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**Maturity in the virtual organizations – the influence of IT architecture  
and strategic alignment**

**Kumiko Oshio Kissimoto**

Rua Maracá, 266 – ap 122 – CEP 04313-210 – São Paulo-SP  
11-8261-9944, [kkissimoto@usp.br](mailto:kkissimoto@usp.br)

**Fernando José Barbin Laurindo**

Av. Prof. Almeida Prado, Travessa 2, Nº 128, CEP 05508-070, Cidade Universitária , São Paulo – SP  
11-3091-5363 r. 454, [fjblau@usp.br](mailto:fjblau@usp.br)

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# **Maturity in the virtual organizations – the influence of IT architecture and strategic alignment**

Kumiko O. Kisimoto; Fernando J. B. Laurindo

**Abstract:** It is increasing the number of organizations that are operating in the virtual space. Virtual organizations are companies that join primarily through the use of technology, mostly the internet resources. In this new economy, the environment suffers constant and dynamic changes, and more and more companies suffer the pressure to adopt a new posture in the marketplace. As customers become more knowledgeable, informed, networked and empowered, they seek to exercise their influence in the business process, changing for once the nature of the customer-company interaction. In this article, it is discussed how IT and business strategy have changed to accommodate all these changes. Also it is analyzed the importance of aligning both strategies in order to sustain their competitiveness in the market and give them capacity to innovate constantly. Through case study approach in e-commerce companies, the present paper investigated how companies are working the IT architecture to achieve the operations maturity in the virtual space and how the IT strategic alignment between IT and business strategies contributes to give to companies a competitive advantage.

**Key-words:** New economy, Virtual Organization, Strategic Alignment

## **1. Introduction**

The advances in the Information Technology (IT) has been the responsible for the major changes that the marketplace is witnessing in the last years, forcing companies to review their strategies and the way they operate their business. The globalization, the technological convergence and the quick evolution of the internet resources are changing the traditional business dynamics, the organization structure and the customer behavior (Prahalad & Ramaswamy, 2000; Tapscott, 2001).

In the new economy environment, the consumer is probably the most demanding agent for changes. Thanks to the internet, consumers are more informed, empowered and armed with new tools; seek not only to exercise their influence on the business system, but also to become a co-creator (Chandrashekar & Schary, 1999; Prahalad & Ramaswamy, 2000).

The co-creation in the new economy goes beyond product customization. It is about personalizing the experience consumers have in their buying process. It is about shifting the focus from the business process to the interaction with the consumer (Montreuil & Poulin, 2005). The information and the knowledge become vital and are essential for the competitive differentiation. But in order to succeed in the task of offering personalization through co-creation, IT platform must allow the necessary flexibility and agility (Helms *et al.*, 2008; Mccarthy, 2004; Piller, 2007; Piller *et al.*, 2004).

IT can play a more infrastructural role in order to ensure the operations efficiency or can assume a more strategic role, aiming to leverage the technological infrastructure for business purposes (Mcfarlan, 1984; Nolan & Mcfarlan, 2005). Whatever the role IT is playing in the company, if there is no alignment between IT and business strategy, many of the benefits IT can bring to the operation might be lost (Cumps *et al.*, 2009; Henderson & Venkatraman, 1993; Hirschheim & Sabherwal, 2001; Luftman & Brier, 1999).

The present work aims to investigate through a case study approach, conducted in two retail companies, how IT has influenced the virtualization maturity, how the alignment is achieved and how these two factors have enhanced the business. In the next section the theoretical foundation is presented, followed by the methodological

structure, the description of the cases and in the last part the conclusion and future research directions.

## **2. Theoretical Foundation**

Internet has promoted, without a doubt, many important transformations in the last years, generating a powerful and universal means of communication. It surpasses the impact that radio and television brought to the society, mainly because of the extent, content, interaction and the capacity to create new markets (Tapscott, 2001). This section discusses how these transformations influenced the change from the product centered view to a more customer centered view and how IT is fostering this change.

