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Global Strategy in LCD Market for Late Movers: A Brazilian Case

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In this paper a conceptual framework will be presented for the analysis of market entry strategy for those who enter a market later than pioneers. There have been a number of papers on modes and timing of market entry but most of them are based on a certain specific perspective: some are biased to First-Mover Advantage and others are to Late-Mover Advantage while some are focusing on endogenous factors but others are on exogenous

factors. What we're going to do is to set an "integrated" framework to take account of all those various points to design a firm's global market entry strategy.
Resource-based view (RBV), core competences, and knowledge-based view (KBV) will be adopted as the main tool of analysis and Porter's Diamond Model (Porter, 1990) will be used for the analysis of Brazilian competitive market.

1. Objectives

There are two objectives of this work. First, we're going to arrange confusingly various global strategy lessons coherently in longitudinal approach – product life cycle model, RBV/KBV all from the perspective of late movers – fast followers and late comers.
Second, we'll arrange global strategy on the basis of Porter's Diamond model. Although overall center of gravity will be on RBV/KBV, which is based on heterogeneity of firms, the substance from this perspective will be arranged in a container of industrial organization paradigm, which is based on homogeneity of firms.

2. Scope and methodology

Global strategies lessons from first-mover advantage and late-mover advantage will be reinterpreted from the perspective of RBV/KBV, and all of them will be carried on the foundation of four stages of product life cycle hypothesis. The ideas of RBV/KBV are limited to the basic concepts of it, mostly from Wernerfelt (1984) and Barney (1991). Core Competencies from Prahalad & Hamel (1990) is being dealt with as a subcategory of resources. Michael Porter's Diamond Model (Porter, 1990) will be used to set analysis for late entrants going global. An analysis of Diamond Model for Brazilian market in this case study argued on the basis of the nature of and interactions between the four elements of this model: Firm strategy and rivalry; Demand conditions; Related and supporting industries, and Factor conditions. Porter provides an industry cluster framework to explain the determinants of regional competitive advantage. If a region succeeds in developing an industry-specific diamond, then the region's industry cluster can be competitive in the global economy because individual firms belonging to the cluster can draw on specialized services, inputs, and related industries
We'll rearrange a number of market entry strategic tips for late movers, for each of four stages of Product Life Cycle hypothesis. All the global strategy will be reinterpreted from the perspective of RVB/KBV, meanwhile the ideas of First-Mover/Late-Mover Advantages and Product Life Cycle model will be enriched by one another. And Porter's Diamond Model will be used to make an analysis for Brazilian LCD market as a late entrant.

3. Theoretical Backgrounds

3.1 Resource-Based View

A resource-based view (RBV) emphasizes that a firm utilizes its resources and capabilities to create a competitive advantage that ultimately results in superior value creation. According to the RBV, in order to develop a competitive advantage the firm must have resources and capabilities that are superior to those of its competitors. (Wernerfelt, 1984) Without this superiority, the competitors simply could replicate what the firm was doing and any advantage quickly would disappear. Resources are the firm-specific assets useful for creating a cost or differentiation advantage and that few competitors can acquire easily. The following are just a few examples of such resources: patents and trademarks, proprietary know-how, installed customer base, reputation of the firm, Brand equity. Capabilities refer to the firm's ability to utilize its resources effectively. The firm's resources and capabilities together form its distinctive competencies. These competencies enable innovation, efficiency, quality, and customer responsiveness, all of which can be leveraged to create a cost advantage or a differentiation advantage. Scholars of Resource-Based View say that sustainable competitive advantage comes from accumulation and effective deploy of 'key resources', which are hard to imitate or substitute. Barney (1991) says, "A firm is said to have a sustained competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy." (Barney, 1991) He stressed value, rareness, inimitability and non-substitutability.

