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*ORGANIZATIONAL CULTURE INFLUENCE ON  
INFORMATION QUALITY - USE BUSINESS  
INTELLIGENCE SYSTEMS RELATIONSHIP  
Portuguese Context*

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Raquel Antas Gonçalves Onofre Capelo

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Dissertation report presented as partial requirement for  
the degree of Master in Statistics and Information  
Management, Specialization in Management of  
Information Systems and Technologies



School of Statistics and Information Management  
Universidade Nova de Lisboa

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**PORTUGUESE CONTEXT**

by

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## **ABSTRACT**

Business intelligence systems offer managerial advantage in a business environment that rapidly evolves, however the accomplishment of its unique capacities and the delivery of overall efficiency much relies on its use. The use of business intelligence systems is closely related to information quality, in a sense that information should meet end user's needs, providing trust, fast access and reliability. In an attempt to fulfill a research need, it is provided a framework to analyze organizational culture in a sample of medium to large organizations operating in Portugal, and tested potential linkages with individual culture types (e.g. clan, adhocracy, market and hierarchy), and use of business intelligence, through information quality.

## **KEYWORDS**

Organizational culture; business intelligence; business intelligence systems; Information systems; Information technology; knowledge management; Information quality; OCAI.

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## ACRONYMS

|             |                                                |
|-------------|------------------------------------------------|
| <b>BI</b>   | - Business intelligence                        |
| <b>BIS</b>  | - Business intelligence system                 |
| <b>DM</b>   | - Data mart                                    |
| <b>DW</b>   | - Data warehouse                               |
| <b>IQ</b>   | - Information quality                          |
| <b>IS</b>   | - Information Systems                          |
| <b>IT</b>   | - Information Technologies                     |
| <b>KM</b>   | - Knowledge management                         |
| <b>OC</b>   | - Organizational culture                       |
| <b>OCAI</b> | - Organizational culture assessment instrument |
| <b>OLAP</b> | - Online analytical processing                 |

# 1. INTRODUCTION

## 1.1. Information systems shaping business

Information systems (IS) are nowadays widely present in organizations, as the need of understanding the own business and the external environment, at reasonable costs, rises. The *information era* promoted cheap data storage which triggered a very fast and broad development of IS in business. Information was never been so accessible, yet technological investments had to be made in order to take the best advantage of this information. Top executives became directly involved on new technologies management, as they understood the power of good use of information for competitive advantage (Porter & Millar, 1985). Managerial decisions, once heavily supported on intuition and experience, became to benefit from IS with strong analytical capabilities, that provided a whole business scenario at real time (Turban, Sharda, & Delen, 2011), particularly business intelligence systems (BIS) (Popovič, Turk, & Jaklič, 2010). In fact, this IS large-scale adoption lead to a total remake of how business is done, from public services to enterprises including media. In fact, Watson (2012, p. 444) argues that “organisations, both public and private, have changed almost beyond recognition since 1970. Whilst mainframe computers were used in 1970 to do much of the routine transaction processing, most office work was still done manually and paper-based files and typewriters were still the mainstay of office work. In 2010 personal computers sit on every desk, almost everybody has a mobile phone, and these and other electronic gadgets and communications networks have transformed business, government and people’s private lives”. Moreover, business offices are scattered due to the increase of smartphones use and its increasing powerful applications, delivering the promise of being at office everywhere.

### 1.1.1. The IS Adoption Process

Information technology (IT)-based innovation is a large concept that umbrellas *initiation*, assembling and analyzing information on technological innovation, *adoption*, where decisions are made over innovation adoption and *implementation*, which refers to implementing technological innovation in the business (Thong, 1999).

Weber and Kauffman (2011) distinguish in literature review, different research focus on technology adoption, namely *diffusion*, emphasizing analysis through

different channels, *behavioral*, considering human behavior and its impacts on both individual and organizations, and *economic*, focusing on competitive advantages on decision-making. Moreover, IT adoption has been defined as the capability to integrate information of its business processes through technologies, and deliver it for effective decision-making (Li, Yang, Sun, & Sohal, 2009).

“The process by which a firm adopts and implements technological innovations is influenced by the technological context, the organizational context, and the environmental context. The technological context includes the internal and external technologies that are relevant to the firm. Technologies may include both equipment as well as processes. The organizational context refers to the characteristics and resources of the firm, including the firm’s size, degree of centralization, degree of formalization, managerial structure, human resources, amount of slack resources, and linkages among employees. The environmental context includes the size and structure of the industry, the firm’s competitors, the macroeconomic context, and the regulatory environment.” (Tornatzky, Fleischer, & Chakrabarti, 1990, p. 152).

IS implementation by organizations is not a linear process. Important considerations must be thoroughly analyzed to achieve desired effectiveness:

- Organizations must decide upon its intrinsic characteristics if the best solution is providing a new IS or upgrading an old IS, with integration issues to solve (time consuming, thus highly expensive). Scalability might be an interesting feature to think over, postponing legacy systems problems. Moreover, there are technological issues to take care, such as software compatibility, data sources, network capabilities, security features, data protection, performance, particularly important when IS umbrella heavy analytical processing. Popovič, Hackney, Coelho and Jaklič (2012, p. 730) asserts that “A lower understanding of business processes, supporting IS, legacy systems, and even hardware infrastructure will be reflected in lower BIS maturity, information quality and, consequently, information use”.
- IS implementation should close the strategy gap between current performance of an organization and its desired performance, as expressed in its mission, strategy, objectives and goals.

- Organizational alignment between business and IT strategies in what regards IS is crucial to achieve maximum value out of it (Henderson & Venkatraman, 1993).
- Communication among parts, organization and development team, must assure that IS requirements meet the organization objectives. This means that organizations should know exactly what they need and IT developers must be able to translate that to development of the IS, targeting business-IT alignment. Frequent adjustments to initial plan may be translated into disastrous result. Agile methodologies, use a close communication approach while developing, creating iterative visible prototypes, to ensure that the final product is the best suit - Dynamic Systems Development Method (Stapleton, 1997). In the case of analytical IS, as BIS, the level of complexity is much higher than in transactional IS. A vast range of less structured decisions and end-users groups must be taken into account. A thorough requirement analysis has been pointed out as a critical phase to achieve IS effectiveness (Stroh, Winter, & Wortmann, 2011). Moreover, IS professionals frequently do not adopt a proper methodology to determine executive information needs (March & Hevner, 2007).
- Organizations must be aware that IS implementation allow reorganizing business processes, thus should be prepared to review business process models that better achieve organization's goals (cost reduction, time saving). Moreover, Henderson and Venkatraman (1993) state that "innovative IT systems generally offer great opportunities to improve a company's competitiveness".
- IS development must be oriented to end-users usage, meaning that it's extremely important that IS provides accessible, accurate and current information to earn end-users trust and commitment (Eppler, 2006).

