pattern of end-use demand, the decentralized market structure, and government policies. Second, Bresnahan and Malerba (1999) studied the dynamics of firms' and nations' competitive capabilities in the computer industry. They concluded that North-American leadership persisted despite of shifting sources and locations of competitive advantages. They also discovered that technical progress was demand opening and competence widening, different segments had a coevolutionary process, models of firms varied according to each specific segment, and public policies played different roles according to the country and segment. Finally, Mowery (1999) analyzed the computer software industry. Once more, the United States was found to be the locus of industrial leadership, because of its characteristics of "lead adopter" of innovations that were subsequently diffused throughout the world.

Nevertheless, all of the referred approaches have been developed to examine different industries, including the ICT sector, within the environment found in advanced countries – more specifically United States, Japan and Europe. Among other similarities, these economies usually share, at least in theory, three important characteristics: *i)* high income; *ii)* free international trade; and *iii)* free market. On the other side, emerging countries, such as Brazil, are regularly classified as low or middle-income economies. They are also typically subject to some kinds of trade restrictions, which vary in extension, as well. Governmental intervention and regulation is generally more relevant to economic outcomes. This combination of factors generates market environments with different dynamics from of those found in developed countries.

Thus, domestic firms may rise as leaders in regional or national environments, as they may be more adapted to these particular conditions. Despite not being ahead of their international competitors in terms of overall capabilities, context-tailored innovations (any of the four aforementioned possibilities) or best adjustment to institutional framework (public policy incentives, cultural factors etc.), for instance, may provide advantages to domestic firms that compete locally. Consequently, the concept of industrial leadership needs to be adapted to this particular kind of environment. Although retaining all analytical pieces of the original Mowery and Nelson's framework, the expression *market leadership* seems to be more applicable to the cases under study, as developed in Cavalcante and Araújo (2013).

3 TOTVS' LEADING POSITION IN BRAZILIAN ERP SEGMENT

This section explains Totvs' leading position in ERP, and it is subdivided in six subsections. These subsections aim at contextualizing the dynamics and technological requirements of ERP and its evolution in Brazil; characterizing Totvs' trajectory and the internationalisation process of the group; discussing the sources of marketing and technological capability building; and finally discussing the role of system factors, especially the Brazilian government support.

3.1 ERP: Dynamics and technological requirements

ERP – Enterprise Resource Planning – are systems that integrate internal and external management information across an entire organization, embracing finance/accounting, manufacturing, sales and service, customer relationship management, etc.³ ERP systems automate this activity with an integrated software application. It facilitates the flow of information between all business functions inside the boundaries of the organization and manages the connections to outside stakeholders, including, for example, supply chain management features.

The most important differentials of ERP applications are: *i*) price; *ii*) ease of use; *iii*) system reliability and adequacy to current legislation; *iv*) compatibility with other

3. From: <<http://goo.gl/dedSK7>>.

ERP systems – especially when it is the case for supply chain management –; and *v*) “good dialogue” with the Internet and cloud computing features.

Business model in ERP are mostly based on the SaaS model – software as a service. It means that client firms will not only buy ERP applications in a “once-and-for-all” basis, they will demand maintenance and updates. According to this model, costumers rely on updated applications; both from technological and legislative perspectives, and developers may have a stable source of revenues. However, it demands continuous improvements in software applications and its possible interactions, besides some research on the adaptation of tax legislation changes whenever it is necessary.

Typically, ERP market is segmented in two dimensions: *i*) size of client firms; and *ii*) sectoral peculiarities of client firms. Regarding the first dimension, large firms tend to demand specific ERP solutions, and integration with suppliers’ systems is generally important. Inversely, small firms tend to demand rather generic solutions, but they are very concerned with price, billing and “package” flexibility.

Thus, development requirements are very different to meet the demands of so distinct segments. For large firms, customisation is important, so the ability to understand client company’s peculiarities and develop solutions for that is a competitive advantage. For small firms, price competitiveness may be achieved with scale. Hence, if a software house is able to develop solutions that fit to many firms, the final price may be lower. Moreover, small firms may not be interested in a whole ERP solution; some “parts” or “modules” of the solution may be enough. This is the case, for example, of small firms only interested in fiscal modules of ERP to meet Tax Authority requirements, but not necessarily interested in inventory management modules. Indeed, the Internet has been a very quick way to deliver “packages” in a more flexible and cheaper way.

The sector of client firms is another important segmentation, due to some sectoral peculiarities. Understanding these sector-level specific features allows the development of ERP solutions that may be the top-of-mind for a large number of firms of that sector – hence, achieving scale and reducing costs. ERP solutions that fit specific sector-level needs are called Verticals. Vertical development is midway between customization and large-scale software development, and requires some specific knowledge of distinct segments - ranging from dental clinics from wholesale, for example.

Gartner⁴ points out major technological trends and challenges in ERP for the next years. These trends include:

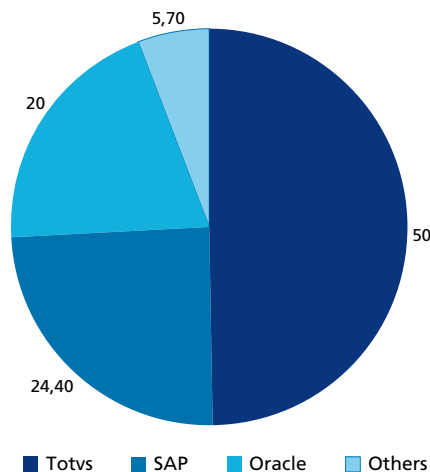
- cloud computing;
- systemic and sophisticated analysis of data;
- client computing (powerful servers, client desktops);
- “green ICT”: logistics optimization, electronic management of documents, videoconferences;
- pod-based data centres;
- social computing; and
- security and intelligence.

3.2 ERP in Brazil

According to Gartner,⁵ the Brazilian market for ICT in general is estimated in US\$ 15 billion, with estimated accumulated growth of 11% a year. Keeping this pace, it is estimated that by 2014 the country will be representing 50% of the Latin American market, and 2% of world market.

GRAPH 1

The Brazilian ERP Market (US\$ 1.5 billion)



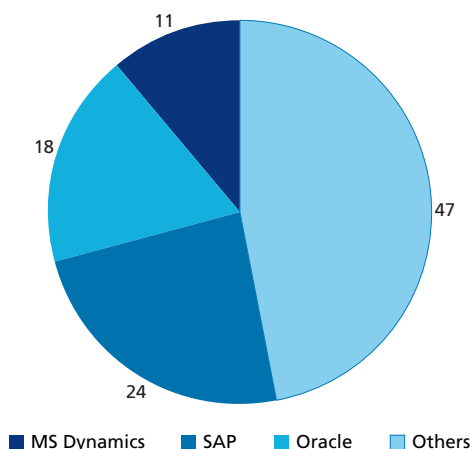
Source: Totvs (2012).

4. According to: <<http://goo.gl/a004zS>>. Accessed in: December 31st, 2012.

5. From: <<http://goo.gl/NGMjh2>>. Accessed in: December 31st, 2012.

According to Totvs financial statements (Totvs, 2012), the Brazilian ERP market is estimated in US\$ 1, 5 billion a year. In 2011, Totvs had around 50% of this market, according to Graph 1. This is very different to the world scenario, where leading companies and SAP, Oracle and Microsoft, as depicted in graph 2.

GRAPH 2
The World ERP Market (between US\$ 21⁶ and US\$ 50 billion)⁷



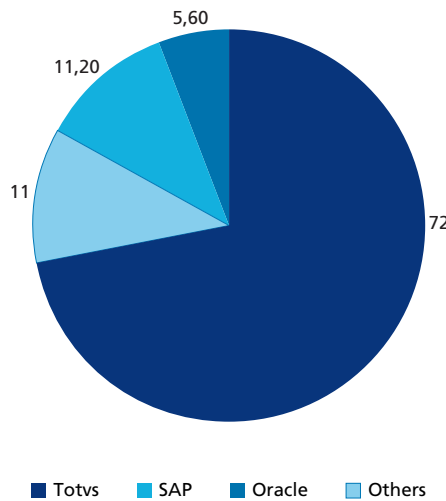
Source: <<http://whatiserp.net/erp-report/erp-market-share-and-vendor-evaluation-2011/>>.