### **2.1 The New Economy**

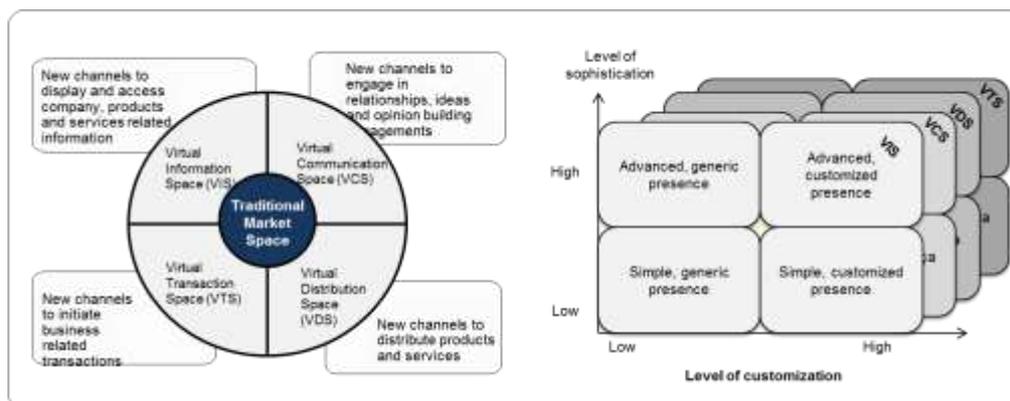
The transformations in the new economy are not just about technology. They refer to profound changes in business, in the market structure, governmental regulations and in the human being behavior. The impacts of all these changes on the competitive dynamics in the global chains are huge (Gereffi, 2001).

The new economy is strongly related to the globalization and virtualization concepts. Globalization is the internationalization of the relationships and it is not a new concept. However, with the internet the connection possibilities among value chains is achieving an extent not seen before (Carvalho & Laurindo, 2007; Hallikas *et al.*, 2008). Virtualization on the other hand, is related to the technological capability (mainly communication capabilities) and with the organization in the net. Companies that get together fundamentally through the use of the internet resources are called virtual organizations (Chandrashekar & Schary, 1999).

Many companies started by establishing a presence in the virtual space through corporate web sites and extending later the internet-related activities, supporting other company activities like business intelligence, R&D and marketing. Companies that aim

to use technological innovations to redesign their business strategy should reshape their operations to develop some characteristics like the ability to convert the IT investments in measurable returns or cost reductions and the ability to develop a clear strategy, aligned with business objectives. Based on these definitions, Anghern (1997) segmented the virtual space in four virtual spaces, the ICDT Model – virtual information space (VIS), virtual communication space (VCS), virtual distribution space (VDS) and virtual transaction space (VTS).

The ICDT Model's segmentation emphasizes the extensive spread of the traditional market space into a new virtual space, where it is possible to identify how existing products and services can be extended and redesigned, as well as the creation of completely new forms of business that has been made possible by the internet. The maturity of the virtual organizations can be measured according to the technical sophistication (simple vs. advanced) and the customization level that they are capable to offer in each of the four dimensions of the virtual space (Fig. 1).



**Figure 1** – The ICDT Model and the types of Maturity Strategies (adapted from Anghern, 1997)

However, it does not mean that the company should present the same level of maturity in all four spaces. Some might be more mature in the information space whilst others might present better enhancements in the communication and distribution spaces, for example. What matters is how companies perceive and work the four virtual dimensions in order to achieve the maturity in the virtual space.

Venkatraman and Henderson (1998) on the other hand, define virtualization as a set of strategies with three distinct vectors:

- (i) *The customer interaction* – deals with the interactivity challenges;
- (ii) *Asset configuration* – focus on the requirements a company should own in order to be virtually integrated in a business net; and
- (iii) *The knowledge* – deal with the opportunities to leverage the many experiences within and outside the company.

These three vectors are interdependent and together they form the basis for the virtual organization, facilitating the necessary changes in order to cope with the market transformations. Each one of the vectors has three distinct stages and each one impacts the results and the company characteristics in a different way. In the first stage, the results are the operations transformation, in the second stage, the transformations have impacts on the organization and in how the activities should be coordinated in order to deliver value and in the third stage, the companies work engaged in a value net focusing in creating multiples communities to foster innovation and growth (Fig. 2).