BIS can be implemented for a long period of time, comparing to other projects. This means that needs may change while developing, due to the complex and fast evolving business environment. High-level commitment and pilot testing are good practices, as BIS demand for data standards, clear information policies focused on information quality (IQ) and a whole new approach to reporting systems. This allows users to know how to use it as suggesting how to improve it. Involving heavy analytics, these are most powerful tools for decision-making, if proper aligned with business strategies and goals. Delivering value while implementation's running is most crucial to

proof its value and worth-investment, so it it's advisable that managers identify target areas to see results (Glaser & Stone, 2008).

Successful implementation of IS in organizations involve innovation acceptance and integration both by organization and users, as its continuous use in time (Gopalakrishnan & Damanpour, 1997). Achieving and maintaining business-IT alignment is an ongoing process, demanding to both business and IT professionals a commitment to adaptation to changes (Wong, Ngan, Chan, & Chong, 2012). Human dimension must be accounted for an organization achieves its performance targets. Several researchers (Cabrera, Cabrera, & Barajas, 2001; Davis, 1989) agree on the fact that IS projects frequently fail because human and organizational components are disregarded, factors recognized as critical for effectiveness of the new systems. IT projects are commonly driven under technological perspective and reveal being high sensitive to costs. There is a reported lack of understanding in business managers over linkages between technical and organization issues, thus over new technologies and strategic business goals. Harrington and Guimaraes (2005, p. 58) conclude that "Managerial IT knowledge, coupled with a strong external and internal communication channel, should aid the implementation of IT innovations, resulting in better payback, user satisfaction, reliability and competitive advantage". IT implementation success calls for a highlight on organizational change, where people and technical factors are connected and interdependent. As a result, top managers must promote long-term strategic change and project managers should manage this change, accounting the impact of technological innovation into working teams organization and jobs design (Cabrera, et al., 2001).

#### **1.1.2. Is Use of IS guaranteed?**

There is a common-sense belief that in organizations employees tend to use their preferred IT tools, even if there are organization policies that might contradict this. Organizations can choose to restrict the use of tools integrated in their IS, but a more successful approach might be to get from users what are their expectations and needs. Being involved in early stages might lead them to use the IS adopted. Wong, Ngan, Chan and Chong (2012) state that communication empowered by trust and knowledge can lead employees to better accept business-IT initiatives.

Although IS supplies the potential for improving business goals, users often oppose to accept and use this systems, dooming all expectations (Powell & Dent-Micallef, 1997; Sharda, Barr, & McDonnell, 1988; Venkatesh, 1999). This fact has been attracting the attention of researchers that have been studying user's behavior towards technology. Davis (1989) propose the technology acceptance model (TAM), the most widely use model of technology acceptance, to explain how users accept and use technology. Critical factors affecting usage are perceived usefulness and perceived ease-of-use, reinforcing the role of behavioral science to IT research.

While IS use depends much upon user satisfaction, McGill, Hobbs, Chan and Khoo (1998) express that end-user applications utility for decision-making is powered by outputs that meet the user's information needs. Moreover, user satisfaction leads to usage rather than usage stimulating satisfaction. Thus, user satisfaction is presented as a critical factor for IS use and consequently success.

Wixom and Todd (2005) research has proven that combining previous research streams on user satisfaction and technology acceptance in a unified model provides more information on linkages between design and implementation, arguments supporting user satisfaction theories, and prediction of usage, the target of technological acceptance models.

Effective use of IS has been studied across IS disciplines and streams. Previous studies on user acceptance of corporate intranet (Barnes & Vidgen, 2012) highlight behavioral intention as strongly influenced by perceived usefulness, social influence, and intranet quality (consisting of usability, design quality, and IQ), being the first two the most strong indicators. A study on IS for decision making focusing on German managers (Vlahos, Ferratt, & Knoepfle, 2004) has proven that IS use and perceived value are highly rated, particularly among managers in IS and in accounting and finance. Li, et al (2009), studying supply chain integration and performance, conclude that proactive adoption, implementation and use of IT systems must result on higher degree of IS effectiveness. Larsen and Wetherbe (1999) conclude that IT and information use varies with the degree of innovativeness, being innovative middle managers more lean to IT use. On innovational processes that support knowledge management, success implies the development of organizational structures that

transfer acquired knowledge into organization's innovation process (Chiaroni, Chiesa, & Frattini, 2011).

BIS should target IQ that makes information useful for users across different user-groups, in order to reinforce BIS usage. English (2009) proposes the term of knowledge workers instead of *users*, arguing that people who bring up value to BIS are not merely users, they input their knowledge across the system in order to increment its value.

While implementing BIS, it is not unusual for BIS users to create high expectations that never are fulfilled and often disappointed by performing hard-working tasks on assuring data quality (Glaser & Stone, 2008). Effective communication while developing might mitigate this undesired effect. Chuah and Wong (2011) refer that technological, organizational, cultural and infrastructural issues drive the majority of BIS to failure. Moreover, they emphasize inaccessible tools for end-users or deviations on meeting end-users needs effectively.

The most cited factor affecting IS end-user satisfaction in literature are perceived benefits and convenience, user background and involvement and organizational attitude and support (Mahmood, Burn, Gemoets, & Jacquez, 2000). Dasgupta and Gupta (2012), state that organizations should evaluate the determinant role of organizational culture and assess its impact on IT planning. Baron, Patterson and Harris (2006) propose an extension of technology acceptance model by applying a more interpretative approach over cultural context in which occur acceptance experiences.

### **1.1.3. Organizational culture: the missing link**

According to Schein (2004, p. 1) culture is a dynamic process, resulting from the interaction among others and promoted by leadership behaviors. Culture encompasses "a set of structures, routines, rules, and norms that guide and constrain behavior". Claver (2001, p. 248) proposes a definition of culture as "a set of values, symbols and rituals, shared by the members of a specific firm, which describes the way things are done in an organization in order to solve both internal management problems and those related to customers, suppliers and environment."

Studying organizational culture dates back from 1980s and its impact on organizations competitiveness and survival in a growing fierce competitive global market where previously disregard.