Although the Brazilian is relatively small compared to the world market (2%), it has a great potential for growth. The reasons are that only 9% of Brazilian firms adopt ERP solutions, and economic growth has fostered the dissemination of ICT technologies in general. Moreover, tax law requirements, such as the compulsory adoption of the Electronic Invoice System in many states in Brazil. Even not being so big as SAP and Oracle, Totvs is currently the 6th largest ERP developer in the world. Totvs market share is even higher when it is only consider the small and medium enterprises market, the main focus of the company and the fast-growing segment in ERP, as depicted in graph 3.

6. According to: <<http://goo.gl/ydQ4ns>>. Accessed in: January 3rd, 2013.

7. According to Jacobson et al., 2007.

GRAPH 3
The ERP Market for SME in Brazil



Source: Totvs (2012).

The question is: why national ERP firms eventually have a competitive advantage over MNE's in Brazil? The answer is that Brazilian market has some idiosyncrasies that do not allow Global Players to settle down the Brazilian market without major adaptations. Some of these idiosyncrasies are the unstable macroeconomic environment, at least until the late nineties, and the complexity and constant changes in Tax Legislation. Totvs estimates that there is 1 change in tax legislation every 3 days in Brazil, if one considers the three levels of tax authority (city, state and federal levels). Another problem is the complexity and rigidity of labour legislation, considered inadequate to a very dynamic segment such as software development. Totvs is a company aware of this environment, and has developed an adequate business model based on SaaS and reliability regarding the updates on tax legislation changes. Moreover, it has invested on flexibility of its solutions, and relies on a well-established distribution network, especially in medium-sized cities. These are some factors that may explain Totvs' leading position, and this model has been replicated in other countries, especially in Latin America. In the next section, we discuss the factors that had lead Totvs to its current position.

3.3 Totvs' trajectory

In 1969 a services bureau called SIGA (*Sistema Integrado de Gerência Automática* – Integrated System of Automatic Management) was created by Mr. Ernesto Mario Haberkorn in São Paulo, SP. The SIGA system allowed centralized enterprise

management, whose main purpose was to automate administrative processes. In 1983, with the advent of microcomputers, Microsiga Software S.A. was established by Mr. Habekorn in a partnership with Laercio Cosentino. Microsiga is the forerunner of Totvs. Currently, Mr. Cosentino is the CEO and Chairman of the Board of Totvs. Microsiga's main purpose was to develop management softwares for personal computers, targeting the small and medium enterprises segment.

According to the company, during the 1980s and the mid-1990s Microsiga grew relying on a franchise system and strategic alliances with major global companies such as Dell, Microsoft, IBM, Intel, Oracle, Novell and Progress, in order to promote Microsiga's products and also for benchmarking.

In 1998, the company began to develop vertical solutions. Verticals are key pillars to Totvs' market strategy, because the company may offer business management solutions suited to the needs of the customers of a specific segment without losing scale advantages.

In 1999, the company used the Advanced Protheus Language (ADVPL) for the first time. The programming language took 7 years to be developed. That same year, Advent (Advent International Corporation) came as a foreign partner, with a 25% share in the company. The company changed its status for an open capital company, preparing for the IPO.

From 2003 onwards there was a process of vigorous growth of the company and increasing profit margins. In its growth strategy, the company embarked on an aggressive mergers and acquisitions. From this moment on, Microsiga acquired several other companies in Brazil and abroad as part of its growth strategy.

In 2005, Microsiga admitted BNDESPar as a partner (for BRL 40 million, or US\$ 16.4 million). BNDESPar is the Brazilian Development Bank's branch responsible for managing the Bank's shares on publicly or privately owned companies or groups. With the arrival of BNDESPar, Microsiga could acquire Logocenter – at the time, Brazilian 4th largest software developer – making it 40% larger with this acquisition, and also rebuy Advent's participation in the company. Also in this year, Microsiga changed its name for Totvs, the company's current brand.

In March 2006, Totvs went public on Bovespa (the São Paulo Stock Exchange), meeting the “Novo Mercado” standards (attaining the highest level of Corporate Governance requirements). Totvs’ IPO raised US\$ 214 million. With cash resources, Totvs acquired RM Sistemas SA, an ERP developer, also in 2006.

The admission of BNDES as a partner changed, *per se*, the asset structure of the group, and this trend was reinforced with the successful IPO. From a company which relied basically on profit reinvestment to grow, nowadays the more than one third of the groups’ assets are in third parties’ hands. With this financial strategy, Totvs has been internalizing skills in segments that did not act, has eased the pressure of competition and has strengthened its distribution network.

In 2007, Totvs also acquired Midbyte (vertical developer, retail segment), BCS (legal segment), and held a joint venture with Quality to create the TQTVTD, for the production of middleware for Digital TV. At the same year, Totvs established EuroTotvs, based in Portugal. TQTVTD represents an attempt to diversify technology and business focused on Digital TV, while EuroTotvs aimed to broaden the international integration into Europe.

Regarding Digital TV, TQTVTD developed a middleware – the ByYouTV – which is also a sticker centre, that is, it is a platform that delivers the so-called stickers, applications developed for TV on various topics: news, social networks, entertainment, commerce, home banking and so on. Digital TV is expected to be a big business in Brazil. However, five years later after the release of the initiative, market results are rather modest. The reason is that when Brazilians seek for Digital TV, they buy Digital TVs with embodied converters and middleware, taking advantage of favorable credit conditions and tax reduction measures. Hence, people are skipping the adoption of converters for ordinary TVs, and foreign TV manufacturers embody their own middleware.

In August of 2008, there was the biggest step in the group’s history: the merger with Datasul SA, Totvs strongest national competitor, but a company more targeted to medium and large enterprises. It is worthy to notice that Datasul was larger than Totvs

at the time, being the 9th largest ERP developer in the world.⁸ By itself, this merger would mean a great leap in scale of production and market access of Totvs. In fact, the combination Datasul/Totvs meant a structure 130 distribution franchises in Brazil, 18 international franchises and a network of over 600 vendors. They held together 21,000 clients and 38% of the national market.

Later in 2008, Totvs re-structured its franchise system and released the TotvsUp system (which is currently the TotvsByYou), a of web-based relationship platform with its clients. This platform enables the hiring of services and the development of solutions in a modular and remote way, reducing costs for customer. This kind of initiative is in line with the global trend in ERP, which involves the provision of *Software as a Service* (SaaS) via the web.

Currently, the group is the ERP leader in Brazil, holding 50% of the market and more than 26,000 customers in 23 countries. Its net revenues reached US\$ 765 million in 2011 (CAGR of 18.4% a.a 2006-2011), and Totvs employs around 9,000 workers, most of them in Brazil. It is also the largest developer of business management applications located in an emerging country, and the 6th ERP developer in the world. It offers vertical solutions in ten segments: design and construction, distribution and logistics, agribusiness, legal, educational, financial services, manufacturing, healthcare, and retail services. It is considered the 56th company in the list of 100 best-performing IT companies in the world (according to Business Week) and it is among the top 1,000 R&D investors in the world (according to Booz&Co). Nowadays, Totvs' is still interested in growing through M&A, especially vertical developers, and has put big effort in unifying and controlling its distribution channel (one must remember that Microsiga grow relying on its franchise system). International growth will continue to be targeted at Latin America and Africa, considered emerging regions to ERP.

3.4 Totvs' internationalisation process

With regard to overseas expansion, Totvs performs Greenfield FDI, mergers, acquisitions and partnerships with foreign enterprises. By the way, the latter seems to be the most preferred way of internationalisation of Brazilian companies, as noticed in

8. According to Tigre (2009), the merger with Datasul involved BRL 700 million (or US\$ 434 million). BNDES provided 57.7% of the funds for the operation.

Cavalcante and Araújo (2013) and Carvalho et al. (2010). It should be noticed that the international presence of Totvs expanded due to the merger with Datasul, which already had some international presence.

The first step towards internationalization through offices abroad was given by Microsiga, in Argentina (1997). The next step was to buy part of Sipros, a Mexican ERP company, which resulted in Microsiga Mexico in 2003. Already under the brand of Totvs, the group established EuroTotvs in 2007 in Portugal, with a view to the European market (especially Portugal and Spain). The group also has an U.S. office. In 2011, the company announced a franchise in Lima, Peru, to serve the SME market segment in manufacturing, services, retail and distribution and logistics. The former group Datasul, just before the merging, had a presence in Argentina, Mexico and USA. Totvs international presence is depicted in table 1 below.

