INFORMATION TECHNOLOGY CAPABILITY AND ORGANIZATIONAL AGILITY ON A HEALTH COMPANY

Abstract

This paper presents a case study relating IT Capability and Organizational Agility within a medical diagnostics company in Brazil. The objective was to identify how IT Capability affects Organizational Agility; therefore, a qualitative approach was adopted. The analysed company is one of the four biggest Brazilian companies in this sector, and it is the youngest of them. The data collection was based on interviews with twelve persons, including IT professionals, business professionals and IT supplier professionals. The relationship between these two concepts was analysed from the perspective of the company's three main information systems. The sensing dimension of organizational agility has so much information from monitoring systems that the importance of reacting dimension is based more on the effectiveness of the projects than on the time of response. The study shows that IT capability supports the organizational agility on its both dimensions – sensing and reacting – and these are not separated nor unrelated dimensions. The organization responses are highly based on the analysis of the identified problem areas, and they bring insights and create a time advantage that allow the company to spend more time choosing the new projects that should be carried on. The reacting dimension of agility are not about time of response, but about the effectiveness of response.

Keywords: Information Technology Capability, Organizational Agility, Medical Diagnosis, Health Company

1.0 Introduction

This paper presents a study about the relationship between IT capability and organizational agility. IT Capability is a concept derived from the resource-based view theory (RBV). In the RBV perspective, IT Capability is seen as part of the IT organizational resources. It also helps to understand the relationship between IT investments and organizational performance, as there are several studies in the literature that present IT capability as an intervening agent of this relationship.(Bharadwaj, 2000; Chen, Wang, Nevo, et al., 2014; Huang, Ou, and Lin, 2006; Lu and Ramamurthy, 2011; Santhanam and Hartono, 2003).

Organizational agility refers to the company's ability to perceive changes in its environment and to generate responses to these changes. In a certain way, the concept of agility is close to flexibility. The difference, according to Teece, Pisano and Shuen (1997), is that flexibility is a way of responding to the risks that the company faces, and organizational agility is the appropriate way to deal with uncertainties. Risk refers to potential future events and their likely consequences. Uncertainty refers to unpredictable events whose nature and probability of occurrence are unknown (Teece

et al., 2016). Therefore, organizational agility is more critical for organizations in environments of greater uncertainty. Several authors discuss about the relationship between organizational agility and business performance (Santhanam and Hartonos, 2003; Ray, Muhanna, and Barney, 2005; Jiao, Chang and Lu, 2008; Stoel and Muhanna, 2009; Lu and Ramamurthy, 2011; Mithas, Ramasubbu, and Sambamurthy, 2011; Chakravarty, Grewal, and Sambamurthy, 2013). Chen et al (2014) showed causal relationships between IT investment, IT capability, organizational agility and business performance, and the role of agility organization are mediated by environmental characteristics.

The focus of this work is the relationship between IT capability and organizational agility since the other two relationships (between IT investment and IT capability and between organizational agility and business performance) have been exhaustive studied and verified.

Differently from most of the previous studies in the literature, this article uses a qualitative approach to evaluate this relationship because its focus is not on the existence or not of the relation (IT capability → organizational agility), but in on "how" this relationship occurs.

Wade and Hulland (2004) cite authors who have found a negative relationship between IT and organizational performance (Sager, 1988; Venkatraman and Zaheer, 1990; Warner, 1987). This suggests that the nature of this relationship and its stakeholders are not yet clearly specified in the literature. That is the reason why this study opted for the qualitative approach based on a case study.

The case approached in this study is a Brazilian medical diagnosis company founded in 2011 by an investment group (Fundo Pátria) that executes an aggressive strategy of acquisition of regional brands and has quickly become one of the four largest medical diagnostic groups in Brazil. Its operation is strongly based on the management of operational information that flows through interfaces with three main actors: health care providers, doctors and patients. The observed data suggest that some of the dimensions of IT capability, manifested in key IT applications, support the development of key competencies for organizational agility. The obtained advantage of perceived capability has made its reaction dimension more linked to the effectiveness of actions (operational improvement projects and development of new products) than to the speed of reaction.