Therefore, RBV advocates stress 'path-dependency.' Because how the accumulation of key resources was made and how long was the time decide the sustainable competitive advantage. As a consequence, a longitudinal approach is regarded as a more appropriate approach than a transverse approach. As the origin of RBV can be traced to theorists who began developing behavioral theories of organizations in which firms were conceptualized as something more than bundles of transactions or simple production functions. Learning capacity is one of the bases of company resources. Some scholars suggest that 'coordination group' should be in an organization to promote communication, involvement and a deep commitment to working across the boundaries, to foster core competence. (Prahalad & Hamel, 1990) Core competencies will be used as a sub-category of resources in this paper. The discussion will be based on the very basic concepts of 'resources' – the accumulation of inimitable and non-substitutable resource, path-dependency, and so on.

3.2 Core Competencies

According to Prahalad & Hamel (1990) core competence lead to the development of core products. Core products are not directly sold to end users; rather, they are used to build a larger number of end-user products. For example, LCD is a core product that can be used in wide array of end products. The business units of the corporation each tap into the relatively few core products to develop a larger number of end user products based on the core product technology. By combining a set of core competencies in different ways and matching them to market opportunities, a corporation can launch a vast array of businesses (LCDs for TVs, Games, and Medical Devices).

Without core competencies, a large corporation is just a collection of discrete businesses. Core competencies serve as the glue that bonds the business units together into a coherent portfolio. According to Prahalad & Hamel (1990), core competencies arise from the integration of multiple technologies and the coordination of diverse production skills. Some examples

include Sharp's expertise in optoelectronics and Sony's ability to miniaturize electronics. There are three tests useful for identifying a core competence. A core competence should: provide access to a wide variety of markets, and contribute significantly to the end-product benefits, and be difficult for competitors to imitate.
Core competencies tend to be rooted in the ability to integrate and coordinate various groups in the organization. It is the effective coordination among all the groups involved in bringing a product to market that result in a core competence. It is not necessarily an expensive undertaking to develop core competencies. According to Prahalad & Hamel (1990), core competencies are not necessarily about: Outspending rivals on R&D, sharing costs among business units, integrating vertically, while the building of core competencies may be facilitated by some of these actions, by themselves they are insufficient.
Prahalad & Hamel (1990) suggest that a corporation should be organized into a portfolio of core competencies rather than a portfolio of independent business units. If a business unit does manage to develop its own core competencies over time, due to its autonomy it may not share them with other business units. As a solution to this problem, Prahalad & Hamel (1990) suggest that corporate managers should have the ability to allocate not only cash but also core competencies among business units.

3.3 The Porter´s Diamond Model

Traditional trade theorists have considered capital, labor, and natural resources as sources of national competitiveness. Criticizing the conventional model, for being at best incomplete and at worst incorrect, Porter (1990) introduced the diamond model. The author argues that national prosperity is created, not inherited. Thus, his model is dynamic, in addition, the model is comprehensive because it creates a single model by incorporating the production factor conditions that most traditional theorists have employed, along with other important variables to explain national competitiveness.
The diamond model is composed of two parts with indigenous and exogenous variables. The indigenous variables are factor conditions, firm structure, strategy and rivalry, related and supporting industries, and demand conditions. The exogenous variables are government and chances.

- *Firm Strategy, Structure, and Rivalry* represent the national environment in which companies are created, organized, and managed, as well as the nature of domestic rivalry. Related and Supporting Industries test competitiveness of industries related to a given industry or supplier industries. Domestic capital markets affect the strategy of firms. Some countries' capital markets have a long-run outlook, while others have a short-run outlook. Industries vary in how long the long-run is. Countries with a short-run outlook (like the U.S.) will tend to be more competitive in industries where investment is short-term (like the computer industry). Countries with a long run outlook (like Switzerland) will tend to be more competitive in industries where investment is long term (like the pharmaceutical industry). A country will be competitive in an industry whose key personnel hold positions that are considered prestigious.
- *Factor Conditions* measure the factors of production necessary to compete in certain industries, which are further divided into two subcategories of basic factor conditions

such as natural resources, climate, and population, and advanced factor conditions such as skilled labor, technology, and know-how. Factor conditions refer to inputs used as factors of production - such as labor, land, natural resources, capital and infrastructure. Now they also embrace data communications, university research, and the availability of scientists, engineers or experts in a particular field.