TABLE 1
Totvs' International Presence

Enterprise	Location	Kind of investment	Year
Totvs Argentina S.A. (Totvs Argentina)	Buenos Aires, Argentina	Greenfield. Afterwards, it was merged with Datasul Argentina	1994
Totvs México S.A. de C.V. (Totvs México)	México City, México	M&A (Sipros). Afterwards, it was merged with Datasul Mexico	2003
EuroTotvs Ltda.	Portugal	Greenfield	2007
Totvs Corporation (Totvs Corporation)	EUA	n.a.	n.a.
Totvs Peru	Lima, Peru	Franchise	2011

Source: own elaboration.

Notwithstanding, Totvs international presence is not so significant in terms of relative importance to total sales. Precise information is not available, but market specialists argue that no more than 5% of Totvs sales come from abroad (Multinacionais..., 2010).

Indeed, Totvs recognizes that it is very hard to compete in Eastern markets and also in Europe and North America, for distinct reasons. Competing in Eastern markets imposes the technological challenge of dealing with 2-bytes characters, which implies higher costs. The European market has its own regional leaders (such as SAP), which are the "top of mind" option for many business segments. In North America, there are also large "top of mind" companies such as Oracle, Microsoft and also SAP, but there are also very strong vertical developers, which are very competitive due to the large scale of the American market.

Hence, Totvs focuses on the Latin American and African markets. These markets have very similar characteristic to the Brazilian market – low penetration rates of PCs in the SME segment, high growth rates of the ERP market, few competitors, context of economic fluctuations and constant changes in legislation. The African market also has a great growth potential, and Totvs is using EuroTotvs in Portugal to serve the Portuguese-speaking African countries at first. According to Totvs, growth rates of the ERP market in some countries of Latin America and Africa may reach 30% a year in this decade. In a Totvs' director's words, "Totvs wants to be in Latin America what SAP is in Europe. For example, the German SAP has 85% of the Austrian ERP market".

3.5 Sources of capability building

3.5.1 Totvs' marketing capabilities

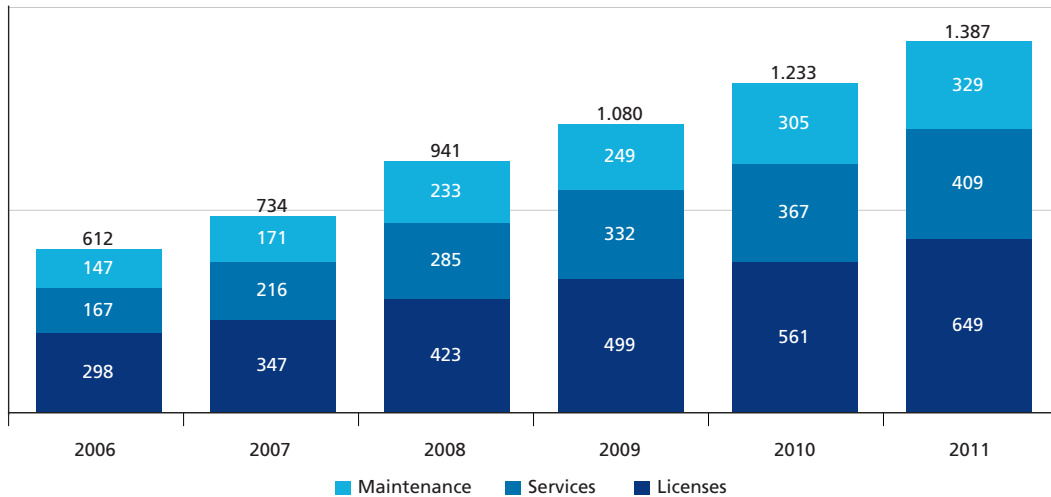
It is not easy to draw a clear line dividing marketing and technological capabilities – indeed, they are strongly tied to each other. For example, focus on SMEs demands less customized ERP solutions, but in turn they may demand a higher degree of flexibility in commercial terms. In short, Totvs has put some effort in developing a rather flexible SaaS scheme to its clients, aggregating their needs as much as possible in verticals and modular solutions, everything supported by a strong brand. These features are detailed as follows.

Software as a Service Approach (SaaS): the provision of software as a service is a global trend and refers to a form of distribution and marketing according to which the supplier is responsible for all the necessary infrastructure for the delivery system (servers, connectivity, information security) and the customer uses the software via the Internet, paying an amount for recurring use.⁹ In the case of ERP systems, the main advantages to the customer are able to rely on system upgrades and adjustments to changes in tax legislation. For companies, the advantage is straightforward, since they may rely on recurring revenues.

In fact, Totvs ensures that its clients will have a new version of their softwares every two years, and all changes in tax legislation will be promptly updated without additional costs. This has proved to be a marketing differential, since Totvs' main competitors charge for these updates, or changes in tax legislation take some time to be implemented. As a result, most of Totvs' revenue comes from maintenance, as displayed in graph 4 below.

9. According to the Wikipedia, disponible in: <<http://goo.gl/KWtEk9>>. Accessed in: September 28, 2011.

GRAPH 4
Totvs' revenue composition



Source: Totvs (2012).

- *Customization through verticals:* Commercially speaking, Totvs offers two dimensions of customization for SMEs: verticals and the stage of development of managerial capabilities. The management development cycle is divided into four phases: control (accounting, cost reduction), productivity (automation, customers' service), relationship (beginning of SCM implementation), and business collaboration (full SCM). To some extent, the division of the management development cycle was a way to develop "vertical" solutions aimed at these different stages.
- *Flexible commercial approach:* Totvs has developed many ways to offer and charge for its technological solutions. For this flexibility, the intensive use of the Internet has been crucial, following a worldwide trend. A client may hire an ERP solution that fits best to its needs by choosing the modules available for sale online. Two examples are the TotvsOcean and TotvsByYou projects.
- TotvsOcean allows modularization of Totvs ERP solutions via web. The TotvsByYou project is a collaborative platform via cloud computing used by Totvs clients and software and apps developers. The TotvsByYou environment allows for knowledge and experience sharing, as well as template files and even apps and software modules.
- *Capillarity and distribution:* Totvs inherited a sound distribution network from Microsiga, Datasul and others. Of course, Internet is a very flexible way to deliver Totvs' solutions, but one must remember that many of Totvs' clients are first-time users, who may prefer traditional selling approaches. Hence, a consolidated and unified distribution network may constitute a marketing differential.

- *Strong branding*: Strictly linked to the previous feature, Totvs has invested a lot in branding and advertising since the consolidation of the group. This is consistent with the objective of being the “top of mind” brand in ERP, especially for SMEs. Of course, Totvs inherited part of the prestige and recognition of previous brands (Microsiga, Datasul, RM, Logocenter and others).

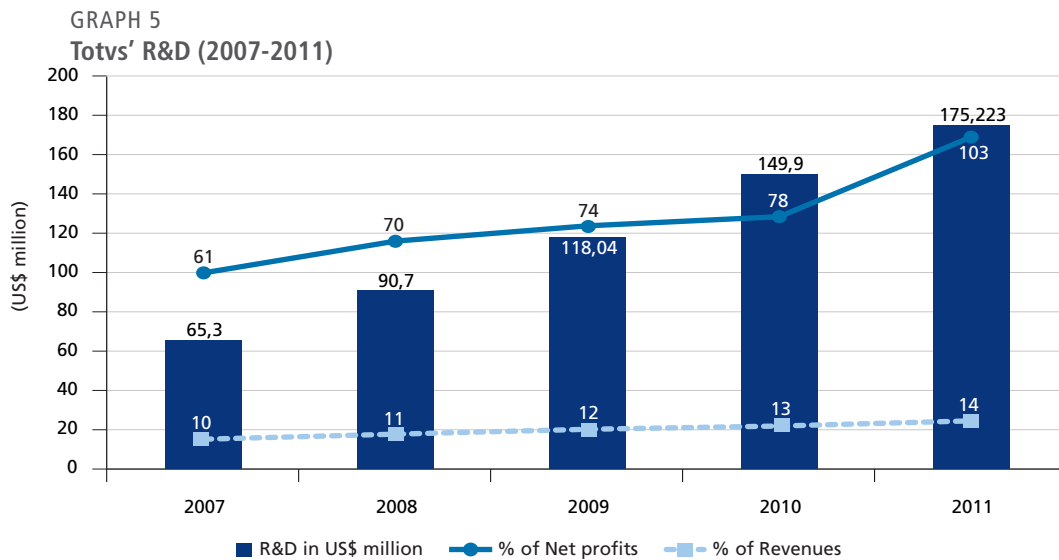
3.5.2 Totvs’ technological capabilities: internal sources

Technological capabilities are developed to support business strategies. In this sense, Totvs’ path for technological development has been oriented by the need of the development of verticals, commercial flexibility and more recently the use of cloud computing and social network resources.