2.0 Literature Review

Bharadwaj (2000) used Resource-Based View Theory RBV to study how IT affects the performance of companies and created the term IT capability. She used CIO assessment provided by IT professionals from other companies as an indicator of IT capability. In companies with greater IT capability, the financial indicators analysed were higher than those of companies with lower IT capability. This is a considerable limited operationalization of IT capability concept since it be should be an organizational and non-personal characteristic. Later Santhanam and Hartono (2003) employed the same operationalization of IT capability and obtained conclusions consistent with the work of Bharadwaj (2000), and a recommendation is made about the need of indicators for the dimensions of IT capability as a way to evolve the research in this area – the relationship between IT investment and organizational performance. Several researchers have presented different scales for the dimensions of the IT capability (Chen et al, 2014; Mithas, Ramasubbu & Sambamurthy, 2011; Jiao, Chang & Lu, 2009; Gao, Chen & Fang, 2009; Chakravarty, Grewal & Sambamurthy, 2013; Huang, Ou, Chen & Lin, 2006; Bhatt & Grover, 2005; Tippins & Sohi, 2003; Pérez-López & Alegre, 2012; Lu & Ramamurthy, 2011; Stoel & Muhanna, 2009; Wade & Hulland, 2004; Piccoli & Ives, 2005). All these quantitative studies found a positive relation between IT capability and organizational performance.

Overby, Bharadwaj and Sambamurthy (2006) contributed to a better understanding of this relationship when proposed the concept of organizational agility to mediate the relationship between IT capability and organizational performance. According those authors, in most organizations the main impacts of IT on the business occur indirectly across business areas and processes, and IT would play an important role in redesigning and deploying business processes. According to these authors, agility has two dimensions – sensing and responding that extend the reach and richness of the company's knowledge and processes.

The sensing dimension is related with knowledge management and environmental scanning, refers to the intellectual ability to find appropriated opportunities; and the responding dimension is related with to supply chain management, production management and resource usage, and the ability to act properly. In addition to the direct impact that IT has on organizational agility, there is also an indirect impact through the creation of digital options (Overby et al, 2006).

Sambamurthy et al (2003) suggest that IT indirectly supports agility by providing companies with digital options, which are defined as a set of IT-enabled capabilities in the form of work processes and knowledge systems. A basic premise of this theory is that IT increases the breadth of reach and the richness of information that is available to the company, enhancing its ability to perceive and respond to the environment, thus making it more agile. The term "options" is used because a company can apply its IT-related capabilities to emerging opportunities, or it can remain unusable, depending on the company's environment and strategy. These authors define three types of IT agility (dimensions): customer agility, partner agility and operational agility.

Customer agility is the ability of the company to utilize customers in exploration and exploitation of innovation opportunities. It refers to the company's ability to understand customer manifestations to gain market intelligence and detecting opportunities. Partner agility is the ability to mobilize the organization resources, and the knowledge and skills of suppliers, distributors, contracted manufacturers and logistics providers, through alliances, partnerships. It enables companies to build a network of strategic partnerships to explore innovation opportunities and create competitive advantage. Operational agility refers to the ability of the business processes of companies to achieve competitive standards of time, cost and quality for the exploration of innovation opportunities and the creation of competitive advantage. This dimension allows the company to quickly redesign existing processes and create new processes to exploit the conditions of a dynamic market. Table 1 shows dimensions of organizational agility used in different papers

In general, the researches that study the relationship between IT capability and organizational agility take a quantitative approach from a positivist perspective. These previous study were important to identify the relationship between these concepts, and relations with other concepts, such as organizational performance, environmental characteristics and IT investment. However, because of the methodological approach adopted, they did a limited contribution to the understanding of the mechanisms underlying these relationships.