Several case studies published show how neglecting organizational culture lead to disastrous results, in spite of relevant technological and business investments made (Detert, Schroeder, & Mauriel, 2000). Culture is perceived as a critical factor in successful technology assimilation (Alavi, et al., 2005). In fact, Jackson (2011, p. 58) explains that “Many IS adoption initiatives fail due to a misfit between culture and the IS introduced, or the failure of managers to understand culture and how this influences IS adoption practices.” And goes further by asserting that “culture is becoming increasingly important given the adoption of groupware applications, enterprise resource planning systems and other internet based systems by organizations, which support cross collaboration and require greater user participation at all levels.” However, Informal characteristics as organizational culture among organizations are much more difficult to account for, yet they represent a determinant role in the use of IS and particularly on BIS, that involve knowledge management practices into the organizations (Alavi, et al., 2005). Cabrera, Cabrera and Barajas (2001) perspective over culture reinforces the need of an integrated approach, containing the interdependencies between an organization’s technology, structure and culture and its impact on organizational processes and behaviors. Moreover, obtaining results from new technology is most common in organizations that are able to implement additional changes, required to maintain overall fit. Figure 1 illustrates Cabrera, Cabrera and Barajas framework.

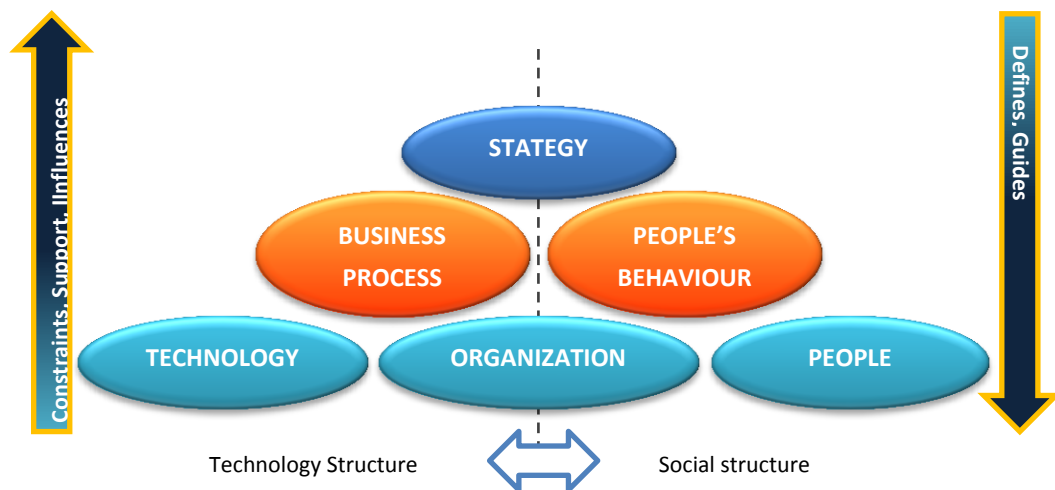


Figure 1 - Integrated framework of organizational performance, adapted from Cabrera, Cabrera and Barajas (2001)

## 1.2. Description of working problem and research general question

Literature suggests a need of specific research on interdependencies between use of BIS and organizational culture. This research purpose is to assess how does specific prevailing culture styles defined by Cameron and Quinn (2006) namely Clan, Adhocracy, Market and Hierarchy Cultures affect BIS use. This research aims to bring some insight over these dependencies, using a methodology that has been largely tested by practitioners and researchers.

## 1.3. Research objectives

This research objective is to provide a scenario over implications that organization culture might have in the use of BIS in a Portuguese business context. Once use of IS is highly related to IQ (L. P. English, 2009; Vlahos, et al., 2004), the question if culture types affect the relationship IQ – use of BIS, will be addressed.

The purpose of offering a profile on organizational culture among medium to large organizations operating in Portugal is also an objective of this research.

#### **1.4. Added value of this research**

Exploring the cultural influences over the use of business intelligence can bring up information that was not previously assembled together, offering valuable insight for managers, making them able to promote changes when needed, to best achieve effectiveness in BIS usage, thus allowing improvement. By presenting a profile on organizational culture in Portuguese business environment, some important awareness might be useful to foresee constraints or emerging problems.

## 2. LITERATURE REVIEW

### 2.1. Users and IS

Although passing through an economic climate of insecurity and uncertainty, investments on IT have been globally growing, in spite of the pressures to cut costs. Organizations have to measure and evaluate the benefits and costs of technology in order to assess its continuous investments. As the impacts of IT are often indirect and influenced by human, organizational, and environmental factors, the measurement of IS success is complex given its multidimensional nature (Petter, et al., 2008).

DeLone and McLean Model (1992) propose a model as frameworks for conceptualizing and operationalizing IS success that has been vastly used and tested by several researchers. This model, known as D&M IS Success Model it's based on Shannon and Weaver's over their theory of communication (1949) and Mason following findings (1978), identifying three levels of information measurements, considered interdependent, and its effects:

- i) Technical level, which refers to accuracy and efficiency of information production system, measured by *system quality*;
- ii) Semantic level, which refers to how successful is information conducted across IS according to its meaning, measured by *IQ*;
- iii) Effectiveness level, measuring information effect on its receptor/user, measured by *use, user satisfaction, individual impacts and organizational impacts*
  - a) Information reception and evaluation.
  - b) Information effect on receptor/user.
  - c) Inputs from receptor/user on IS, directly caused by information received.

DeLone and McLean (2003) update their model after a decade, reviewing thoroughly the developments and researches made upon D&M IS Success Model, and agree on adding system quality dimension to their 1982 model to measure IS overall success. They also agree on combining *individual impacts* and *organizational impacts* on single variable, designated *net benefits*. This term that implies positive response

unlike *impact*, which might be positive, negative or neutral. The IS Success model is presented on Figure 2.

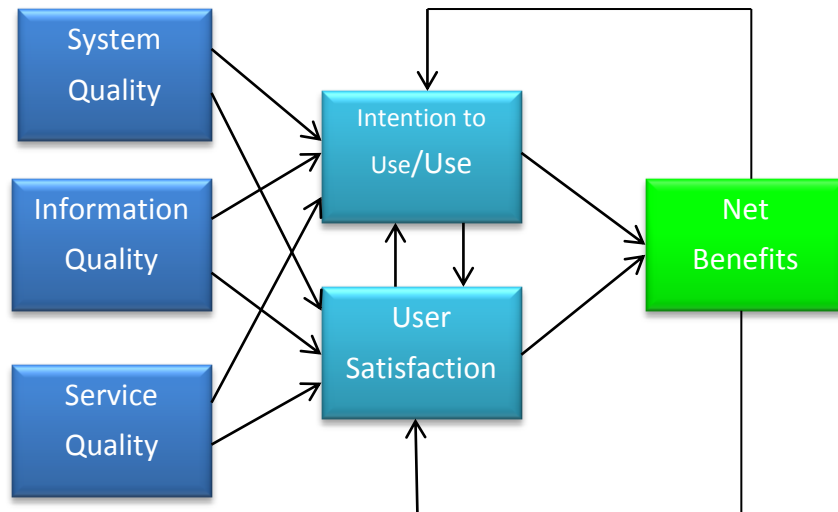


Figure 2 - Updated DeLone and McLean IS success model, adapted from DeLone, & McLean (2008)

Delone and McLean (2003) researches have proven that *IQ* is strongly associated with system use and net benefits. Teo and Wong (1998), revisiting D&M IS success model, conclude that IQ appears to be significantly related to managerial satisfaction, improvement in work environments and organizational impact.