Broadly speaking, Totvs’ technological development personnel are in charge of three tasks: *i*) elaborate a broad “road map” for future developments, based on customers’ feedback, market research and benchmarking; *ii*) updating and adding new functions to existing versions (currently, it has meant to add social network functionalities, but there are other improvements pointed out in the road maps); and *iii*) tax legislation updates. One must remember that a new version of Totvs’ softwares must be provided every two years.

Another challenge for Totvs’ developers is related to the fact that Totvs is a merging group of ERP developers with self-developed software languages.

Totvs is a heavy investor in R&D. In 2011, the group invested the equivalent of more than US\$ 100 million in R&D, which represented 13.7% of its net revenues. The group has been increasingly investing in R&D, both in absolute and in relative terms to its revenue. Indeed, it has consistently invested in R&D more than 10% of net revenues since 2007, as depicted in Graph 5 below. Currently Totvs is considered one of the five largest investors in R&D in Brazil, and among top 1,000 worldwide, according to Booz & Co.



As a matter of comparison, according to the Brazilian Innovation Survey (PINTEC), in 2008 the share of net revenues invested on innovative activities (not only R&D) was 2.9% (2.5% in industrial sectors and 4.2% in selected services). With regard specifically to R&D, manufacturing invests on average 0.64% of net sales in these activities, and selected services sectors, 2.54%. Specifically, the “IT Services” sector invests around 1% of its net revenue in R&D, the same percentage as the subsector “Development and licensing of computer programs.” That is, Totvs has a prominent position with respect to its industry when it comes to investments in R&D.

3.5.3 Totvs' technological capabilities: external sources

Totvs does not only rely on own capabilities to develop its solutions, although own technology efforts are the most important. For the development of their systems, the group also has some partnerships with universities and research groups.

In Brazil, the group has some partnerships in the fields of computer science as well as in areas related to business management (HR, Logistics, Supply Chain Management). The regional units of the groups are empowered to lead partnerships with universities. An example is the partnership between Totvs Rio and ILOS Institute (Institute of Logistics and Supply Chain), from the COPPEAD-UFRJ, with the aim of sharing knowledge in logistics. Another example is the partnership with the research group on integrated management systems, Department of Computer Science from UNISUL, University of Southern Santa Catarina (a Brazilian State).

Abroad, the group Totvs partnered in 2010 with Stanford University and the San Jose State University (SJSU). The partnership with Stanford University aims to identify new business in the U.S. market. Stanford University surveys the strengths and weaknesses of the group and its systems and points out technologies in which it must invest in the future. The partnership with SJSU aims to develop the platform “Totvs ByYou”, as exposed above.

Another important external source for technological capabilities is M&A. Mergers and acquisitions have expanded the capabilities and scope of services offered especially the ones with vertical developers.

3.6 System factors

Totvs’ linkages to the rest of the sectoral innovation system are rather weak, except for some aforementioned links with universities. However, what was very important for consolidating its national leadership was the government support through BNDES, especially for the group’s M&A strategy.

Totvs’ growth was contemporary to some important changes in Brazilian support system to the software segment. Software was considered a priority in the Industrial, Technological and Foreign Trade Policy (PITCE) released in 2003 by the Brazilian Government, and under this new institutional environment, BNDES modified its support program to the software segment – the Prosoft, originally released in the end of the 1990s. The most important modification was the change from product-based to firm-based support. This change was crucial to support internationalisation initiatives, services operations – one must remember that, strictly speaking, software developers are increasingly becoming service firms –, as well as M&A.

According to Totvs, the first contact with BNDES happened in 1997, a private equity operation. In two moments, BNDES was crucial for the growth path of the group. In 2005, BNDES sponsored the purchase of Logocenter (the fourth largest Brazilian software house by that time), and Microsiga got 40% larger. As a counterpart, BNDESPar (BNDES Participations) became a partner of the group, buying 16.7% shares for US\$ 16.4 million. Moreover, with this operation, Microsiga could re-buy Advent’s shares in the company (25% of total). BNDES support was crucial for Totvs IPO in 2006. After the IPO – and with the equivalent to US\$ 211.5 million in local currency –, Totvs could buy RM Sistemas, another competitor in the ERP segment.

The second moment was in 2008: the merging with Datasul, by the time the 9th largest ERP developer in the world and the no. 1 in Brazil. The purchase of Datasul was estimated in US\$ 381.7 million, and BNDES gave US\$ 220.3 million, half of them as borrowing in special conditions, the other half as debentures.

Whether Totvs support from BNDES is a case of “pick-the-winner” kind of policy is a matter of tough debate. On the one hand, it is clear that Totvs growth strategy would not have been possible without BNDES’ support. Intentionally or not, through BNDES the Government could foster a “national champion” at least in the Brazilian market, during a global consolidation wave in the ERP segment.

On the other hand, Totvs was already one of the Brazilian ERP leaders before the arrival of BNDES as a partner. According to Totvs’ IPO prospectus – a good document to analyse the company’s pre-2006 situation – the group’s market share in 2004 was 29.4% in Brazil and 12.2% in Latin America (Totvs, 2006). Moreover, it was already the market leader in the 10-499 employees segment. Its revenues reached around US\$ 60 million in 2004 – thus, before the arrival of BNDES and the acquisition of Logocenter.¹⁰ One could argue that, as it happens to any sector in Brazil, Totvs could access BNDES in the condition of a large enterprise. The choice of admitting BNDES as a partner was a financial decision by the firm, as a solution to the classical debt-equity finance dilemma. Other firms choose to rely solely in debt – Positivo is one case of this strategy.

During an interview with BNDES’ staff, it was argued that Prosoft support has also been used by Totvs competitors. Linx, a Brazilian ERP developer for the retail segment (US\$ 120 million revenues in 2012), is a direct competitor of Totvs, and has also BNDESPar among its partners. As well as in Totvs’ case, BNDESPar supported Linx’s IPO in 2013. In the same conditions, Senior Solution, an ERP developer for financial sector (US\$ 23 million revenues in 2012), went public in 2013.

10. It should be noticed that the eleven-fold revenues growth between 2004 and 2011 in U.S. dollars is partially explained by the appreciation of the Brazilian Real, besides, of course, M&A and organic growth.

Finally, although the most important, BNDES is not the only way the Government has supported Totvs. The group is a heavy user of innovation tax incentives. Tax incentives covered 9% of Totvs' R&D in 2007 and 12.7% in 2008, corresponding to US\$ 3 million and US\$ 6.3 million in the form of indirect subsidies, respectively.¹¹

4 POSITIVO: LEADER IN PC MANUFACTURING SEGMENT IN BRAZIL

4.1 PCs: Technological requirements

For the purpose of this work, the PC manufacturing segment encompasses assembling of desktops and notebooks, which includes a wide range of products, such as desktop and mobile workstations, all-in-ones, servers, tablets, and ultraportable PCs. Due to convergence, firms originally from computer, consumer electronics, and telecommunications industries have been competing in all segments. The new frontier for competition is the *smartphone*¹² segment. Although smartphones are not at the core of the current analysis, firms' capabilities to innovate and compete in this segment may be crucial to their survival in the long run.

Standardisation plays a very important role in the ICT sector. Standards are necessary to assure compatibility and interoperability among a great variety of systems, subsystems, equipment and network elements. The coordination between different technologies allows the emergence of new or improved products and services. Hence, standardisation enables as well as constrains the behaviour of various actors in the sector, currently and in the future. According to Fomin, Keil and Lyytinen (2003), ICT firms are highly motivated to engage in standardisation. Successfully setting of ICT standards means significant competitive advantages to the companies that have supported them, generating lock-in effect for costumers and lock-out effect for possible competitors.

11. Regarding tax incentives to innovation in Brazil, see Araújo (2009).

12. Smartphones are mobile phones that use an operating system, allowing computing capabilities similar to a conventional PC.

Additionally, standardisation in ICT industry has allowed modularisation, which is a method for subdividing a system into modules that can be independently designed, tested and implemented. Modules with standard interfaces may be reused multiple times in different contexts, driving new systems and functionalities. Benefits of modularisations are reduction in production costs (due to economies of scale), flexibility in design of new systems, and scalability.