- *Demand Conditions* show the nature of the domestic market for its size and sophistication. Porter argues that a sophisticated domestic market is an important element to producing competitiveness. Firms that face a sophisticated domestic market are likely to sell superior products because the market demands high quality and a close proximity to such consumers enables the firm to better understand the needs and desires of the customers. If the nation's discriminating values spread to other countries, then the local firms will be competitive in the global market. One example is the French wine industry. The French are sophisticated wine consumers. These consumers force and help French wineries to produce high quality wines.
- Porter also argues that a set of strong *related and supporting industries* is important to the competitiveness of firms. This includes suppliers and related industries. This usually occurs at a regional level as opposed to a national level. Examples include Silicon valley in the U.S., Detroit (for the auto industry) and Italy (leather-shoes-other leather goods industry). What are the advantages and disadvantages of locating within a cluster? Some advantages to locating close to your rivals may be potential technology knowledge spillovers, an association of a region on the part of consumers with a product and high quality and therefore some market power, or an association of a region on the part of applicable labor force.

Together, these four determine wheath in nation has competitive advantage or not. Porter emphasizes the *role of chance* in the model. Random events can either benefit or harm a firm's competitive position. The *government* plays an important role in Porter's diamond model.
When governments deliberately set out to help companies compete, however, their efforts are often counter-productive. The principal economic goal of a nation is to produce a high and rising standard of living for its citizens. The ability to do so depends not on the amorphous notion of competitiveness but on the productivity with which nation´s labour and capital resources are employed.

3.4 The Diamond Model and Multinationals

Although Porter's diamond model is a revolutionary enhancement in explaining national competitiveness, the model is not free from criticism and has been extended in two directions (scopes and sources) of national competitiveness. The first was an incorporation of multinational activities through the introduction of the double diamond model (Rugman, 1991; Rugman & D'Cruz, 1993; Moon, Rugman, & Verbeke, 1998; Dunning, 2003). While the variables of Porter's diamond model are useful when analyzing a nation's competitiveness, the model has a narrow focus which is limited only to home-base. The second extension to Porter's original model was the addition of human factors through the proposition of the nine-factor model (Cho, 1994; Cho & Moon, 2000). Porter's diamond model is mainly designed to explain the sources of national competitiveness possessed by the economies of advanced countries, but is limited when explaining the levels and dynamic changes of economies in

emerging countries such as China, India, Russia, and Brazil. The human factors in the nine-factor model drive the national economy by creating, motivating, and controlling the four physical factors in Porter's diamond model.
The double diamond model and the nine-factor model enhance Porter's diamond model in terms of the source and context of competitiveness, they are not integrated into a single model. In order to analyze and explain national competitiveness more thoroughly an international contexts analysis is a natural extension to the Porter's Diamond Model, and consequently, provides a more comprehensive explanation for national competitiveness. Compare an emerging economy as Brazil only for the Porter´s Diamond Model is not rigorous for an analysis of Brazilian market