Delone and McLean (2003) advert for careful attention when defining each dimension of the dependent variable (IS Success) and its measurements, given the complex nature of the multidimensional, and interdependent nature of IS success, that should be interpreted in conformity with the research scope. Petter, et al (2008) reviewed DeLone and McLean IS Success Model, analyzing different types of IS, concluded that the model was equally successfully applicable to both individual and organization level of analysis. They confirm a reasonable support from the model, suggesting D&M model of IS Success value on utilitarian IS. The research didn't focus on IS design for leisure, like gaming or social networking.

Use, user satisfaction and intention to use are therefore key determinants to IS success. Researchers frequently link factors and processes behind IT investments and the accomplishment of their economic value to user perceptions about IT and how it impacts their work (Torkzadeh & Doll, 1999; Wixom & Todd, 2005).

“After years of significant investment in putting in place a technological platform that supports business processes and strengthens the efficiency of operational structure, most organizations have reached a point where the use of tools to support the decision making process at the strategic level emerges as more important than ever”(Petrini & Pozzebon, 2009, p. 178).

Eppler (2006) states that IQ is an ambiguous concept, much supported by the use of the information. Nevertheless, the usefulness of that information for a specific purpose involving decision making arises as a sensible and critical issue inside organizations. This usefulness is related to data quality, given its content, format, cost and time characteristics (Eppler, 2006) and purpose (Chengalur-Smith, Ballou, & Prazer, 1999). Popović, Coelho and Jaklič (2009) state that BIS can provide better IQ, by increasing its accessibility, simplifying querying and analysis, offering a higher level of interactivity, improving data consistency by assuring data integration processes and by enabling focused management activities. Both technological and business processes affect IQ; analytical capabilities, data integration and organizational structure combined together influence the quality of information. Wixom and Todd (2005) highlighted the need of integrating information technologies and its user’s behavior. The trust decision makers have on the information they use is determinant for a business intelligence system proper usage. This understanding is illustrated on Figure 3, as it can be seen the crucial organization characteristics that impact on IQ.

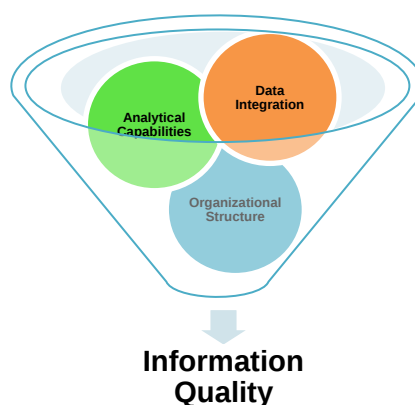


Figure 3 - Organization characteristics that impact on IQ

IQ is considered a major dimension for evaluating IS success (DeLone & McLean, 2003). Several researchers interested in different fields of knowledge have discussed what *good information* means. In spite their definitions on IQ differ, there is a general

consensus on the criteria used to describe information products value (Eppler, Helfert, & Gasser, 2004).

## **2.2. The importance of BIS for organizations**

According to Watson (2009, p. 23) , “Business intelligence (BI) can be defined as a broad category of applications, technologies, and processes for gathering, storing, accessing, and analyzing data to help business users make better decisions. Organizations use BI in a variety of ways – as a single or a few related applications, an enterprise-wide adaptability, or an enabler of organizational transformation to support a new business model.” Human resources are as important as information resources to achieve organization effectiveness. In fact, information is not valuable intrinsically, but in the measure that meets knowledge workers quality requirements. IQ is a premise for a proper use of BI (L. English, 2005).

BIS state their importance on rapidly changing business environment, supported on web resources and technologies also on a fast speed evolution. Under these conditions, organizations are pressured to adapt to changes and challenged to undertake innovative ways of doing business (Lonnqvist & Pirttimaki, 2006; Turban, et al., 2011). Strategic, tactical and operational decisions must be quick, independently of the complexity involved, which must be supported by a considerable amount of relevant information, turning organizations more fit to face challenges and opportunities. BIS are nowadays powerful tools to achieve added value in products and services in the market. BIS collect and process data, thus offering quality information, enabling end-user’s ability to make good decisions (Michalewicz, Schmidt, Michalewicz, & Michalewicz, 2007), being quite fit on achieving information asymmetry. As Rud (2009, p. 25) states, business intelligence encompasses all components that allow “getting the right information to the right people at the right time through the right channel”.

However, BIS is a considerable investment to an organization, and the return of this investment is not easily proved (Rajterič, 2010), as its value cannot be measured using only traditional economical investment indicators. Lonnqvist and Pirttimaki (2006) emphasize that BIS effects on organizations are essentially non-financial and even intangible. Moreover, develop mature BIS it’s important to take the most out its value (Chamoni & Gluchowski, 2004).

BIS is a particular IS and stands out from traditional decision support systems as they encompass a broader technology components, namely knowledge management, data mining, among others. In its architecture, BIS are composed of two main parts: a) Data warehousing (DW) and b) data analysis, data access, reporting and delivery (Popovič, et al., 2010). Data integration in data warehouse, combining consistent information from scattered sources, provides to BIS an advantage of being application oriented, embedding business strategies. Inmon (1996) emphasises the symbiotic relationship between DW and data mining. The goal of having *one version of the truth* is acquired through a good DW development. DW allows effective analytics, like analytical functions used in forecasting, organizing, managing, training and controlling-evaluating solution management problems (Ratiu-Suciu, 2009). DW offers integrated data, detailed and summarized data, historical data and metadata, the fundamental basis for keeping track of relevant data, time-efficient on using proper data for each analysis path, enabling trend analysis over time and always assuring the proper context of data. Kimball and Ross (2002) state that DW not only organize business needs as provides benefits for the overall organization, allowing a better control of scarce resources and obtain gain efficiencies through the use of reusable components.