Because of modular design and standardisation, parts and pieces that compose ICT systems, such as personal computers, have become exchangeable. On the one hand, modularisation allows multiple combinations of parts and pieces to form a final configuration of a PC, a process that it referred as “customisation”. On the other hand, PCs produced by different manufacturers, with similar technical specification, have very little differentiation between them,¹³ which is designated as “commoditization”. For firms engaging the consumer market, lack of differentiation in final products have been compressing profit margins in the last decade. In turn, diminishing profits have been forcing consolidation of firms in the sector, seeking economies of scale.

As a consequence of the lock-out effect of standardisation, the number of companies in the semiconductor industry, which supply parts and pieces for ICT systems, is limited. Therefore, much of the value added in a PC is captured by the semiconductor industry. For instance, Dedrick, Kraemer and Linden (2007) assessed the contribution of value added from the main phases of the production process of certain kinds of ICT equipments. Their study unveils that, for a notebook, value added by assembling and integration phases corresponds to approximately 1.5% of retail price without taxes, while value added by manufacturing parts and pieces represent more than 15.0%. Furthermore, according to their study, components account for approximately 85% of PC's factory cost, which is about 60% of retail price without taxes.

Moreover, innovation in PC manufacturing is essentially technologically pushed and is heavily dependent on the semiconductor industry, whose aim is to progressively produce more powerful processors, faster components, larger storage, and newer peripherals. Sometimes innovation occurs in a cooperative way between PC manufacturers and semiconductor firms, especially during project and design phases. Innovations produced solely by PC manufacturers are usually restricted to industrial design and marketing of

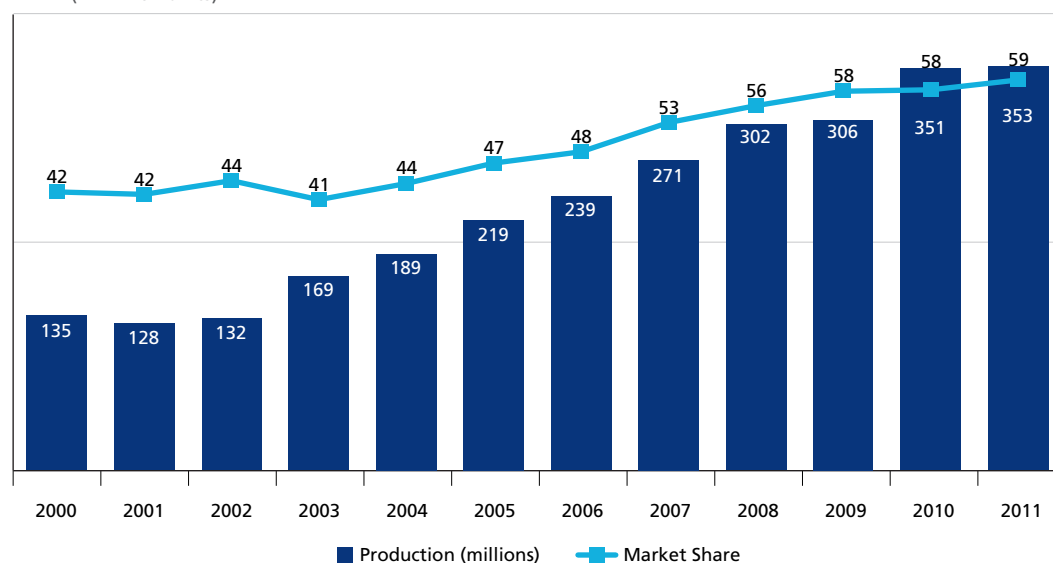
13. Although the products are not very differentiable, PC retailers attempt to acquire competitive advantages in embedded software applications and bundled services.

their products. Using Pavitt's (1984) taxonomy, PC manufacturing would be classified as scale intensive, along with other sectors that assemble consumer durable goods, although PC manufacturing has features of specialized supplier since it may spread technical progress to other sectors. Demand pull of new features appears indirectly, through increased requirements from software applications.

4.2 Market structure

In the last decade, PC manufacturing segment has passed through astonishing growth and has become progressively concentrated. As depicted in graph 6, annual PC production has raised 162% in the last 12 years, achieving more that 350 million units per year. Mostly, it reflects diminishing costs due to economies of scale and modularization. At the same time, market share of world's five largest firms has augmented 17 percentage points, from 42% in 2000 to 59% in 2011. As mentioned in the previous section, this indicator points to the ongoing consolidation in the sector, which followed the shrunk of profits.

GRAPH 6
Annual PC production and market share of world's five largest firms (2000-2011)
(In million units)



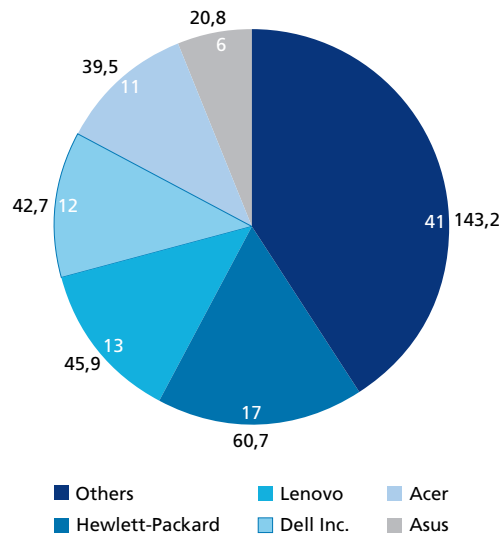
Source: Gartner Dataquest (2000-2011).¹⁴

14. Available at: <<http://www.gartner.com/>>.

GRAPH 7

Production and market share of the five world's largest PC manufacturers (2011)

(In million units)



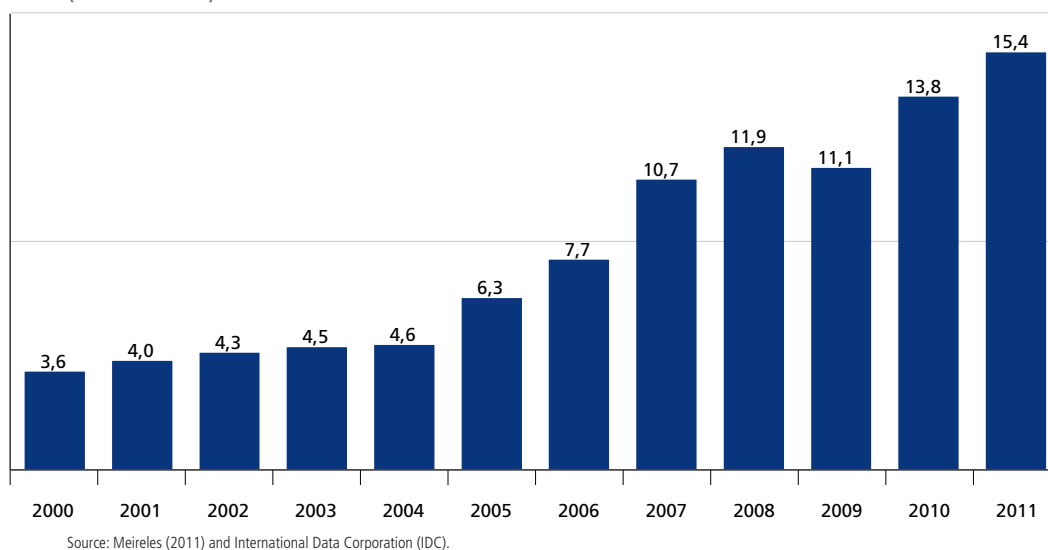
Source: Gartner Dataquest (2011).¹⁵

Currently, five multinational companies control almost 60% of PC's global market: Hewlett-Packard (USA), Lenovo (China), Dell (USA), Acer (Taiwan), and Asus (Taiwan). Graph 7 portrays the market share of the world's five largest PC manufacturers in 2011. Despite of the effects of consolidation and tight profit margins, competition has remained fierce since 2000, as ten different companies have been alternating in the top five positions of world's biggest firms in the sector. This group includes the five mentioned firms, as well as Compaq (acquired by Hewlett-Packard), IBM (acquired by Lenovo), NEC (Japan), Toshiba (Japan), and Fujitsu (Japan). As of the 3rd quarter 2012, Gartner has reported that Lenovo had surpassed Hewlett-Packard to become the world's largest PC manufacturer for the first time.