The literature shows that there is a relationship between the concepts studied here – IT capability and organizational agility. These previous researches are mainly from quantitative nature and focused on statistical evidences of this relation. As the interest

of this study is to identify how this relationship occurs, we chose a qualitative approach based on a case study.

Authors	Analysis technique	Dimensions of Organizational Agility
Sambamurthy, Bharadwaj and Grover, 2003	Theoretical review	Customer agility Partnering agility Operational agility
Tallon and Pinsonneault, 2011	Structural equations modelling	Unidimensional concept
Chakravarty, Grewal and Sambamurthy, 2013	Latent class regression analysis (CLCRA)	Adaptive agility: the company´s ability to detect and respond to the market in a defensive way. Usually as an attempt to recover from disturbances in market forces. Entrepreneurial agility: the ability to organize the business processes in order to catch potential opportunities.
Lu and Ramamurthy, 2011	Regression analysis	Market capitalizing: the company's ability to continuous monitoring and rapidly deliver product / service improvements in order to meet customer needs. Operational adjustment: is the ability to adjust business processes to quickly responding the market changes.
Fink and Neumann, 2007	Structural equations modelling (covariance-based)	System Agility: the ability to perform changes in information systems efficiently (in terms of cost and time). Information Agility: the ability to perform changes in the way users access and use information resources. Strategic Agility: the ability of efficiently and effectively responding the emerging market opportunities by leveraging existing IT capabilities.
Richardson, Kettinger, Banks and Quintana, 2014	Longitudinal case study	Customer agility Partnering agility Operational agility

Table 1. Previous studies about organizational agility

3.0 Research Method

In order to better understand the reaction between IT capability and organizational agility a qualitative approach was chosen. A case study was performed at Alliar, a diagnosis company that has few local brands around Brazil. Its operation is strongly based on management of operational information. This information has been processed by some applications that has created strategical advantages. Despite Allier be a very young company, it is one of the four biggest Brazilian companies its sector.

One characteristic that distinguishes this company from the others in the market is the fact that its operation is strongly based on a set of information systems that allow a high standardization of processes across the various units and a centralized monitoring of operations at the company headquarters.

The access to the case was granted by the company´s CIO who is also the COO. The fact of same person occupies this two positions illustrated the importance of IT management in this company.

We conducted 14 interviews with 12 individuals in a two stages process (Table 2). The first staged aimed to obtain an overview of the company, its operation and the role of IT. The CIO was the first interviewed. He talked about the company structure, its strategy and the IT role. He indicated other six people to interview: three from IT operations and three on business areas. From IT area, the first interviewed was IT Infrastructure Manager who is responsible for design and operation of IT infrastructure. The second one was the IT Applications Manager who conducts the specification, design, development and implementation of new IT applications. As the company outsources all software development, the third interviewed was manager from a system supplier. From business area, the CFO and the CMO of the company were interviewed, and a unit manager who is responsible for one of the group's brands.

The results of this first stage was discussed with the CIO. It was identified three system that have affected stronger the organization. In order to understand the impacts of each of this three systems, another stage of interviews were performed. The CIO indicated six persons (two for each system) who had participated of the system implementation. The identified applications were 1) command centre, 2) online monitoring of clinic operations and (3) billing system. Six people were interviewed, two for each system.

The data collected data (interview´s speech) was transcribed, and analysed using descriptive coding (Saldaña, 2009).

Individual	Position	Stage 1	Stage 2
1. CIO	CIO – Chief Information Officer / COO – Chief Operating Officer	X	X
2. IT_Supp	IT Supplier	X	
3. CMO	CMO – Chief Marketing Officer	X	
4. U_Mgmt	Financial Manager of one of the group's brands	X	

5. CFO	CFO – Chief Financial Officer	X	
6. IT_App	IT Applications Manager	X	(ii) online monitoring
7. IT_Infra	IT Infrastructure Manager	X	
8. Proc_Mgmt	Process Management		(ii) online monitoring
9. CC1	Command Centre		(i) command centre
10. CC2	Command Centre		(i) command centre
11. Bill_1	Billing		(iii) billing system
12. Bill_2	Billing		(iii) billing system