4. The Flat Panel Display Industry

Sharp Electronics of Japan introduced the world's first LCD pocket calculator in 1973 (Joao, 2004), and the early 1980s, Sharp produced a remarkable series of pocket calculators using LCDs but the TFT-LCD trajectory was launched in 1991 when the industry innovators - Sharp, NEC, IBM Japan and Toshiba first perfected mass production for the new panels. The competitive dynamics played out in terms of the quest for commercially acceptable yields, and in terms of finding new applications. The first such "killer application" was displays for laptop PCs (Apple Computer launches the Newton MessagePad 100 personal digital assistant in 1993 with 4-inch LCD screen), and the competitive dynamics played out in terms of the race to produce larger and larger screens as well as better resolution. The very large investments involved in rushing to meet this new application led to a supply-demand imbalance, and the new industry tipped into its first downturn in 1993-94. This created a space for new Japanese entrants – and firms such as Matsushita, Hitachi or new entrants like Hosiden all entered at this time. The new entrants were able to achieve extra productivity gains from the use of the new equipment – a newcomer advantage. All these players then enjoyed profits as the industry moved into upswing again, from 1994-95.
The growth during this second upswing, with so many new entrants, became overheated, exceeding 40% per annum for the first time and again excess capacity tipped the industry into a second downturn in 1995-96. This time the new entrants came not from Japan, but from Korea – led by Samsung and LG. These firms had managed to acquire the technology without licensing it from the Japanese incumbents – something quite unexpected. Samsung basically acquired the technological capability to build panels during this first downturn, combining this new knowledge with its mastery already of semiconductor fabrication, to build Generation-2 pilot fabrication lines.
Samsung and LG entered the industry through aggressive counter-cyclical investment in 1995-96, utilizing the newest Generation-3 fabrication equipment, at the time that the incumbents were being forced to pull back on their investments The firm pours investment funds into an industry at the very time when prices are falling, production is falling, and other firms are cutting back on investment – and with no end in sight.
Indeed the upswing came, in 1996-97, and the Korean firms were able to profit from it, just as were the Japanese incumbents. The competitive dynamics were now being driven by the new entrants, who moved to larger substrates for their panels, enabling them to produce panels for new applications including large-screen laptops and – for the first time – desktop monitors. This was the beginning of a new application, driven by the Korean new entrants that would eventually have a huge impact in expanding the market.

The Korean firms were forced to suspend all investment in 1998, and Japanese firms, feeling the effects of the crisis through their exposure in SouthEast Asia, also cut back, creating a new downturn. This time the players that were ready were Taiwanese firms. Although there had been several efforts by Taiwanese firms such as Acer Display Technology and UMC spin-off Unipac to enter TFT-LCD production, they had been aborted because of the huge barriers to entry. There had been sustained efforts by the government-owned Industrial Technology Research Institute (ITRI) to build capabilities in TFT-LCD large panels, as anticipated successor to the country's great success in semiconductors. This changed in 1997-98 with the third downturn, and a new willingness on the part of Japanese firms to license technology to Taiwanese partners – partly as a way for the Japanese to fend off the Korean challenge. So, during this downturn, no fewer than five Taiwanese new entrants plunged in, utilizing Generation 3.5 & 4. The massive investments made by these Taiwanese new entrants swung the industry into a short-lived upturn in 1999 – 2000, when again all firms involved in the industry enjoyed profits. Samsung was again driving this upswing with its new investments in 4G substrate lines, allowing it to cut extra panels for a wider variety of applications – from laptop screens to ever larger desktop monitors and new applications in cell phones, PDAs and digital still cameras as well, directly challenging Japanese incumbents like Sony and Seiko-Epson in these fields.

This fourth downturn created more space for new entrants, and the opportunity was seized by new Taiwan firms such as Quanta Display, Innolux and Toppoly. But this time the Koreans led by Samsung were also engaging in counter-cyclical investment, to build capacity in next-generation 5G lines, driven by competitive rivalry with the new Taiwan entrants.

Now in the fifth cycle, which is likely to peak in 2005, Korean and Taiwanese firms have become the incumbents, furiously investing in next-generation 5G and 6G fabrication lines, while firms from Singapore, China and India are the challengers.

The complex dynamics of the industry today are fashioned by the efforts of these fast followers to become leaders and innovators, while the initial leaders, Japanese firms, are consolidating and seeking advantages through the launch of new technological sub-trajectories, such as low-temperature polycrystalline silicon (LTPS), organic light-emitting diodes (OLED) and plasma displays (PDPs). Meanwhile U.S. firms and European firms also seek re-entry to the sector via continued technological innovation in these and other display technologies.

In the next section, we build the elements of such a framework to capture the dynamic competitive forces at play.