Operational Characteristics			
Vectors and Characteristics	Stage 1	Stage 2	Stage 3
Customer Interaction (Virtual Encounter)	Remote experience of products and services	Dynamic customization	Customer communities
Asset Configuration (Virtual Sourcing)	Sourcing modules	Process interdependence	Resource coalitions
Knowledge Leverage (Virtual Expertise)	Work-unit expertise	Corporate asset	Professional community expertise
Organization Characteristics			
Target Locus	Task units	Organization	Inter-organization
Performance Objectives	Improved operating efficiency (ROI)	Enhanced economic added value (EVA)	Sustained innovation and growth (MVA)

**Figure 2** – *Virtual Organizing* (adapted from Venkatraman and Henderson, 1998)

The customer has been the most influencing factor in the business transformations (Chandrashekar & Schary, 1999; Prahalad & Ramaswamy, 2000). The immediate impact of the customer presence in the company process is the need of reviewing and considering the collaborative relationship between customers and

enterprise. Companies are achieving differentiation as they acquire the ability to serve each customer with personalization and value co-creation.

Prahalad and Krishnan (2008) call this movement as N=1, where internal resources are worked in continuous basis in order to anticipate customer needs and preferences. But, it is only possible to achieve this N=1 if the company is able to explore the resources globally (R=G). This movement requires new levels of visibility, agility and flexibility in the value chain in order to attend each customers' specification.

In the next section the IT role in all these transformations is discussed, with special attention to the influence IT has in the collaborative relationship and how it is changing the personalization process both in products/services and in the experience in the buying process.

## **2.2 The transformations in the new economy**

There is no doubt about the importance of the customer's presence in the production process. Customers have played a more active role, demanding profound changes in the business strategies and in the way enterprises build their internal architecture.

The virtual organization maturity, the evolution of the virtualization stages and the search to work according to the concepts of N=1 and R=G, demand two key factors, which are discussed next:

- (i) An internal processes and a technical architecture that is able to leverage the innovation; and
- (ii) The customer recognized as part of the company's competence

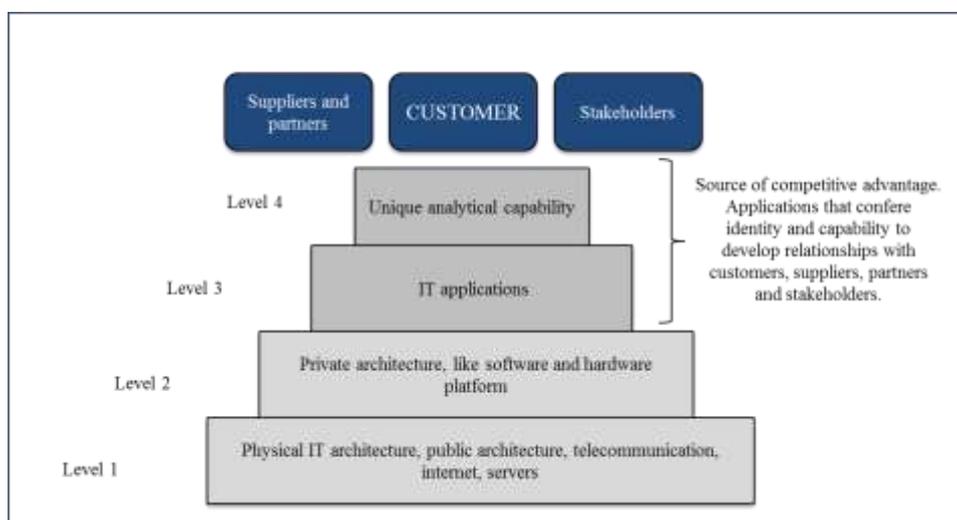
### **2.2.1 Internal processes and technical architecture that enable innovation**

According to Prahalad and Krishnan (2008) the internal processes of a company are the existing links between the company strategy, its business model and the

operations. It is the logic that define the company's and the collaborative chain's activities (R=G) and determine the level of the relationship the company is able to offer to their customers (N=1). The internal processes, on the other hand, influence and are influenced by the technical architecture (IT infrastructure) and the social architecture (organizational structure and management model).

The technical architecture can be divided in four levels, where the first two levels concentrate on the standardization and operation efficiency (Figure 3). Companies today are not able to differentiate themselves based on the choices they do about the hardware, software, database and operational systems. However, although these two levels do not bring differentiation, it must be well planned and implemented to provide all the necessary integration and scalability.