Table 2. Interviewed people

4.0 The Case

Alliar was founded in 2011 by an investment fund – Fundo Pátria – that saw an attractive opportunity in the sector. Despite some ups and downs, Brazil has shown a rising income trend and a middle class expansion. On the other hand, the bankruptcy of the public health system, as well as the social security system, creates an expectation of expansion of private health services. Alliar's growth strategy was the acquisition of regional brands. These regional brands maintain their local identity, the former owners also become minority shareholders of Alliar, but they had to adopt and to use the group's processes and practices.

Figure 1 shows the geographical distribution of these local brands. The State of São Paulo is the main state of Brazil and it is where the biggest part of the operation is located.

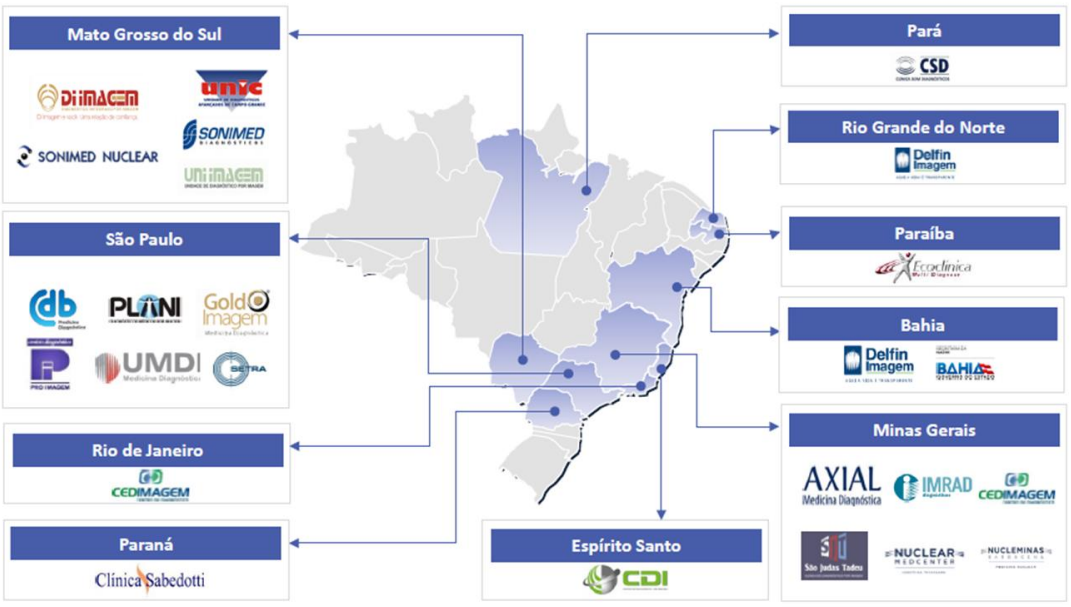

Figure 1. The local brands of Alliar on Brazil.

Figure 2 shows the structure of Alliar market. It is one of the four biggest diagnostic medical companies in Brazil, and also the youngest. The second youngest company was created 30 years ago. Therefore, it is natural that it has adopted routines that are not usual elsewhere. The main interactions in this sector involve four actors' groups: competitors (other medical diagnosing companies), health care providers, doctors and patients. The state regulates all these interactions to some degree. The first interaction refers to the patients that buy health support services from health care providers. There are many providers offering different contracts for the population. These providers have high a level of influence on government decision and are the strongest branch of the chain. They have enough power to impose, within legal limits, the price patients pay for health care support, and the values they pay to their suppliers: medical and diagnostic services.