4.1. Dynamic competitive forces analysis: TFT-LCD sector

At the core of the framework for understanding how fast-moving industries like flat panel displays are driven by strategizing and entrepreneurial behavior, we thus focus on the fundamental cyclical dynamics and the competitive forces that shape these cyclical dynamics.

The interplay of these competitive forces over time is what creates the conditions for strategizing by firms in cyclical industries. By analogy with Porter's five "competitive forces"

framework, we may identify five sources of competitive dynamics – from the industry cycles themselves, to demand-side and supply-side dynamics, new entrants (with existing technology) and substitutes and alternatives. Let us proceed to analyze the strategizing by firms in (or potentially in) the TFT-LCD sector in its short history so far utilizing such a dynamic framework.

The five historical cycles of the TFT-LCD sector (Mathews, 2004), exhibit certain regularities and repetitions, which create the setting for strategizing by the firms involved. The repetitive dynamics of the Crystal Cycle as the upswing gets underway; the incumbent firms (the rivals) start to receive orders from downstream customers, who are anxious to put the product – in this case, flat panels – into their own gadgets. To preserve market share, the companies have to ramp up their investments, possibly learning a new configuration at the same time if one of their number has driven the competitive race by introducing a new process generation. They have to ramp up production on the basis of these new investments as quickly as possible, both to preserve market share and to keep up with the technological pace. Strategizing in this case is a matter of the timing and scale of such investments.

As the upswing gathers momentum, production rises; employment rises, and for as long as capacity cannot meet demand, prices rise – up to a point. But these actions carry their own logic, and eventually the capacity being laid down and the supply that it generates starts to exceed demand – and prices signal this fact by starting to fall. It may be that customer firms cut back on orders as they find marketing channels starting to fill up. As soon as the delicate dynamic balance is upset, the industry can tip suddenly into a downswing, where everything that was working to increase prosperity before now works in reverse. As prices fall, firms are forced to cut back on production, and then on planned investment, and so orders for equipment are cancelled – and so the downswing is exacerbated in the equipment supplies industry. Again, firms have to strategize around these dynamics, or go under.

These fundamental cyclical dynamics that exist over and beyond the will of the industry participants, and shape strategizing by all players are in turn shaped by the strategizing by firms on the demand side and the supply side. The upswings might be prolonged, or the downswings cut short, by effective enlargement of the market due to new applications of the product being developed. On the supply side similar kinds of dynamics are operating, only in this case they are driven by rival firms striving for productivity and yield improvements, and working with supplier firms to find ways to gain an edge over their rivals – again, accelerating a cyclical tendency.

These competitive forces and entrepreneurial initiatives reconfigure the fundamental cyclical dynamics of the industry, like harmonies being induced on the fundamental octave of a plucked string.

4.2 Late Movers: The Role of Emerging Markets

A firm that targets the industry will utilize the first available downturn to acquire the technology and the technological capabilities – as Korean firms Samsung and LG did during the first downturn in the flat panel display industry in 1993-94. They hired Japanese engineers made redundant, and set up R&D Centers in Japan to take advantage of the downturn and the circulation of resources and knowledge that it unleashed. Then they waited for the next

downturn to launch their attack – which they did, unleashing massive investments in the next downturn, in 1995-96. Correspondingly, the Taiwanese firms were building their capabilities during this second downturn, and succeeded in negotiating technology transfer from the Japanese firms as they cut back on investment during the third downturn, in 1997-98, ramping up investment themselves. During the fourth downturn in 2001, new Taiwanese entrants made their mark, now making bets on variants of the fundamental TFT-LCD technology, such as LTPS

Thus the explanation for the ability of new firms to gain entry during a downturn is that it is only during such downturns that the required technological resources become available. The key to understanding the countercyclical investment pattern seems to be the availability of specialized human capital that potential new entrants can attract and leverage from incumbent firms. During an upturn, this human capital is fully utilized and effectively not available. Without the required specialized expertise, entry is either forbiddingly costly or technologically impossible.