BIS are particular IS that enclose technology, business and people in an interdependent way. Typical components of BIS (Glaser & Stone, 2008) are:

- *Infrastructure*: The organization's servers, operating systems, workstations, and networks;
- *Data acquisition*: The core transaction systems that are the sources of data used by BI analyses software;
- *Data integration*: The software used to extract data from source systems, clean the data, and link data from different sources;
- *Data aggregation and storage*: The repository of data that results from the data integration process, which can store both detailed data and metadata, subject-oriented according to business processes and needs;
- *Data analyses*: The analytic software used to query the repository, manipulating, mining, and analysing the data in the data warehouse in order to create information and knowledge and run reports, and conduct data modeling and "what if" scenarios;

- *Portal or User Interface*: The interface used by managers and IT analysts to interact with information they need.

BIS were first used as tools to support strategic decision-making. Nowadays, organizations further exploit BIS capabilities to support tactical and operational process improvements, supply chain, production and customer service. Trustworthiness and expertise arise as relevant factors for a user's credibility decision, mainly over a knowledge source that supports decision (Elbashir, Collier, & Davern, 2008).

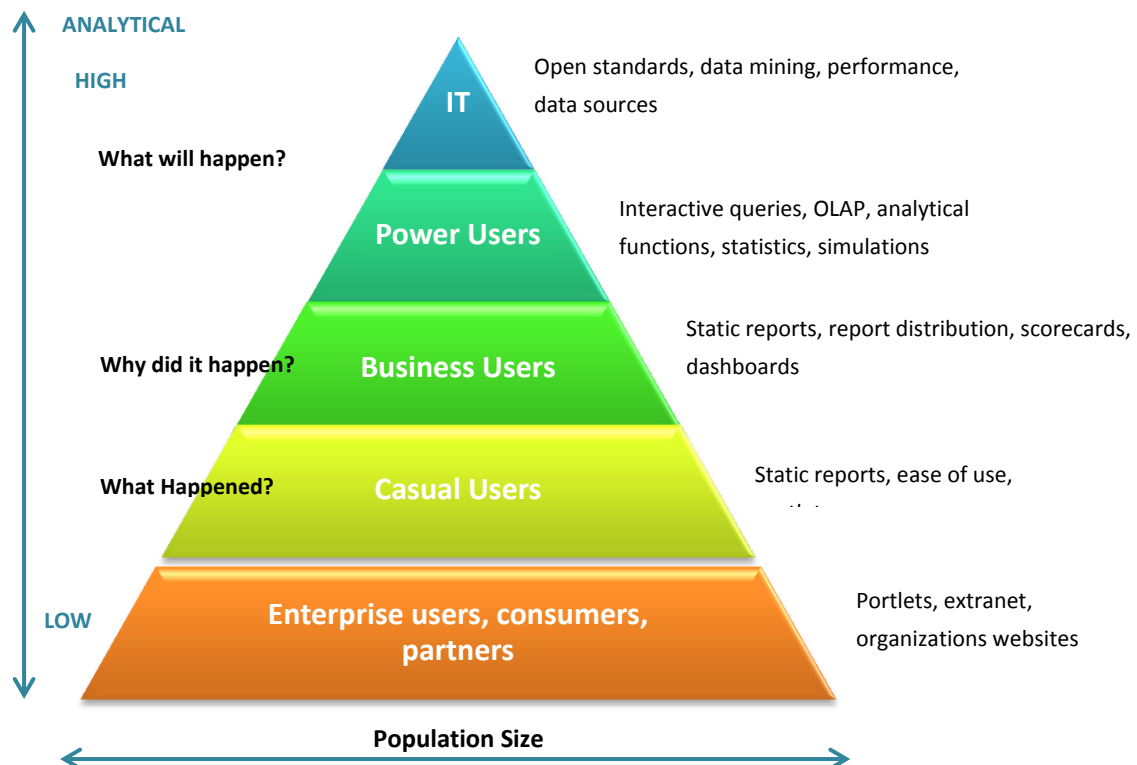


Figure 4 - BIS Users by their reporting needs, adapted from Ballard, Farrell, Gupta, Mazuela, & Vohnik (2006)

Given the ratio on Figure 4, organizations should endeavor an extra effort on making BIS a success for its different users. This might require perceiving the organization's prevailing culture and to undertake processes of change that might arise as necessary.

## **2.3. Organization culture**

Powell and Dent-Micallef (1997) emphasize that innovations impacting organization characteristics, both formal, structure and informal, organizational culture, have the most strong effect on resistance to adoption, as managers recognize them as survival risks, avoiding IT developments in open cultures.

Hansen and Wernerfelt (1989), studying firm performance, merging economic data and behavioral data, conclude that human resource factors explain better performance variance obtained than strategic and economic data. Ginsberg and Venkatraman (1992) stated that behavioral responses to an implementation that radically changes organizations can be a blockage, even when there's managerial evidence of the need to change. These findings suggest that there is empirical data supporting cultural aspects of an organization that need to be known, analyzed and action taken.

### **2.3.1. Origin and concepts**

Organizational culture is a recent concept, being explicitly used only in the last few decades (Schein, 1990). Although there are many definitions in the literature, organizational culture can be defined as "a pattern of shared basic assumptions that the group learned as it solved its problems of external adaption and internal integration, that has worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems"(Ruzevicius & Gedminaite, 2007; Schein, 2004).

Schein (2004) decomposes culture at three levels, represented on Figure 5:

- 1) *Basic assumptions*, which refer to interpretative personal schemes used for perceiving situations, creating the basis for collective action. They develop over time while members of a group create strategies to face problems and pass them along to incoming members. A certain culture exists when groups share similar interpretative schemes, independently of group size.
- 2) *Values* embody a more perceptible manifestation of culture and imply adopting beliefs, with clear identification of what's important to a certain

cultural group. These values allow organizational members to interpret signals, events and issues that guide behaviour.

- 3) *Artifacts* are considered the most visible manifestation of culture and umbrella concepts such as art, technology, myths, rituals and language. Its use can either reinforce existing values, or reshape them over time, impacting also basic assumptions.

Therefore, organizational culture is represented as dynamic process of interaction among basic assumptions, values, and artifacts (Alavi, et al., 2005; Schein, 1996).