When a patient has a health problem, the patient schedules an appointment with a doctor who is authorized by the patient's health care provider. The doctor requests the patient to execute a medical diagnosis examination, and the patient goes to a medical diagnostic clinic to perform the examination. The health care provider pays the doctor and the clinic for their services. Therefore, Alliar has interactions with three groups. The health care providers pay Alliar; negotiate for cost reduction and create different rules for billing services. The medical doctors should not dictate where the patients must execute their examinations, but they actually select the clinics and fulfil Alliar´s demand. The third group are the patients, and interactions with them determine Alliar's operational costs.

In order to be competitive, Alliar and its local brands must manage their relationships with these three groups – doctors, patients and healthcare providers. The company must follow the contractual guidelines with the health care providers. It is a very complex process since the rules vary across providers, type of clients of the same provider, and examination clinics. It is very important to follow contractual rules to avoid the risk of not being paid for services performed, or payment delay. Alliar must also deliver high quality medical exams, with good data analysis and specialized medical reports to support the diagnosis request made by medical doctor. The medical doctors' dissatisfaction affects the Alliar demand, so the company invests on technological updates through better equipment, professionals and protocols. The perception of patient service quality is mainly based on time spent to schedule the examination, time spent in the clinic, and lead-time to deliver examination results.

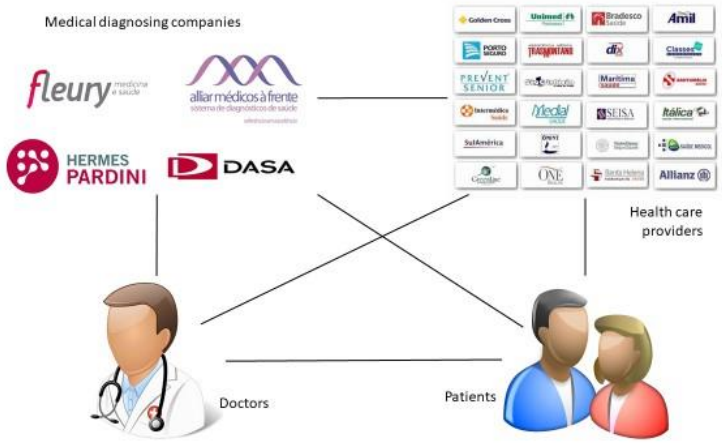

Figure 2. The structure of the sector.

IS applications and IT management are designed to improve relationships with these groups by: (i) reducing the payment delay of health care providers; (ii) stimulating the demand for exams created by doctors; and (iii) reducing the operational cost of patient examinations.

After the first round of interviews, the preliminary data analysis was shared with the CIO. Three information systems were selected to be analysed. All the applications selected had high impact on Alliar´s performance. The analysis focused on the relationship between IT capability and organizational agility. The systems chosen were: 1) command centre, 2) billing system, and 3) online monitoring of the clinic´s operation. They are presented in details in the next sections.

4.1 Command centre

The Command Centre (CC) is an operation centre for magnetic resonance imaging. It is located in a larger city that operates equipment installed in smaller cities. IT support for the operation of a Command Centre can be divided into three tiers: 1) remote operation of the resonance equipment, 2) chat, audio and video communication with the local operator and the patient being examined, and 3) communication network that supports the two previous layers.

Initially, the Command Centre's main objective was to reduce costs, because there is constant and intense pressure from health care providers and from the major shareholder of Alliar, the investment fund. The labour cost per unit would be reduced, and the cost of skilled labour in the CC would be higher; but with a higher output, the

average unit cost of the exams would decrease. This happened because processes were reviewed so that the most qualified technician, who carries out the examination in the CC, is dedicated exclusively to the examinations, and other low cost professionals perform the peripheral activities, such as onsite patient reception, orientation and their positioning on the equipment. Other gains have emerged as well, such as an improvement in the quality of the exam, since the senior technician is dedicated only to the core activities of the exam, which reduces the need for patient return and leads to an increase in equipment availability and an increase in the number of examinations performed.

The creation of CC generated a scale of examinations for a group of radiologists, which brought an increase of examination diversity and protocols. In order to control this diversity, the company decided to review and standardize the protocols, and invest in the qualification of generalist technicians, i.e., professionals capable of performing different examinations with different equipment.