It is entirely plausible that firms have to strategize around downturns in order to effect entry. It is only during downturns that they are able to raise investment, while the existing incumbents are being forced to cut back on investments. It is a small "window of opportunity" that potential new entrants must seize – the timing is everything. Moreover it is plausible that new entrants strategize around the cycles in the sense that it is the prior downturn that provides them with the opportunity to acquire the needed technologies and technological capabilities. The entrepreneurial dynamics involved in the strategizing around entry to the sector turn on the ability to, firstly, acquire the needed resources (technologies, capabilities) and then, secondly, ramp up the needed activities in time to catch the downturn before it becomes an upturn.

5. Case Study: LCD competitors in Brazil

Brazilian competitors are located in two states: Amazonas (Manaus) and São Paulo (Taubaté e São Paulo). Tax incentives and the subsequent complementary legislation created comparative advantages in the region with respect to other parts of the country and as a result the Manaus Free Trade Zone attracted new investment to the area. These incentives constituted tax exemptions administered federally by SUFRAMA (Superintendence of the Free Trade Zone of Manaus). In the first few years after its redefinition, the Manaus Free Trade Zone served as a huge shopping centre for all Brazilians. The military regime at the time prohibited imports and Brazilians were not allowed to leave the country. Thus, the Free Trade Zone became an escape pod for those with the greatest buying power; in Manaus they could find imported novelties from all over the world.

For Manaus (a Free Trade Zone) the greatest competitors are show in table 1:

Year	Ranking	Company
2007	**1º**	LG ELECTRONICS DA AMAZONIA LTDA.
	2º	SAMSUNG ELETRONICA DA AMAZONIA LTDA.
	3º	PHILIPS DA AMAZONIA INDUSTRIA ELETRONICA LTDA.
	4º	SONY BRASIL LTDA.

	5º	GRADIENTE ELETRONICA S.A.
	6º	SEMP TOSHIBA AMAZONAS S.A.
	7º	IBT INDUSTRIA BRASILEIRA DE TELEVISORES S/A
	8º	EVADIN INDUSTRIAS AMAZONIA S.A.

Table 1: Competitors in Manaus
Source: COISE/CGPRO/SAP, 2007

The production of plasma and LCD TVs in Brazil is still very limited, although this is changing due to the sales increase and aggressive financial policies that some retail stores have adopted.
According to ELETROS, plasma and LCD TV sets currently represent a very small market share. However, the number is increasing significantly and it is expected that 600 thousand units will be sold in 2007. Local production reduced the product's final price by 25 percent since the pieces are bought in Brazil and assembled in Manaus. Only the screen is imported from Asia.

Year	Production	Solds	**Revenues (US$)**
2002	538	357	213.089
2003	1.706	1.769	989.564
2004	1.326	816	712.401
2005	9.837	9.849	12.048.106
2006	188.095	185.512	245.615.564
2007*	600.000		

Table 2: Production for LCD TVs (Manaus) (*) Projection
Source: SUFRAMA, 2007

In Brazil, the Korean company LG was the first company to invest in this growing market. In 2002, LG invested US$ 2 million in the implementation of a production line for LCD monitors (15 and 17 inches) at its plant in the Manaus Free Trade Zone. The Dutch and Japanese companies Phillips and Sony followed LG's strategy, and also invested at their plants in Manaus.

5.1 LG

The LG Group started its activities in South Korea in 1947 and, nowadays, its business operations take place in 130 subsidiaries around the world, in over 45 countries, employing about 143 thousand workers. Settled in the five continents, the group unites 31 companies, with global sales surrounding US$ 98 billion in 2006. The LG Group operates in several fields, like chemistry, power supply, machinery, metals, finances and services. In Brazil LG has two industrial facilities, in Manaus (in the Amazonas state) and in Taubaté (in the São Paulo state). The Manaus facility is responsible for all the LCD TV production that supplies the national market.
LG operates 30 R&D centers around the world, including Korea, USA, China, Russia, Israel, Germany and India. In Brazil, the central office and the R&D center are located in São Paulo. LG has yet Corporative Design Centers in Seoul, Milan, Beijing, Tokyo, New Delhi and New

Jersey. Settled in Manaus since 1996, the company is, today, the greatest LCD TV producer in Manaus, by quantity. In 2005, the brazilian subsidiary reached a total revenue of US$ 1,3 billion, representing a 57% growth in relation to the previous year.