The differentiation is achieved from the upper two levels, where applications are developed according to the business needs and are designed to offer the necessary link with customers, suppliers, partners and stakeholders. However, it only can be considered source of differentiation if the company knows the role of each one of the levels and how each of them contribute to this differentiation.



**Figure 3** – Technical Architecture (Adapted from Prahalad and Krishnan, 2008)

According to Venkatraman (2000), some of the differentiation sources a virtual organization should offer are: (i) superior functionality, considering the large technological resources available; (ii) offer personalized interactions; (iii) facilitate and simplify all the transactions in the web; and (iv) provide privacy to the users. If a company is building their architecture, looking to these points, there is a great chance to succeed in the new economy.

### **2.2.2 The customer as a source of competence**

The importance of the customer/enterprise interaction is emphasized by other authors like Duray (1997) and Lampel and Mintzberg (1996) that first started to discuss that more or less customization might be offered depending on the point of customer contact in the production process. Meanwhile, Gilmore and Pine (1997) considered the value of customization and personalization from the customer point of view. Marketing area also developed several works emphasizing the importance of understanding the customer needs and the market segmentation, like Kotler (1989) and Peppers *et al.* (1999) that started the “one-to-one” marketing concept.

According to Prahalad and Ramaswamy (2000) companies should develop some specific competences that would enable them to engage their customers in an active, explicit and ongoing dialogue; mobilize communities of customers; manage customer diversity and co-create personalized experiences. Each one of these competences is discussed below:

- *Encouraging active dialogue* – in the new economy, companies should recognize that the conversation with the customers is a dialogue of equals. Should also find ways to dynamically process what they have learned from customers and use it to bring the dialogue forward;

- *Mobilizing customer communities* – thanks to the internet facilities, customers have created on-line communities exercising powerful influence on the market. Companies should create tools to mobilize these communities;
- *Managing customer diversity* – understand that the judgment of one product or service will vary according to the level of skill, knowledge, sophistication and purpose of the customers. If a product or service is offered to the wrong customer community, the experience might be disastrous. So identify and manage this differences is key factor to succeed in this new economy environment;
- *Co-creating personalized experience* – consumers are more and more searching for new personalized experiences in the net – it goes beyond the concept of acquiring a customized product – they want to co-create value.

Company's strategy should be dynamic to constantly keep with the changes that occur in the market (Campbell & Alexander, 1997; Eisenhardt & Brown, 1999; Markides, 1999). When the business strategy is aligned with IT strategy, the results might be greater. In the following section the impact of this alignment is discussed.

### **2.3 The strategic alignment and the alignment perspectives**

Studies have proved that the alignment between business and IT strategies give better results for all the company and not only in the IT department (Cumps *et al.*, 2009; Henderson & Venkatraman, 1993; Hirschheim & Sabherwal, 2001). Another benefit of the alignment is a more focused use of the IT resources, resulting in a better business performance (Chan *et al.*, 2006).

This point was first discussed in a survey conducted by MIT (Massachusetts Institute of Technology) in the 1980s, which generated one of the first models showing

that revolutionary changes, involving IT investments, generate substantial benefits since the essential elements of the strategy, e.g. technology, structure, processes and people are aligned. Later, Henderson and Venkatraman (1993), based on this study, created the strategic alignment model, which now must be the most cited among all models of alignment (Chan & Reich, 2007).

The alignment model proposed by Henderson and Venkatraman (1993) identifies two integration ways – (i) strategic integration, that is the link between the business strategy and the IT strategy, reflecting the external factors; (ii) operational strategy, that is the existing link between the administrative infrastructure and the IT infrastructure, reflecting the internal factors. In order to achieve an effective IT management, equilibrium among the four domains must be pursued.

The most common alignment perspective is when the business strategy changes the IT strategy. But in some cases, mainly in vanguard companies, is the IT strategy that changes and molds business strategy. Luftman and Brier (1999) cite four types of alignment perspectives:

- **Alignment perspectives driven by business area**

- ✓ *Strategy execution* – the business strategy demands a change in the organization infrastructure that impacts the IT infrastructure.
- ✓ *Technological transformation* – the business strategy demands new IT strategies (including new competencies) and an IT infrastructure that supports these initiatives

- **Alignment perspectives driven by IT area**

- ✓ *Competitive potential*- New technology and IT strategy demand new business strategy and model.