Complex examinations requires modern equipment and well qualified radiologists. This professional profile is often not available in smaller cities, but the modern equipment is. Thus, the very skilled professional of CC can expand the range of examinations offered at local units up to the technical limits of available equipment. From this point of view, there were improvements for the patient, who can be examined at a site closer to their location, and for the medical specialists who now have a greater variety of examination equipment to support their diagnoses.

The CC is a platform for standardization and modernization of resonance examination protocols, which has a direct impact on the quality of service and operational cost. This better quality affects the relationship with doctors who request the examinations and with doctors who report the exam [results]. This higher quality also helps with reduction of costs, which directly affect the relationship with the health care providers who pay for the exams performed.

It is possible to note that values such as quality and operational efficiency are results of the pressure of the health care providers to reduce service prices, and the pressure of the Fundo Patria for increased results. It creates a culture of innovation based on 1) dissemination of best practices; 2) encouraging the personal development of brand professionals in Alliar´s projects; and 3) innovation improvement projects such as service development and process operational efficiency.

The doctors who review the examinations are key stakeholders in this application, and it was designed in order for them to have a positive perception of the application. These doctors are former owners of the brands that were bought and they became minor shareholders of Alliar. In addition, they are prominent people in the local community and act as commercial branding agents with the doctors (who request examination) in their area. Thus, instead of bringing more qualified professionals, actions were taken to improve the profiles of these physicians. For instance, standardization and modernisation of protocols with the participation of the best experts in the group, along with general training of physicians was provided. Social media groups (WhatsApp) were created where physicians exchanged information about specific cases. This is an example of socialization of knowledge. In central terms, it generates an improvement of protocols that is an example of the internalization of knowledge.

4.2 Billing system

The performance of the billing function depends on the schedule of income payments descripted by the agreement with the health care providers for all the examinations carried out in the period. This is a very complex task due to the wide variety of processes associated with it. Each health care provider has different plans, each plan covers a set of examinations, and each examination has its own authorization process. Thus, the way an examination´s request is processed in the company depends on the patient health plan (provider and health plan). In addition, billing rules vary across health care providers: Some are billed once per month, twice billed a month, or once a week.

The company may be subject to not receive the amounts invoiced for two types of errors: 1) it does not perform the process as agreed with the operator, and it generates a gloss, and 2) performs an uncovered examination. The latter generates a loss; the first generates a delay in receiving payment. To reduce these errors, Alliar has invested in the operating support system (called Pleris) that registers all the rules negotiated with each health care provider (and with each operator's plan). This prevents scheduling an examination that is not covered by the plan and/or conducting an examination without the formal provider's authorization. Because the authorization process varies among health care providers, the company has used robots to automate

this process. Thus, billing success is closely linked with operation automation (Pleris system) that focuses on efficiency: reducing errors and reducing deadlines.

The billing gloss happens when the provider does not pay part of the examinations performed (and invoiced) in the period. The effort has been on two fronts: to identify the causes of the gloss (ability to perceive organizational agility) and to reduce the time it takes to receive the tests performed (organizational agility).

When the health care provider makes the payment, it displays which exams were paid and which ones were not. Due to the volume of exams, the process of identifying unpaid exams (glosses) would be very labour intensive without IT help. In addition, it is necessary to analyse these examination in order to identify the causes of the gloss to 1) solve it and 2) identify its root causes so that they do not recur in the future. In this sense, the integrated billing system with the operating support system (Pleris) is critical. The quick treatment of the gloss brings a reduction in the receipt term, which reduces cash flow and increases the profitability of the company. The identification of systemic causes of gloss leads to changes in processes and information systems that also improve financial performance.

The billing system has also supported negotiation with health care providers. Basically, it helps to simulate the financial impact of billing rule changes with health plans. If Alliar requests to send invoices more frequently, the provider will ask for a longer payment period. Thus, this system has helped Alliar to receive the highest possible percentage of the billed amounts, and to receive the billed amounts in the shortest period possible.