15. Gartner Says Worldwide PC Shipments in Fourth Quarter of 2011 Declined 1.4 Percent; Year-End Shipments Increased 0.5 Percent. Available at: <<http://goo.gl/Ek9iv4>>.

According to International Data Corporation (IDC), Brazil is currently the third largest PC market in the world,¹⁶ behind China and United States. In 2011, annual sales achieved 15.4 million units, a figure that is four times greater than the one in the beginning of the decade. Graph 8 presents the evolution of annual PC sales in Brazil, from 2000 to 2011.

GRAPH 8
Annual PC sales in Brazil (2000-2011)
(In million units)



Nevertheless, it is important to mention a crucial transformation that has been occurring in Brazilian market since 2005. Not only the total sales have been increasing in an exponential basis, but also illegal market has been proportionally decreasing. Until 2004, illegal sales corresponded to more than 70% of the total. Although the latest revisions of the institutional framework contributed to this transformation (as it will be discussed later), other relevant factors also help to explain this phenomenon: *i*) economic growth; *ii*) income distribution; *iii*) credit; *iv*) appreciation of exchange rate; and *v*) internet diffusion. The result is that, during the period between 2005 and 2010,

16. Brasil comercializa 15,4 milhões de computadores em 2011 e se consolida na terceira posição do mercado mundial, segundo pesquisa da IDC. Available at: <<http://goo.gl/aSz9hH>>.

illegal market shrunk to 25% and official sales have soared ten-fold in just seven years (from 1.2 million in 2004 to 11.5 million in 2011). In other words, official market is increasing at a 38% average compounded annual growth rate (CAGR).

Brazilian PC market is disputed by all major multinational brands and also by national firms. All domestic companies take advantage of tax incentives, which require local assembling of products, while multinational firms may select one of the following strategies, which also may vary in time according to their business planning:

- direct importing, when price is competitive regardless of tax incentives for local production or the product has a strong brand;
- outsourcing production to Contract Equipment Manufacturers (CEMs) already installed in Brazil (such as Flextronics and Foxconn); or
- installing an assembly line in Brazil.

With respect to market environment in Brazil, semiconductor industry is very restricted in size and scope, limiting opportunities to develop locally new products to global markets. Table 2 depicts some information about hardware manufacturing in Brazil, represented by CNAE¹⁷ codes 26.1 – manufacturing of electronic components and boards and 26.2 – manufacturing of computers and peripheral equipment. It may be verified from Table 2 that there is weak linkage between these economic segments in Brazil, as net revenue of the former account for less than 20% of net revenues of the latter, albeit parts and components correspond to 85% of PC factory costs.

TABLE 2

Net sales and number of industrial firms with 5 or more employees in Brazil, according to economic activity (2010)

CNAE Code	Description	Number of firms	Net revenue (US\$ million)	Number of employees
26.1	Manufacture of electronic components and boards	519	2,327 ¹	22,822
26.2	Manufacture of computers and peripheral equipment	319	12,831 ²	49,035

Source: Annual Industrial Survey, Instituto Brasileiro de Geografia e Estatística – IBGE (2010a).

Note: ¹ BRL 3.886 million, in Brazilian currency.

² BRL 21.428 million, in Brazilian currency.

17. CNAE is an acronym for *Classificação Nacional de Atividades Econômicas*, which is the Brazilian version of the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4.

Figures presented in table 3 demonstrate that innovation developed in hardware manufacture segment in Brazil is not internationally competitive. Less than 2% of firms have stated that had developed new products or processes towards the global markets. Moreover, the R&D intensity, an indicator of innovation effort measured by R&D expenditure to net revenue ratio, also shows that Brazilian hardware manufacturing is very distant from international investment levels. Average R&D intensity in the USA and Europe is in the range of 4% to 8% for IT equipment and 14% to 15% for IT components (Turlea et al., 2011), while these indicators in Brazil were 2% and 3% in 2008, respectively.

TABLE 3
R&D expenditures and percentage of innovative firms, ICT sector in Brazil (2008)

CNAE Code	Description	R&D exp./ net revenue (2008)	% of innovative firms (2008)	% of firms that developed new products to global markets (2006-2008)	% of firms that developed new processes to global markets (2006-2008)
26.1	Manufacture of electronic components and boards	1,98%	46,5%	0,27%	-
26.2	Manufacture of computers and peripheral equipment	2,82%	46,8%	1,35%	0,45%

Source: Innovation Survey 2008, Instituto Brasileiro de Geografia e Estatística – IBGE (2010b).

Despite of these facts, innovations have been occurring in the Brazilian PC market, given that about 47% of hardware manufacturers in Brazil affirm to have introduced locally some kind of innovation in 2008. So, Fransman's framework in its original way and the concept of industrial leadership are both inadequate to describe the Brazilian environment for PC manufacturing, as most of the innovative products or processes developed in Brazil would be simply disregarded. Nevertheless, the idea of market leadership fits well a scenario where innovation is described as developing customized solutions to regional and specific market, using industrial design techniques (in aesthetics, ergonomics, and interface fields) and taking into account cultural preferences. There are also opportunities to innovate through introduction of new services (e.g. technical assistance and embedded software), and engagement of new markets.

4.3 Positivo's trajectory

Curso Positivo (in English, Positivo Course) was founded in 1972 by a group of teachers as a preparatory course for admission exams to Brazilian higher educational system (colleges and universities). Supporting the main business, the founders also established

a printing shop in order to produce textbooks with adequate quality and content. Both firms were located in Curitiba, capital of the Southern State of Paraná.

In the last 40 years, Positivo Group has been broadening its activities. Its current portfolio comprises a full range of educational services, including preparatory courses, primary and secondary schools, a university, a technological center, and a cultural institute. Currently, the group has approximately 25,500 students and has attended approximately 10 million students with its products and services since its inception.

The creation of Positivo Informatica in 1989, the computer and IT branch of Positivo Group, is closely related to the institutional framework effective in Brazil at that time. Brazilian computer market was closed to imports, and national production could not fulfil entirely the demand. So, the new company was started, with the initial objective of manufacturing computers to support the educational and publishing businesses of the group. In the following year, it also engaged in public tenders and bidding processes to supply computers and IT solutions to government-owned companies and institutions. Although officially called Positivo Informatica, the company will be designated simply as Positivo hereinafter, for simplification's sake.

In 1994, Positivo started developing educational technologies, which supported the creation of a wide range of educational products, such as software, portals and learning tables. Nowadays, these products are used in more than 10,800 public and private schools in Brazil, and are exported to more than 40 countries.

The year of 2004 was a turning point for Positivo's history, and marked true spin-off from the group. In that year, the company engaged retail business for PCs. Although conceptually simple, the implemented strategy proved successful: the company established partnerships with the largest retailers in Brazil (supermarkets, department stores, etc.) to distribute low-cost/low-end computers designed to the emerging middle-class in Brazil. Using sales channels already familiar to the customers had a significant effect, which positively impelled sales. In just 9 months of retail operation, Positivo became the largest computer manufacturer in Brazil, and computer sales accounted for 85.1% of the company's net revenue in 2004.

One year later, Positivo also engaged the corporate market, offering a full series of desktops, notebooks and servers. In 2006, the company became listed

in Bovespa (São Paulo Stock Exchange) through an IPO that raised US\$ 281 million¹⁸ from national and foreign investors. It was more than the companies' net worth, of US\$ 146.5 million¹⁹ that year.

In 2008, Positivo began implementing two new strategies: vertical integration and regional decentralisation. It started the production of desktop motherboards in Curitiba, Positivo's original plant; additionally, it established two new facilities, one located in Ilhéus (Northeastern region) and the other in Manaus (Northern region). In the following year, Positivo started the production of notebook motherboards and desktop memory boards. Currently, the plant in Curitiba assembles desktops, notebooks, memory boards and cabinets; the plant in Manaus, desktops and notebooks; and the plant in Ilhéus is in charge of LCD monitors.

By the end of 2008, Positivo's controlling group refused an offer to sell the company to competitor Lenovo for the price of R\$ 18.00 per stock²⁰, roughly twice the price of stocks traded at Bovespa that time.

During 2009, Positivo initiated its strategy of mergers and acquisitions (M&A) and acquired Kennex – a competitor Brazilian brand. In 2010, it became international by forming a corporate joint venture with BGH, an Argentinean company in the consumer goods segment. Each partner has acquired 50% of Informática Fueguina S.A. (IFSA), the vehicle for the joint venture, whose management is also shared. Using the brand Positivo BGH, the corporate purpose of the joint venture is to sell desktops, notebooks, all-in-ones, e-readers and tablets in Argentinean and Uruguayan markets. In 2011, Positivo acquired Crounal, a Uruguayan company.