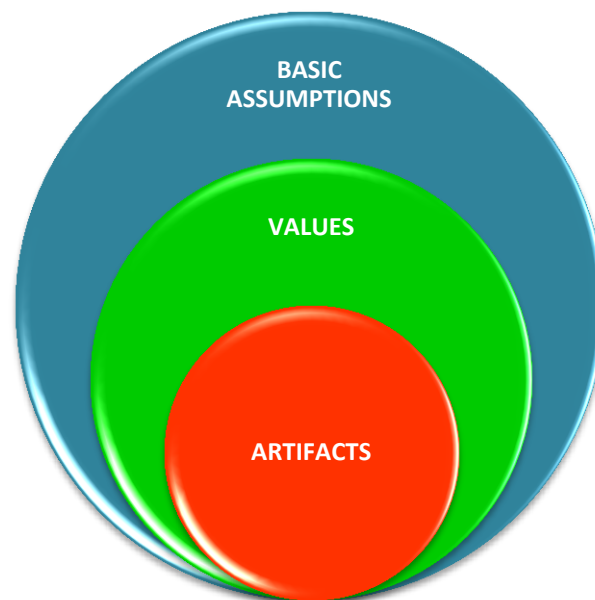


Figure 5 - Three Levels of Culture, according to Alavi, Kayworth, & Leidner (2005)

Farris, Senner and Butterfi.Da (1973) emphasizes the role of *trust* in organization interpersonal relationships. Their findings show a linkage between trust and organizational culture and organization workers commitment to their work and integration into their work groups and organizations.

Organization culture is a complex matter, built upon dynamic social processes. "Cultures are challenged, ever-changing and emergent; they are invented and reinvented in social life. IS researchers need to consider the ways in which people within organizations create and recreate meaning through the use of information technology" (Avison & Myers, 1995, p. 52). Schein (2004) argues that organizations

should have a deeper understanding of organizational culture, so they can better know how to manage and improve them.

### **2.3.2. The importance of organization culture**

In a rapidly changing business environment, where uncertainties are considerable, organizational culture has lately been described as a determinant factor of success though not traditionally recognized as one. Several examples of success point out organizational culture as the key to prosperity (Cabrera, et al., 2001; Claver, et al., 2001; Detert, et al., 2000; Jackson, 2011). Hofstede (1986) emphasizes as fundamental for managers getting an insight into the organizational culture and perceive how it contributes to organization control: leading it to meet its goals and foresee consequences if no action is taken.

Organizational culture role in an organization comprise its functions, namely *internal integration*, which refers to the feeling of belonging and commitment, and *coordination*, concerning the creation of a competitive ground and development of social glue that holds organization together, and, its impact on organization's processes. Furthermore, organizational cultures influence how creativity and innovation are stimulated in an organization (Martins & Terblanche, 2003).

Avison and Myers (1995) suggest that IS research can benefit from a more current approach on organizational culture, allowing to foresee linkages between new information technologies, particularly adoption and use of IT, and organizational cultures.

New technologies, such as BIS, impact the way tasks are performed in an organization. BIS is particularly demanding on data governance and business processes, leading frequently to new requirements, including in users behavior. This might confront current culture, and managers should analyze if some culture changes need to be promoted in order to achieve the best alignment between technology and culture. This is a sensitive matter, once it implies revising organizational procedures and policies and its strategic goals (Cabrera, et al., 2001).

Jackson (2011, p. 58) emphasizes that “culture is becoming increasingly important given the adoption of groupware applications, enterprise resource planning systems and other internet based systems by organizations, which support cross collaboration and require greater user participation at all levels”.

Being organizational culture such a complex matter that comprises so many different factors, it is useful to have a framework that uses the most important dimensions to focus on, though the loss of detailed information.

### **2.3.3. Dimensions of organizational culture**

Cameron and Quinn (2006) developed an organizational culture assessment instrument (OCAI) to diagnose organizational culture. It is supported on four culture styles, adhocracy, market, hierarchy and clan, being the core values which evaluations on organizations are made, and in 2 x 2 competing values, Flexibility and discretion opposing Stability and control and internal focus and integration versus external focus and differentiation, illustrated on Figure 6. Jones, Cline and Ryan (2006) stated that internal versus external focus separates the organizational improvements driven by mostly internal business processes and people caring from the ones caused by external stakeholders wishes. Stability versus flexibility distinguishes between organizations that are more stable and organizations that promote innovation, personal growth, continuous organization improvement and change.

These competing values cross upon six dimensions, dominant characteristics, organizational leadership, management of employees, organizational glue, strategic emphasis and criteria of success.

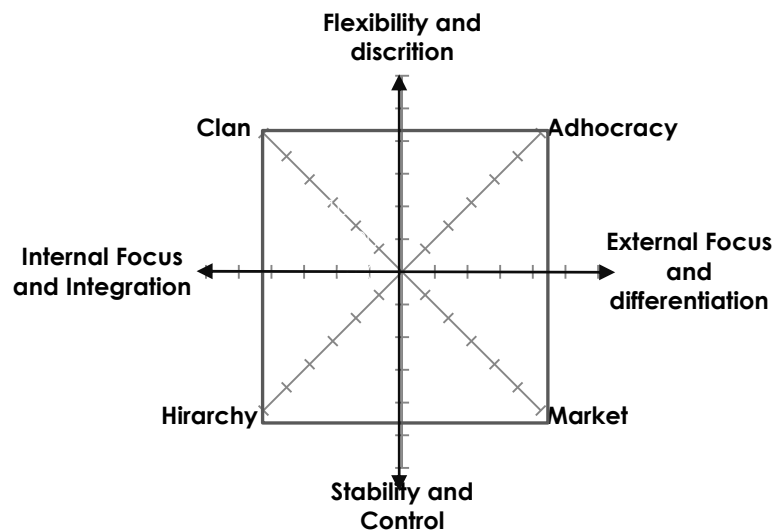


Figure 6 - Organizational culture framework, adapted from Cameron and Quinn (2006b)

The culture styles define major characteristics and core values of an organization or parts of an organization in a given moment of time.

*Adhocracy style* is characterized by innovative approaches to do business or to design new products, where teams are encouraged to bring up new ideas and organized according to each innovative axe undertaken by the organization, involving risk taking. Success is to offer new, innovative products or services and stand out as leader.

*Market style* is an analogy of the organization itself as the market; it is focused on results, where people are goal-oriented in an atmosphere of competition. Winning is key-word across organization. Success means market share and penetration.

*Hierarchy style* lays on strict rules and procedures, achieving smooth operations in a very controlled environment. Managers are good organizers and keep processes running by the organization standards. Employees are managed upon the premise of secure employment and predictability.

*Clan style* focuses strongly on human resources, which are considered an important asset of the organization. Team-building, mentoring and commitment are important drivers. Tradition and loyalty are implicit values. Success is measured in terms of sensitivity to customers and concern for people.

This instrument has a practical purpose, timely effective, and has been used extensively by organizations worldwide by Cameron and Quinn (2006a) and by

practitioners and researchers. The OCAI questionnaire design allows diagnosing an organization culture, or groups of organizations, as well as the determination of prevailing culture upon different dimensions.

#### **2.3.4. Culture changes and organizational impacts**

Detert (2000) asserts that there is a lack of useful information on organization culture dimensions and how these dimensions relate to change programs and organizational improvements.