4.3 Online monitoring of the clinic´s operation.

This application monitors the operation of three major stages in the operation of Alliar clinics: reception, technical assistance and delivery of exams. It is an application that captures data from transactional systems and synthesises them in a large panel, in which everyone can see the operation of the group's clinics. It is an operation monitoring system and it is fundamental to identify operational problems. The identified problems are separated into two groups: punctual and structural. Punctual issues, or initially classified as such, are sent to the operational team to be reviewed and solved. The structural problems show trends and they are analysed by the process management engineer. Eventually, this starts a new operational improvement project that implies some system change.

Even when there is no chronic problem to be solved, there is still pressure for operational improvement. This pressure comes from two sources. The first is the relationship with health care providers who are pushing for price reductions (or updating values below inflation) of the services performed. The second comes from the investment fund that is a majority shareholder of Alliar; this majority shareholder asks for constant performance improvements that is also reflected in efforts to reduce costs through operational efficiency.

From the point of view of organizational agility, this application mainly contributes to the organization's perception ability.

The reaction capacity is less tied to the reaction speed, and more linked to the effectiveness of the reaction. The improvement projects involve a process of study and analysis of the situation that involves individuals from Alliar, people who work at Alliar´s clinics (different brands) and people from the its suppliers also. Apparently, this is not a problem, since monitoring (perception) gives an advantage over competition that allows Alliar to spend more time evaluating the available action alternatives. This process is performed by a process development staff who interview and operation´s workers, and goes to the operational areas to monitor the patient´s attendance. They also construct pilot applications and tests them on selected units.

4.4 Conclusions about studied IS applications

We did not find any IT infrastructure features that are unique in the organization, as it works with software packages provided by external suppliers over which t small customizations were made.

All the Alliar´s systems are based on a web platform that creates a unique structure for all brands of the group. This facilitates the standardization of the operation in all units (of all brands), the comparison of results, the identification of the best areas and the identification of bottlenecks. However, this architecture, which does not seem to exist in some of the competitors, does not constitute a sustainable advantage since it is a well-established technology in many sectors. Thus, the IT resources that support organizational agility should be others.

First, there is a partnership between the process management and IT groups. These elements are highly interrelated: Process developments generate changes in information systems, and changes in information systems generate changes in

processes. Inside new projects, people from these two functions work together and it is difficult to identify who is the trigger of the changes.

There is also the use of existing expertise in brands. Individuals who possess a knowledge considered distinctive and important to the group are invited to participate in projects to diffuse this knowledge as process change and systems implementation in other brands of the group. These people have a double assignment. They maintain their responsibilities in their units of origin (even with a reduction of workload and journey) that may be out of the city of São Paulo, and begin to participate in projects of the Alliar group that can be conducted, even temporarily, in another city. The individual motivation of these employees is not linked to an increase in income or hierarchical change. Apparently, they are inventive people who like to get involved with improvement actions. Alliar seeks people with this profile for the activities at headquarters. Perhaps the proximity to the centre of power and decision, and the recognition of expertise by top managers are a sufficient compensation for them.

Someone can see these arguments from the point of view of knowledge management. Explicit knowledge is managed by the integration of IT staff and process management, and tacit knowledge is managed by the participation of the most outstanding employees (experts) in the group's deployment projects.

An important aspect of project management is the continuous efforts to achieve its goals, even with changing paths. The web check-in project is an illustrative example. The company decided to apply a workflow in the clinics similar to that of airline companies. Similarly, this would eliminate the patient's time of reception at the clinic and the patient would go directly into the examination area ("boarding area"). Apparently, people are more confident in interacting with an airline application than in a laboratory where the examinations involve less commonly used names. The low adherence of the pilot project did not lead to the abandonment of the idea, but to the revision of the design of processes and support systems. In the new version, information about patient and examination will be obtained by the system and no longer informed by the user.