Some facts and data may illustrate Positivo's current position. As exhibited in graph 9, it is the current leader of PC manufacturing in the Brazilian market. According to its financial statements, Positivo is the 4th largest in Latin America and the 11th in the

18. BRL 604.1 million, in Brazilian currency.

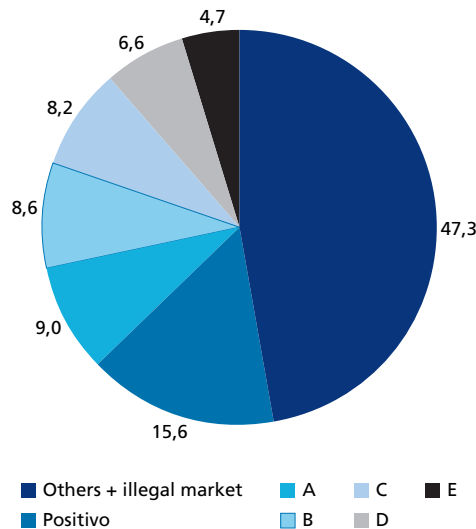
19. BRL 319 million, in Brazilian currency.

20. Available at: <<http://goo.gl/O3LGD9>>.

world. The company produced 2.4 million PCs in 2011 (2.05 million in Brazil and the rest in Argentina), achieving net revenues of approximately US\$ 1.1 billion.²¹ Positivo has been the market leader in Brazil uninterruptedly for the seven years (since 2004), with an average market share of 14% (considering the last five years). In 2011, its market share in the retail market was 19% and in the government procurement market it was 46%. However, its performance in corporate segment is far less effective: it has been steadily around 3%. Regarding the Argentinean operation, Positivo BGH sold 360 thousand notebooks in 2011, achieving leadership in its first year of operation, with 22.0% of market share. Nowadays, Positivo has three production sites in Brazil, and one in Argentina. The company has over 4,000 employees in Brazil.

GRAPH 9

Market structure of PC manufacturing industry in Brazil (4th quarter, 2011)



Source: Positivo's annual report (2012).

In any case, Positivo's margins are rather low – The Earnings Before Interest Taxes, Depreciation and Amortization (EBITDA)/Gross Revenue ratio is 3.4%. This must be why the company has tried to diversify its businesses. The company released a content portal, called *Mundo Positivo* (in English, Positivo's World), focused on

21. BRL 2.08 billion, in Brazilian currency.

Brazilian lower middle-class families, allowing with access to magazines, newspapers, videos, books, music, games and other software applications. After that, Positivo started the production of tablets,²² complementing its portfolio in hardware business. Recently, Positivo announced its entry into smartphone market.²³ *Mundo Positivo* may be considered an adaptation of Apple's App Store to Positivo's products, where applications are in Portuguese and costumers are charged in local currency.

4.4 Sources of capability building

4.4.1 Positivo's marketing capabilities

Positivo has innovated through unveiling of new markets (one of the possibilities pointed out by Fransman's model), which were unexplored or underexplored by existing competitors. This is especially relevant in retail and government segments. From 1989 to 2004, Positivo has acquired expertise in PC manufacturing and public tendering processes, which proved to be an important foundation to the company's next move. When Positivo engaged the retail business in 2004, the company's marketing strategy focused on developing low-cost/low-end products for emerging middle-class in Brazil. Moreover, access to easy credit by this class of consumers was a very important maneuver used by Positivo to increase sales and retain clients. Both retail business and government tendering have been supporting Positivo's leadership throughout the years.

Positivo puts strong effort in brand management. Using high investments in branding, the company has been able to consistently receive marketing awards, such as "top of mind" in computer and notebook categories. Brand investments comprise both advertisements, handled through newspapers, magazines, and TV commercials, and trade marketing, such as point-of-sale promotions and events.

At last, Positivo is also diversifying its portfolio, which now comprises desktops, notebooks, educational tables, an internet portal, tablets, and, more recently, a line of smartphones using Android platform.

22. Available at: <<http://goo.gl/Gpoygw>>.

23. Available at: <<http://goo.gl/R3YLVi>>.

4.4.2 Positivo's technological capabilities: internal sources

During the last five years, the company has been investing an average of US\$ 11.9 million per year²⁴ (about 1.1% of net revenues) in R&D, mostly as compensation for tax incentives, as will be discussed below. Using an industrial design approach (aesthetics, ergonomics and interface techniques), the company has been developing a wide range of new products. First, it launched “Positivo Faces”, a desktop with customisable cabinet bundled with an application that allowed consumers to produce their own “face”. Then, it produced a new line of notebooks, which as well featured some design elements. Other products include *Positivo PCTV Digital*, equipped with an analog/digital TV board, and *Positivo Fácil*, bundled with an application for first-time users. Positivo entered into tablet segment with *Positivo Ypy*, specially designed for the Brazilian market after an extensive research local consumers. The company also produced other incremental innovations focusing on local customers, such as soft touch keyboards, which may be regarded also as a kind of customization.

All in all, R&D strategy of Positivo targets at incremental innovation, customization and design improvements, in order to consolidate its position in the low-cost/low-end segment. No major “high tech” developments may be expected from Positivo. Indeed, Positivo has only nine industrial patents and models of utility at the Brazilian Institute for Industrial Property (INPI), which refer to educational systems and computing algorithms. Nowadays, this segment is responsible for about 2.0% of Positivo's net revenue.

4.4.3 Positivo's technological capabilities: external sources

M&A and joint-ventures are not an important source of capability building.

Regarding research centres, Positivo has established relationships with some of the most important IT centres in Brazil: BRISA, in São Paulo; C.E.S.A.R. – Centro de Estudos e Sistemas Avançados de Recife, in Recife; and IRT – Instituto Recôncavo de Tecnologia, in Ilhéus. All of them are private research institutes and most of the projects with these centers refer to the development of Digital TV technologies.

24. R\$ 22.5 million, in Brazilian currency.

Positivo also has an agreement with Positivo University, a company owned by Positivo group, in order to mutually cooperate and exchange in science and technology fields of ICT sector, which involves outsourcing of R&D, provision of technological and scientific services, education, training, technology transfer, and use of laboratories.

In any case, it should be noticed that the developments that which arise from these partnerships tend to be technologically marginal, since the company itself is not engaged into a technologically-challenging strategy. Notwithstanding, many of these links to research centres are to meet the IT law requirement of investments in R&D.

4.5 System factors

The most important systemic links for Positivo are not those established with competitors or suppliers, but those marketing-related alliances: retail chains and technical support structure. Concerning the first factor, the company took advantage of solid commercial relations with biggest retail chains in Brazil, which are largely responsible for selling consumer goods to the emerging middle-class, as well as financing these purchases. As a result, Positivo claims to have the widest and least concentrated distribution network in the country, making products available in more than 8,800 points-of-sale. Positivo also has been taking benefit of these close ties with the retail chains by receiving constant access to information on consumer demand. By controlling point-of-sale inventories, the company has been capable to respond rapidly to customer needs and preferences.

Positivo was also able to build the largest technical support network in the country, covering every Brazilian city. The company also implemented a Customer Care Center, which allows a direct link with consumers in order to solve simpler issues, such as computer set-up.

4.5.1 Evolution of the institutional framework of ICT sector in Brazil

The most important system factor for Positivo, however, is the institutional framework of ICT sector in Brazil. Although computer industry is a global one, institutional environment in Brazil is quite peculiar. Therefore, based on the concept of ecosystem presented in section 2, dynamics of ICT sector in Brazil has been affected by these idiosyncrasies. So, a brief description of trajectory of PC manufacturing in Brazil, as well as the main characteristics of the current institutional framework, may clarify its influence on Positivo's current market leadership.

In Brazil, the dynamics of ICT sector has been highly dependent on public policies. The Federal Government has been adopting some kind of public policy for ICTs since 1984. In its first version, national market was closed to imports, under the “infant industry” argument. After an outcome that combined high prices, existence of illegal markets, and slow diffusion of computer technology, a new version of the public policy was implemented in 1991. Designated as *Lei de Informática* (in English, Information Technology Law or IT Law), it significantly changed the previous institutional framework. On the one hand, seeking more efficiency in the Brazilian market, it authorized the competition with foreign companies. On the other hand, it offered tax incentives for a period of 8 years for companies installed in Brazil, both national and foreign, that carried out local R&D programs. A third version (truly, a revision of the second version) was implemented in 2001. A summary of the main characteristics of each period is presented in table 4.