Shan and Yeoh (2009) conclude that managers, when selecting a particular IS, should promote a proper culture aligned with the characteristics of the implemented IS.

Leadership has been recognized as having a relevant role on organizational culture. Alavi et al. (2005) conclude that KM leaders should focus on valuing expertise and collaboration. They demonstrate that KM leadership has a greater impact on KM use than a system of bonuses and incentives that rewards potential users.

Eng Huang Chua, Lim, Soh, and Kien Sia (2012, p. 596) studying how clan control can be enacted in a complex IT projects, conclude that clan control requires both the building up and control of the clan to succeed. Moreover, “controllers play an instrumental role in employing significant resources and authority to influence the building and leveraging of the clan”. These leaders (“controllers”) access a large amount of resources that are used to guide others for project outcomes, but also promote the build-up of shared structures, cognition, and relationships that smooth the development of clan control that strengthen or inhibit clan norms.

Harrington and Guimaraes (2005) suggest that managers should focus on activities that promote the ability to recognize the value of new information, assimilate it, and use it for commercial purposes. They emphasize the extensive use of external and internal communication channels, hiring highly expert IT and promoting cross-functional teams, group meetings, worker exchange and cross training. Salaun and Flores (2001, p. 26) defend that the “dynamic process that constitutes information

necessarily implies a communicative relation between the transmitter and the receiver, the informer and the informed”.

Claver, et al. (2001) state that IQ and quantity, IS supported by a good data system are key factors for a culture embrace IS supported by a good data system initiatives and usage. They propose a progressive implementation with pilot-use, which spreads to all organization over time, giving the time to culture to grow and absorb IS. Regarding BIS implementation, Glaser and Stone (2008) share this approach.

Alavi et al. (2005) studying knowledge management tools for collaborative work and organizational culture, suggests the need to develop a proper social context to achieve positive KM behaviors. Brown, Dennis, and Venkatesh (2010) studying knowledge management tools for collaborative work and organizational culture, suggests that collaborative technology enables users to adopt and use the technology. Some authors like Rud (2009), suggest that collaborative leadership teams are essential for commitment to strategic use of information, at different organizational levels, in order to reinforce knowledge process.

Kanungo (1998) states that organizational culture has a major role on user satisfaction and consequent IS use. He concludes that organizational culture controls the quality of computer-mediated communication and information access.

### **3. METHODOLOGY**

#### **3.1. Data Collection**

A structured questionnaire was designed, which content was validated by two academics interested in the theme. The structured questionnaire has seven-point Likert scales for the IQ items and a combination of seven-point Likert scales and seven-point semantic differentials for those items measuring BIS. A scale with more than five-points presents generally stronger convergent and discriminant validity and greater explanatory power, when compared to five-point scale (Coelho & Esteves, 2007).

The target is final users of BIS. A presentation letter accompanied the request for answering the questionnaire, explaining what is under study and assuring confidentiality. Questionnaires were submitted first by postal address then by web address to 2915 medium and large scale organizations operating in Portugal, from April to May 2012. Follow up involved resending the questionnaire to non-responders, which are internally identified by a unique code. 127 organizations have replied to the questionnaire with 146 responses, thus a response rate of 4,35% of organizations responding. Although the low rate of responds, data analysis can still be performed and information can be produced concerning the universe under account. Quantitative analyze by sectors of activity won't be performed once low level of responses could lead to bias effect.

#### **3.2. Data analysis**

In order to analyze data, both qualitative and quantitative analysis were performed.

To assess organizational culture, OCAI was used, with Microsoft EXCEL support. This methodology comprehends both qualitative and quantitative analysis.

OCAI has been largely used both by private as public sector (Ramachandran & Ismail, 2010).

To study potential relationships between the use of BIS and IQ under a particular prevailing culture style, descriptive statistics were performed using SPSS. A multiple linear regression model was set up to analyze the relative contributions of IQ on the use of BIS, the dependent variable, under a particular prevailing culture style.

To perform this analysis, and considering use of BIS the dependent variable, it was used a mean of variables AIII1-AIII3, that represent use of BIS in the survey, assessing intentionality to use BIS, being the constructs equivalent, once regression only supports a unique dependent variable. The methodology used provided different models according to prevailing cultural styles.

A stepwise regression procedure was carried out in order to identify as few variables as possible in well predicting the BIS use. In this case, those variables that made it to the model would be considered to be the critical IQ dimensions, as they alone could account for the outcome of the dependent variable.

Regarding the Adhocracy style as prevailing culture, the number of observations was smaller than the independent variables (IQ), so the stepwise regression analysis was only performed among the variables with significant Pearson's correlation coefficients ( $p < 0.05$ ). Statistical analysis was carried out with SPSS 19 (SPSS Corp., Chicago, IL, USA) and SigmaPlot 11.0 (Systat Software Inc., California, USA). The normality of the dependent variable and homoscedasticity were checked to meet the assumptions of multiple linear regressions. All statistical relationships were considered significant at  $p < 0.05$ .

According to Johnson and LeBreton (2004, p. 238) multiple regression analysis can be applied both to prediction and explanation. He asserts that "When multiple regression is used for a purely predictive purpose, a regression equation is derived within a sample to predict scores on a criterion variable from scores on a set of predictor variables. This equation can be applied to predictor scores within a similar sample to make predictions of the unknown criterion scores in that sample. The elements of the equation are regression coefficients, which indicate the amount by which the criterion score would be expected to increase as the result of a unit increase in a given predictor score, with no change in any of the other predictor scores".

Regression analysis has been used to assess organizational culture issues, particularly on medical research (Al-Hussami, 2009). Kabanoff and Daly (2000) also

have used regression analysis to study espoused values among Australian and American organizations. Choo, Bergeron, Detior, & Heaton (2008) used also regression analysis for studying information culture and use.

## 4. RESULTS AND DISCUSSION

Here are presented descriptive statistics concerning use of BIS and assessment of organizational culture. OCAI analysis concerning data related to organizational culture in a global approach is also presented.

### 4.1. Descriptive statistics and stepwise regression

The universe of variables is considerable, corresponding to particular questions of the questionnaire, so here results are presented in variables grouped by its meaning. Description of variables under scope is provided in annex 8.1.

#### 4.1.1. Descriptive Statistics Results for Organizational Culture

Using SPSS, descriptive statistics were performed and results are presented.

**Dominant characteristics** results are presented on Table 1. Market culture presents the higher mean (3.14), indicating that this might be the culture style that most influences organizations. Lower values for measures of dispersion were found in adhocracy culture style (variance – 0.90 and standard deviation – 0.95), which means that all organizations share evenly the relative weight of this culture style into their own cultures.