- ✓ *Service Level* – Standardization of the IT services, many of times represented by the outsourcing of the IT services for those that are considered world class, targeting the internal customer satisfaction.

However, the strategic alignment is not a simple task due to the dynamism and complexity of companies' activities. Some ways to examine the presence or not of the alignment is to verify (i) if the organization strategy is communicated within the company (Chan & Reich, 2007); (ii) if there is an understanding about the relevance of the alignment (Henderson & Venkatraman, 1993); and (iii) if the role of both IT and business are clear along the company (Chan & Reich, 2007).

### **3. Methodological procedures**

The new economy is characterized by the globalization and virtualization of the enterprises. The globalization is related to the internationalization of the relationships, powered by internet resources and the virtualization is related with companies that are able to manage their technological capabilities in order to consolidate a virtual presence. The maturity of the virtual organizations is achieved when companies are able to build a technological architecture that enables them to innovate in collaboration with customers. The strategic alignment between business and IT strategies might confer competitive differentiation and the alignment perspective adopted by the companies also can influence the quality and intensity of the innovations.

Based on the literature review, the following propositions are stated:

- P.1** Technical architecture might influence positively the maturity of the virtual organizations (Prahalad & Krishnan, 2008);
- P.2** Companies that seek to align their business and IT strategies have bigger chances to differentiate in the marketplace (Luftman & Brier, 1999)

The research's approach depends on the type of the questions that have to be answered and on the nature of the phenomenon to be analyzed. In the operations management, the main research approaches are – survey, case study and modeling/simulation (Miguel, 2010). In the present work, once the nature of the questions is “how” questions, proper for case studies, this approach was chosen. Also, the nature of the phenomenon is contemporary and the context where it occurs matters requiring a more deep understanding, what reinforces the chosen approach (Yin, 2005).

The criteria to select companies for the case study were:

- Companies that use e-commerce;
- Companies with global presence (initiating or established)
- Companies in the retail segment (because of the intensity of the customer interaction).

Two companies were selected and the research instrument was a semi-structured interview with IT and marketing managers. All the interviews were recorded, transcribed and the report was sent to the interviewed person to be validated. The analyses were made based on the theoretical review. The description of the cases will be presented in the next section.

## **4. Discussion of the cases**

### **4.1 Company A**

The origin of the company A is Brazilian and belongs to the retail industry. It was first an advertising and marketing agency. It is a small company, working there about 30 employees, the majority in the creation and technology area. It is specialized in offering customized decoration products, and sell since customized calendars to personalized wall banners.

The idea of offering customized products emerged when the owners realized that always during the creation period many good material – ideas, materials, designs and highly qualified human resource - were wasted. Around 2006, when the digital cameras’ technology was gaining more popularity and quality, the advertising agency owners decided to invest in one technology that could combine all the available material and the digital photograph resources. The concept behind the idea is to try to immortalize the special moments that are captured by a digital camera in a personalized decoration piece.

Initially the company was a physical store where the owners used as a laboratory to check the acceptance of this kind of product. The company’s web site was just to inform some corporative information, the location and a product portfolio to be consulted. Customers that wanted to acquire their products had to go to the store with the photograph in digital format, choose the product and the lay-out they wish. After this, all the process was made through e-mail. The creation staff creates a model, which was sent to the customers to be approved – all by e-mail. Frequently this process repeated more than three times until the customer gives the final approval, making the process long and expensive.

**Table 1 – Company A evolution with the virtual store**

<b>Variables</b>	<b>Before the web site</b>	<b>Working with virtual store</b>
<b>Product reach</b>	Local	Global – have customers in the Brazilian territory and also abroad; immediate divulgation.
<b>Production process</b>	Long, with many steps, demotivational for the customer;	The product definition, design and the lay-out creation steps are done directly by the customer, conferring agility to the process.
<b>Costs</b>	It was very high, mainly because of the costs related to the creation staff, time spent in each project and equipment usage.	The costs lowered, once the company is responsible just for the production and distribution of the finalized products.

In 2008 when they already had greater products variety, they decided to start a virtual store, where the customer himself defines the product, the photograph and final lay-out of the products. Some benefits were immediate as seen in the Table 1.

Company A has an integrated staff of marketing and technology. All the company systems are developed internally so they can assure the agility and exclusivity. It is in their plan to expand their capability by offering more products variety, and they are analyzing the existing technologies in order to define what platform they should adopt to develop the unique system that will support the planned growth.