TABLE 4
Summary of ICT public policies in Brazil

Phase	First	Second	Third
Period	1984-1991	1991-2001	2001-present
Policy	Close national market to imports	Promote local production Stimulate local R&D	
Main goals	Protect infant computer industry	Substitute imports Develop local capabilities in Science & Technology (S&T)	Idem
Instrument	Control of trade	Tax incentives	Tax incentives (revised)
Main characteristics	Creation of small national firms	Assembly lines of multinational firms	Technological convergence of telecom, IT & media Rapid demand growth in the consumer market
Outcomes	High prices in official market Existence of illegal markets Slow diffusion of technology	Negative balance of trade Low value added in Brazil Limited effects for R&D	Faster diffusion of technology Reduction of illegal markets More negative balance of trade Still low value added in Brazil Still limited effects for R&D

Source: authors' elaboration.

Current institutional framework is valid through 2015. A transition to a fully open market is expected to occur from 2015 until 2019, using a decreasing tax incentive scheme. The existing model consists of three instruments at the federal level:

- Tax incentives of 12% to 15% on domestic sales of PCs and other products for firms that comply with local production and investment in R&D.
- High import fees for final goods (16%) and low import fees for parts and pieces (2%).

- Since 2005, tax exemptions of 9.25% for personal computers used in households – both imported and locally produced.

The combination of the first two instruments accounts for a difference of as much as 30% in PC retail price, when compared to direct imports. Depending on the existence of tax incentives also in the State level, the difference in tax percentage between PCs assembled in Brazil and imported may go up to 50%. A more detailed discussion of the Brazilian institutional framework for ICT sector may be found at Sousa (2011).

5 MAIN FINDINGS AND FINAL REMARKS

This paper brought two cases studies in the Brazilian ICT sector, one company is an ERP software developer (Totvs) and the other is a PC assembler (Positivo). Both are leaders in their segments in Brazil, and have some international presence.

These cases are of interest because they are leadership cases in sectors Brazil has no tradition. Even not having become world leaders, they keep their leading position in segments where there is tough competition with multinationals in Brazil. Stimuli provided by Lei de Informática is very important to Positivo and may have been crucial to the decision of entry in the PC market, but this incentive is available to all assemblers located in Brazil, including transnational companies.

So, in short, what explains both cases of leadership? It is argued throughout the paper that it is strong marketing capabilities of both companies. These marketing capabilities identified market niches that were not properly explored by any company, and adapted their technological capabilities to explore it. In the case of Totvs, its focus on SMEs has proved to be a promising strategy, and there is still great potential for growth. In the case of Positivo, the low-cost/low-end strategy proved to be the most adequate to the “new middle class” which emerged in Brazil in the last decade.

Indeed, Both Totvs and Positivo successfully followed mass customization strategies.²⁵ Mass customization is the marketing and production strategy that deliver wide-market goods and services that may be modified to satisfy customer needs, combining flexibility and low unit costs generally associated to mass production strategies. In the case of Totvs, verticals and the modularization of ERP solutions, which may be delivered using the Internet, are types of mass customization strategies. In the case of Positivo, in-depth market surveys indicate how computers are being used within a household, and design and aesthetic improvements are suggested, sometimes introducing some degree of customization by costumers. The “Positivo Faces” project is another example of mass customization strategy.

Notwithstanding, neither Totvs nor Positivo have technological capabilities capable of changing the technological trends in world level. Both companies have technological capabilities which put them in line with world's best practices – in other words, they “caught up” – but it is not enough to put these companies among world's technological leaders. It is interesting to notice how technological capabilities are pulled by marketing strategies. Additionally, neither of the companies have strong relationships with their sectoral systems of innovation, since there is little cooperation with other firms and with universities, for example. Regarding the system factors, the most important of them is the role of government, albeit using different approaches in both cases.

Although one may question whether it is or not a “pick-the-winner” kind of government support, the fact is that BNDES support to Totvs has been crucial for its growth strategy.

Regarding Positivo, it benefited from trade protectionism provided by the IT Law. However, despite of the institutional environment stimulating local production, Brazilian market is highly competitive. All major multinational companies in PC manufacturing segment are installed in Brazil, all of them may have the same access to IT Law stimuli but none of them have been able to surpass Positivo's position.

25. On mass customization, see Pine II (1992) or Silveira, Borenstein and Fogliatto (2001).

In any case, the original *industrial leadership* framework of analysis (Mowery and Nelson, 1999) was adapted to these cases, although the structure of the framework – context, trajectory, capabilities and system factors – proved to be very useful to explain these leadership cases. The point is that of this paper is that although Totvs and Positivo managed to be market leaders in Brazil, they did not manage to be technological “trend setters” in world level – and they do not signal that they aim to be so. Totvs and Positivo have been successful in allying some technological capabilities to marketing capabilities, and have achieved market leadership through the development of customized products and solutions to specific market segments that have not been properly addressed by world industry leaders.

For the future, it is expected that Totvs must grow hand-in-hand to the growth of the ERP market itself in Brazil. Despite of having some international presence following the same strategies as in Brazil, it is not expected that international operations will become an important part of Totvs’ revenues.

Despite Positivo’s leadership for the last seven consecutive years, its advantages are now at challenge. Positivo’s low profit margins are symptomatic that it has been facing fierce competition.

Positivo’s business model is highly dependent on two factors: PC sales, which represent about 98% of company’s total revenues; and the Brazilian current institutional framework. In contrast, world market seems to be changing dramatically. In 2010, notebook sales have exceeded desktop sales for the first time; in this niche, Positivo’s advantages are smaller. New devices, such as tablets and smartphones, are also globally affecting PCs market, which is stabilizing around 350 million units per year. Additionally, institutional framework in Brazil is subject to change in the near future, as some tax incentives are supposed to be reduced from 2014 on, and end by 2019. Moreover, multinational competitors are moving forward in Positivo’s ground: in 2010, Hewlett-Packard’s net revenue in Brazil has surpassed Positivo’s;²⁶ in 2012, Lenovo has acquired the Brazilian local brand CCE.²⁷ Notwithstanding, in response Positivo has made some decisions to adapt itself to the new

26. *HP ameaça liderança da Positivo no mercado de computadores*. Available at: <<http://goo.gl/gmB1FA>>.

27. *Lenovo Acquires CCE to Build PC+ Leader in Brazil*. Available at: <<http://goo.gl/Yxf7hy>>.

competitive scenario. Its recent incursions in tablet and smartphone segments prove that the company is expanding its portfolio. Furthermore, Positivo has been able to maintain its leadership in notebook niches in both Brazilian and Argentinean markets, despite of competitors' attacks.

Finally, from the standpoint of public policy implementation, two issues are important to be emphasized. On the one hand, as highlighted in Sousa (2011), public policies pursue, in general, a series of objectives, sometimes divergent ones. While some appear manifestly declared, others are given only implicitly. Thus, the existence of multiple purposes is one of the factors that significantly difficult the evaluation of public policies. Notwithstanding, one could realize that the policies for ICTs in Brazil had at least the desired effect of enabling the rise of Brazilian domestic market leadership. Without the institutional framework of the ICT Law or without support from BNDES, it would hardly have occurred.

However, if such idiosyncratic conditions allowed for the rise and consolidation of Brazilian companies as domestic market leaders, they also impose barriers to these same companies on their way to the international market. This is because competitive advantages in the domestic market cannot be extended to substantially different competitive environments. In ICT international markets, leadership is a result of industrial development and exploitation of new technologies, which does not seem to be the focus of none of the cases in this paper.

A part of this result can be attributed to the type of instrument to support ICT firms. In both segments analysed, the government has been using financial instruments to directly support businesses, such as tax incentives and bank loans. These tools, in turn, are used by companies to focus on short-term and, therefore, they have not been able to articulate and strengthen the Sectoral Innovation System, which would be essential to develop ICT in the long run.

In summary, the model of incentive policies for ICT in Brazil has shown some signs of exhaustion. However, their elimination tends to risk the results obtained so far. Therefore, the solution for the future development in the ICT sector in Brazil is the gradual transition from the existing institutional framework to one that offers long-term incentives for the strengthening of the ICTs' Sectoral Innovation System in Brazil.

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