Two points must be highlighted in this example. The first is the certainty that the idea must be pursued despite the initial difficulties. This is due to the process of analysing the situation and choosing the available alternatives of action. This reinforces that the effectiveness of the reaction seems to be more important than the speed of response. The other point that also appears in this example is the automation of tasks involving

less qualified personnel (clinic reception area). The role of IT applications here is to eliminate costs (reduction of labour involved and time of operation).

Alliar is a young company, compared to competitors, and its history is unique. It was not created by doctors, but by investors. This explains why certain behaviours happen. The company appears to be much more open to absorbing practices from other sectors, especially industry / manufacturing, such as process review and standardization, operation monitoring, idle identification, and bottlenecks.

5.0 Final Remarks

Alliar interacts with different type of actors. The investment fund (Fundo Pátria) is its main shareholder and aims increasing profitability from its operation. This pressure produces internal changes such as process and products revisions, and improvements on the relationship with other actors. Alliar´s income came from health care providers and the company tries to reduce the gloss (increase the income) and reduce the time of receipt. The third actors are the doctors who order examinations for patients. They want examination availability in their region and high quality services (e.g., updated protocols and high image quality). The last group are the patients who want to be readily attended.

The three IT systems analysed here cover these actors' relationships. The billing system is focused on maximising the income while simultaneously reducing the gloss and the time to be paid. The command centre offered the most modern examinations at locations where communities did not have specialized professionals to perform the exams. It also reduced the unitary cost of these services, and acted as a centre of development for best protocols that improved the overall quality of the service. The online monitoring application allowed identification of the limitations and bottlenecks of the operation. The comparisons among units generated data to define improvement process projects that were focused on cost reduction. In a simplistic way, for the operations that involved highly qualified technicians, IT was being used to improve the professional skills and the service quality. At operations with less-skilled professionals, IT was used as an automation tool to reduce and eliminate human interaction.

The importance of IT resources to IT capability are not the same. We did not find any distinctive aspect of IT infrastructure. Alliar uses mainly software packages that can

be easily copied by its competitors. There is no big technical competence of its IT personnel. The main aspects are the management competence of IT personnel and shared values that are intangible assets.

There is an influx of the culture of appropriation of best practices and ideas, both internal and external. The concept of a command centre came from one newly acquired brand, and the idea of a new non-proprietary application for remote operations of the resonance equipment also came from another brand. The company also tried to incorporate solutions from other industries, such as web check-in projects from airline companies. There is an intern environment stimulates the participation on improvements projects, not just workers from Alliar central office, but also people from local brands. This participation creates process changes that improve the quality of services (as it was seen with the command centre), and reduce cost, as it was demonstrated by the changes in processes monitored by the online system.

In a project, the IT professionals must manage the business knowledge of Alliar professional and the IT technical expertise of IT suppliers. IT professionals must identify and recruit inside Alliar the best personnel for projects, and manage the heterogeneous team formed.

The applications created support the organizational agility on both of its dimensions: sensing and reacting. The billing system and online monitoring system are applications to monitor the internal operations, the behaviour of doctors, and the payment of healthcare providers. They are used not just to identify local deviations, but also to identify opportunities for improvement. Therefore, sensing and reacting are not separated and unrelated dimensions. The reactions are highly based on the analysis of the identified problem areas. Alliar has much more information about its operations than its competitors have. It creates a time advantage that allows the company to spend more time choosing what projects should be implemented. Alliar is determined to see that your improvement project portfolio is well designed. The reacting dimension of organizational agility is not about the time of response, but about the effectiveness of response. The projects are divided into stages and, even under high uncertainty, it is possible to change direction and still achieve their primary objective.

On the opposite side, research by Teece (2016) suggested that there was no conflict found between operational efficient and flexibility – a concept related to agility. The

rules of different healthcare providers are stored in Alliar's transactional system. Therefore, it is able to operate from different rules for different patients at same time.

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