The strategic alignment occurs naturally, but not in a coordinated way. Once the company is small, and the owners are always together with the development and technology staff, in some way they discuss the business necessities and the technology necessary to enable the business strategy. The alignment perspective of the company is the Technological Transformation – when the business strategy demands new technology strategy.

## **4.2 Company B**

Company B is a typical e-commerce company. It was founded by two engineers that created a technological platform that allow any person to customize their products that will be delivered in 24h to anywhere in the globe. It was created to operate only in the virtual space and to be global. The company's operations started in 2005 only in the American market. In 2007 they started their expansion to other countries and today, they have operations in 16 countries. They have one physical facility, located in the west coast of USA, where around 500 employees work in the production, engineering, technology and marketing departments.

They are known as the largest marketplace for custom products with huge variety of unique product designs and options. Their design tools convert customers'

ideas and their own designs into products that go from customized buttons to skateboards. The company structure and production are totally centralized and all software and hardware technologies are proprietary in order to enable the custom manufacturing. Every machine acquired by them, are opened and the internal software replaced by theirs. This is what makes the customization experience fast and fun for the customers.

All the production is on-demand, started by the customer and everything is made in real-time. Once they finalize the buying process, a service order is sent to the machines that start the production process. In 24h any product is ready to be delivered, no matter from where the order was originated and to where it is going.

Any customer can submit their own creation to the company's web site and when a product is sold with their creation (pattern, design, lay-outs, etc), the customer earn 10% to 15% of the sales. Others ways to participate is to become an associate or build a link from the customer's web site to the Company B's site. These initiatives assure benefits to both operational and strategic aspects for customers and for the company:

- Constant new offers and customization options to the customers, with no expenditure with creation staff ;
- Customer involvement and interaction;
- Allow the customers to build their experience with the company, enhancing the perceived value for them;
- Increase loyalty and the creation of communities.

In order to achieve better competitiveness in foreign markets and to be able to deliver a better level of services, company B is now building partnerships with local suppliers. This is an important step to shorten the delivery time and the distribution

costs. Today, all the shipments are made from USA, what increases the final prices because of the shipping costs and although the products are made in 24hs, they take some days to arrive to the customer's hands. The difficulty in this task is to find a local supplier that could have their technological architecture totally integrated with the company B's technological platform.

Company B is totally oriented to technology. It is through the technological innovation that new ways of doing business are opened and developed. The company CEO, one of the co-founders, has long experience and familiarity with technology. Nowadays, 80% of the investments are made in technology. In their understanding, the technology and the technological innovation are the only way they to achieve the quality, agility, flexibility and variety to be always aimed by the business strategy. The alignment perspective pursued by them is the Competitive Potential, where the technology strategy shapes the business strategy.

### **4.3 Case analysis**

In the case of Company A, IT resources were initially used to improve their presence in the virtual space, the efficiency in the operations and reduce production costs. Applying the ICDT Model (Angehrn, 1997) to the case, the virtual information space is the most developed, improving company visibility. Although in a lesser degree, the communication and transaction spaces were also developed, once they are now able to offer personalization of their products through the web site. However, their technological architecture is still in the development stage, what restrict the improvements that could give them maturity in the virtual space operations.

In the point of view of the virtual organizing model (Venkatraman & Henderson, 1998), company A is walking from stage 1 to stage 2. Although they are able now to offer personalization, it is not dynamic. They still need to work to increase the

functionalities, as well as the process interdependence. Also, they must develop the relationship with partners that could give them major product variety and flexibility. Today, they are working with few partners – most of them suppliers that could be developed to offer more customized products if their systems were more integrated.