5.2 Samsung

The Samsung Eletronics of Amazon Ltda is between the largest Brazilian producers of consumer durable goods. Its manufacturing plant located in the Manaus Free Trade Zone started its operations in 1994, producing televisions, stereos and VCRs. Today, Samsung's subsidiary in Manaus produces as well DVD players, DVD recorders, CRT monitors for computer usage and CRT, plasma and LCD TVs.
Recently, Samsung Eletronics and the Japanese company Sony closed a US$ 2 million for an expansion plan, searching for a larger share on the flat TV market. Both companies already operate a US$ 2 billion joint venture along with the South Korean S-LCD Corp. to produce flat TVs.
This expansion allows Samsung, the second largest producer of big screen LCD televisions, to use Sony's brand influence in order to expand the big screen television market.
The selling of flat TVs was a major key behind Sony's climbing to the top pf the LCD TV market in the last quarter of 2005.

5.3 Philips

The Company settled in Manaus in 1972, attracted by the tax benefits offered by the local government. Today, the Manaus facility is responsible by the production of a vast array of electronic devices. Among them, DVD players and recorders, audio systems, Satellite TV receptors, home theater integrated systems, cinescope screen, plasma and LCD TVs, being this last the one with the greatest growth in the amount produced: The growth in the LCD TV production, comparing 2006 to 2005, represents an 865 % increase, in opposition to a 766% growth in the plasma screen TV production in the same period.
Since Manaus is the home base to Philips's fifth largest production facility in the world, and it is considered by the company a strategic center to exportations to Latin America and to the local market supply, the Philips Amazonas Laboratory – Research and Development Institute will be the first of its kind in the country and it will work as a partnership between the company and researchers from the Amazonas State University (who will be responsible by the management of resources), with the support of the University of São Paulo. One of the main objectives of this laboratory is to develop researchers and professionals to be capable of working with cutting edge digital technologies. This investment increases the company's presence in Brazil, generating a ground basis to allow the country's participation in the digital revolution.

5.4 Sony

World leader in the audio and video market, Sony's subsidiary in Brazil employs 1.900 workers, distributed in two offices (in São Paulo and Rio de Janeiro), and in the factory in the Manaus Free Trade Zone. Sony Brasil is structured in two different areas: consumer and professional. The first one is dedicated to the final consumer. It manufactures and

commercializes the whole audio and video product line, video cameras, digital cameras and car's stereo systems. The professional commercializes business solutions to the corporative market and is structured in three divisions: computers, Broadcast and B&I. Sony started its operations in Brazil in 1972 e inaugurated the Manaus factory in 1984.

5.5 Gradiente

Founded in 1964 and settled in Manaus in 1972, Gradiente grew strongly in the 70's due to three main factors: the prohibition of electronic equipment importation; the brazilian economic boost known as "the economic miracle"; and the settlement of Manaus Free Trade Zone's industrial pole.
Among its growth strategies, acquisitions were always a strong one to Gradiente. Between those who were acquired, are Garrard, an english company, Gradiente's former competitor, Polyvox, sold in the late 70's, Telefunken, a german company, bought in 1989, and more recently, Philco, which was acquired in 2005. Philco's incorporation will allow Gradiente to enhance its participation in the TV and DVD market.
Nowadays Gradiente focuses on the production of Home Theater integrated systems, plasma and LCD TVs, projectors, DVD players, Cellular phones and portable sound devices.
To fulfill the national demand, Gradiente relies on the collaboration of approximately 2 thousand professionals, distributed between the Business headquarters, the distribution center (both located in the São Paulo district), the production facility in Manaus, and an office in China.