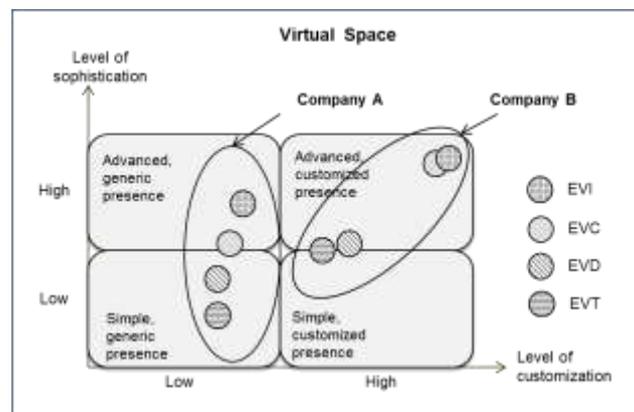
The technological architecture (Prahalad & Krishnan, 2008) is still in development. Company A has worked in the first two levels, but still need more improvements in the upper two levels. Today, they are concentrated in developing the IT applications (level 3) in order to improve the system functionalities that could differentiate them from other customizers. They want to be known in the market as the company that delivers unique decoration products and services. To achieve this point, their analytical capacity (level 4) should be improved, in order to be able to dynamically analyze the customers profile, identify their preferences and offer unique products.

Company B is in a more advanced stage in the maturity of operations in the virtual space. They have already established the strategy for the four virtual spaces cited by Angehrn (1997). Their technological systems present high level of sophistication allowing them to dynamically customize in all four spaces. Prahalad and Ramaswamy (2000) cite that to one company be able to work in the new economy, it should consider customers as a company competence. Company B does it. They are able to work customer's ideas and preferences internally, turning them into products.

Their technological architecture is built to differentiate them from the competition and to give them sustained and continuous capacity to innovate. Through their system they are able to establish valuable relationships with customers that act as a company co-creator and they are able to integrate their systems with suppliers and partners' systems in order to obtain the necessary flexibility, agility and reliability to the operations.

According to Venkatraman and Henderson's (1998) model, Company B is already on stage 3, however, in the opinion of the company's managers, it still needs to work better the partnerships in locations outside USA. Once their systems are all proprietary and to assure the total integration, their partners also should have high technology level and be able to work in total coordination – a point that is not easy to develop outside USA. But this is an important step in order to lower the shipping and delivering costs and times.

In the Figure 4 it is possible to observe how both companies are classified in the Angehrn's (1997) maturity strategy model.



**Figure 4** – Classification of the companies in the Maturity Strategy Grid (adapted from Angehrn, 1997)

## 5. Conclusion, limitation and further researches

In the nowadays economy, companies that do not understand the challenge of redefining their business strategies to be able to follow the changes in the customers' behavior and in the marketplace will face difficult times to maintain the competitiveness. IT cannot be seen just as an infrastructure resource, but as a strategic weapon to achieve organizations' goals. Also, both strategies – business and IT – should work aligned in order to get the maximum benefits from the operations and allow the sustainable and continuous innovation. Customers also are not anymore a passive

spectator. They play now as the leading figure and companies should work in collaboration with them.

The studies allowed the preliminary analysis on how companies are using the IT tools to strengthen their position in the virtual market. The operations' maturity in the virtual space is directly related to the quality of the technical architecture. At this point, the organizational culture, identified in part from the alignment perspective, influences the development of new strategies to improve their operation in the virtual space.

Company A's alignment perspective is driven by business area (Technological Transformation). Their executives are visionaries and are always looking for technological solutions that could support their business strategies and initiatives. They understand that it is through technology improvements that they will gain operational efficiency but they still need to organize their operations in order to define which maturity strategy they will prioritize continue the growth.

Technology innovations are the main driver of Company B. Their alignment perspective is the Competitive Potential, where the IT strategy and innovations are the drivers to their business strategy. Through collaboration with customers and partners, constant improvements in technology and high operational and technological sophistication they have resources to not fear the changes but to be in a vanguard position in the e-commerce environment.

Although it is not possible to make generalization based on just two cases, it is possible to consider that companies are increasingly looking for ways to improve their IT capacity in order to follow the changes that are occurring in the marketplace. However, the IT development is highly dependent to the country culture and level of economic development. This two cases showed a little of this point. Company A is a

Brazilian company, working mostly locally and although internet users and technology are improving, there are still constraints and the lack of familiarity in doing business through the web. Unlikely, Company B is an American company, where the technology available and the culture are in a more mature stage. But even company B faces difficulties in operations outside USA, mainly when talking about reliable partners that could strengthen their position on these regions.

This point leads to the need to deepen the understanding about how Brazilian companies see the operations in the virtual space, how they are adapting to the regional customers behavior, how they are integrating the different systems and how they are working the internal processes to face the need to align IT and business strategies.

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