5.6 Semp-Toshiba

Initiated its activities in 1942 in the city of São Paulo and its major business was the production of radios. In the 90s, due to the reopen of the importation market in Brasil, Semp Toshiba inserts in the brazilian market new and world selling leaders models, enlarging the family of products that it already had, like televisions, DVDs, VCRs, clock watches, mini systems, home theaters, cordless phones and computer goods. In the last years, it made important releases, especially in the big screen televisions, audio and image segments.
Today, the company that has around 1500 employees in Manaus, São Paulo and Bahia, is beside the largest companies in the electronic sector in Brazil. Semp Toshiba works in many segments: televisions (10 to 65 inches), audio (a complete line of sound systems), DVDs, VCRs, communication (cordless phones) and computer goods (notebooks, desktops, servers, copy machines, digital cameras, projectors and commercial automation.
Presenting a innovative position in its management, Semp Toshiba was the first company to offer the largest variety of big screen televisions; it was the fist one to offer to the consumer the widescreen tv (16:9); released the first multimedia television, with 21 inches, that worked like television and computer monitor. It was, as well, the first to release the television combined with a VCR.

5.7 IBT

IBT (Industria Brasileira de Televisores S/A Cineral) is in the consumer electronics since the 40's, when it distributed electronic components and provided technical assistance to radios. In

1964 IBT - Cineral started its own radio and TV production. From 1970 to 1990 IBT outstood from other companies by good sales of an own brand (Cineral) to the final consumer.
The production facility located in Manaus Industrial Pole started its activities in 1992, producing TVs, VCRs, microwave ovens, telephones and audio systems, sold under the brand Emerson. Today, the company still produces electronic devices under its own brand and under other brands, but there are not own-branded LCD TV product lines.

5.8 Evadin

Evadin has been on the market for more than 30 years. It started its operations in 1967 like a importer and distributor of the Japanese company Mitsubishi Eletric products in Brazil.
The company was a pioneer in the Manaus Free Trade Zone, where it inaugurated a plant in 1972, producing electronic good that carried the Aiko brand. In 1979, it started to fabricate and distribute in a national range, televisions and VCRs with the Mitsubishi brand and technology.
In 2000, Evadin started to develop, industrialize and distribute computers and video monitors under the PCI brand, and video monitors for AOC as well. Today, it's the company with the lower number of LCD TVs produced in the Manaus Free Trade Zone, manufacturing only a single model of LCD TV under the Aiko brand.

6. Conclusion and limitations

Electronics industry figures also claim that imports from abroad, particularly from China, are steadily eroding their competitive edge domestically. According to the electronics organization Siscomex, imports of electronics parts and components accounted for sales of US$8.6 billion, with China-originated products taking a 35% share.
The situation as regards inflation has gradually stabilized from 2004 with the government's policy of keeping interest rates high proving effective, and robust economic growth generating higher wages and spending. But local electronics players are still complaining of lower sales domestically, due mainly to the demand for overseas-made products, particularly in the audio and DVD sectors.
Presumably a better tack could be to form alliances with major foreign firms entering the Brazilian market. For example Intel Capital, the investment arm of Intel Corp has recently created a US$50 million venture capital fund to promote technological growth in Brazil, with the idea of stimulating innovation and growth - and inevitably selling more semi-conductors.
The Brazilian government is also currently negotiating with Japanese TV manufacturers to invest US$1 billion in a factory making semi conductors in the Manaus Free Trade Zone. The latter deal will be particularly significant to the Brazilian electronics industry, as it will help to accelerate Brazilian TV production, which currently has 85% of its components for LCD TVs imported.

The move appears to fly in the face of a separate decision to reduce the import tax on TV tuners, signal assessors and monitors from 16% to 2% until the end of December 2007.
The primary limitation of this paper is, similar with those of other papers from RBV/KBV, it's almost impossible to do any exact numerical evaluation to support the assertions of this paper. In addition, as we mentioned before, to recognize the changes of stages in Product Life Cycle,

is very difficult and almost always they can't help time delay even if any change was detected. We also suggest further studies for Brazilian market.

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