**Organizational leadership** results figure on Table 2. As verified for previous dimension, Market culture presents the higher mean (3.23), indicating that this might be the culture style that most influences organizations. Lower values for measures of dispersion were found in clan culture style (variance – 0.78 and standard deviation – 0.88), which means that all organizations share evenly the relative weight of this culture style into their own cultures.

**Management of employees** results are show on Table 3. Regarding this dimension, clan culture style presents the higher mean, 3.09), indicating that this might be the culture style that most influences organizations. Lower values for measures of dispersion were found in adhocracy culture style (variance – 0.83 and

standard deviation – 0.91), which means that all organizations share evenly the relative weight of this culture style into their own cultures.

**Organizational glue** results figure on Table 4. Analyzing results for this dimension, all culture styles have very similar means, though market culture style exhibits a higher mean (2.90). Measures of dispersion are lower in adhocracy culture style (variance – 1.18 and standard deviation – 1.08), however more significant than as verified in previous dimensions.

**Strategic emphasis** results are showed on Table 5. Means are very close one to the others however hierarchy culture style presents a higher mean (2.96). Measures of dispersion are lower in adhocracy culture style (variance – 1.03 and standard deviation – 1.02), however more significant as verified in previous dimension, organizational glue.

**Criteria of success** results are presented on Table 6. Means are very close one to the others however market culture style presents a higher mean (2.78). Measures of dispersion are lower in adhocracy culture style, as verified in every other dimension (variance – 1.34 and standard deviation – 1.16).

### Organizational culture

Table 1 - Results for dominant characteristics

|     | N  | Minimum | Maximum | Mean | Std. Deviation | Variance |
|-----|----|---------|---------|------|----------------|----------|
| DI1 | 93 | 0       | 7       | 2.16 | 1.44           | 2.09     |
| DI2 | 93 | 0       | 5       | 2.24 | 0.95           | 0.90     |
| DI3 | 93 | 0       | 7       | 3.14 | 1.41           | 1.99     |
| DI4 | 93 | 0       | 8       | 2.45 | 1.61           | 2.60     |

Table 2 - Results for organizational leadership

|      | <b>N</b> | <b>Minimum</b> | <b>Maximum</b> | <b>Mean</b> | <b>Std. Deviation</b> | <b>Variance</b> |
|------|----------|----------------|----------------|-------------|-----------------------|-----------------|
| DII1 | 93       | 0              | 4              | 1.68        | 0.88                  | 0.78            |
| DII2 | 93       | 0              | 4              | 1.90        | 0.91                  | 0.83            |
| DII3 | 93       | 0              | 8              | 3.23        | 1.34                  | 1.80            |
| DII4 | 93       | 0              | 8              | 3.19        | 1.31                  | 1.72            |

Table 3 - Results for management of employees

|       | <b>N</b> | <b>Minimum</b> | <b>Maximum</b> | <b>Mean</b> | <b>Std. Deviation</b> | <b>Variance</b> |
|-------|----------|----------------|----------------|-------------|-----------------------|-----------------|
| DIII1 | 93       | 0,6            | 7              | 3.09        | 1.40                  | 1.95            |
| DIII2 | 93       | 0              | 4              | 1.68        | 0.91                  | 0.83            |
| DIII3 | 93       | 0              | 7              | 2.49        | 1.23                  | 1.51            |
| DIII4 | 93       | 0              | 7              | 2.74        | 1.51                  | 2.29            |

Table 4 - Results for organizational glue

|      | <b>N</b> | <b>Minimum</b> | <b>Maximum</b> | <b>Mean</b> | <b>Std. Deviation</b> | <b>Variance</b> |
|------|----------|----------------|----------------|-------------|-----------------------|-----------------|
| DIV1 | 93       | 0              | 7              | 2.64        | 1.42                  | 2.01            |
| DIV2 | 93       | 0              | 5              | 2.05        | 1.08                  | 1.18            |
| DIV3 | 93       | 0              | 5              | 2.91        | 1.14                  | 1.29            |
| DIV4 | 93       | 0              | 7              | 2.39        | 1.56                  | 2.43            |

Table 5 - Results for strategic emphasis

|     | N  | Minimum | Maximum | Mean | Std. Deviation | Variance |
|-----|----|---------|---------|------|----------------|----------|
| DV1 | 93 | 1       | 7       | 2.44 | 1.29           | 1.66     |
| DV2 | 93 | 0       | 5       | 2.06 | 1.02           | 1.03     |
| DV3 | 93 | 0       | 6       | 2.54 | 1.14           | 1.30     |
| DV4 | 93 | 0       | 7       | 2.96 | 1.49           | 2.23     |

Table 6 - Results of criteria of success

|      | N  | Minimum | Maximum | Mean | Std. Deviation | Variance |
|------|----|---------|---------|------|----------------|----------|
| DVI1 | 93 | 0       | 6       | 2.56 | 1.37           | 1.89     |
| DVI2 | 93 | 0       | 6       | 2.01 | 1.16           | 1.34     |
| DVI3 | 93 | 0       | 10      | 2.78 | 1.63           | 2.67     |
| DVI4 | 93 | 0       | 6,4     | 2.66 | 1.44           | 2.08     |

#### 4.1.2. Stepwise regression analysis

The methodology used provided different models according to prevailing cultural styles. In all models, the dependent variable Y represents the use of BIS.

##### 4.1.2.1. *Clan style*

The resultant model is:

$$Y = 0.511 + 0.452BI4 + 0.469BI14$$

$$R^2 = 0.767$$

Variables in Model:

N - 20

| Group    | Coef. | Std. Coeff. | Std. Error | F-to-Remove | P     |
|----------|-------|-------------|------------|-------------|-------|
| Constant | 0.511 |             | 0.704      |             |       |
| BI4      | 0.452 | 0.515       | 0.135      | 11.180      | 0.004 |
| BI14     | 0.469 | 0.449       | 0.161      | 8.496       | 0.010 |

Under *Clan style*, 76.70% of the variability of use of BIS is explained by variables BI4, associated with format of information and BI14, associated with relevance, which is considered a good power of explanation.

#### 4.1.2.2. Market style

The resultant model is:

$$Y = 0.898 + 0.597BI11 + 0.292 BI16$$

$$R^2 = 0.713$$

Variables in Model:

N - 40

| Group    | Coef. | Std. Coeff. | Std. Error | F-to-Remove | P      |
|----------|-------|-------------|------------|-------------|--------|
| Constant | 0.898 |             | 0.535      |             |        |
| BI11     | 0.597 | 0.576       | 0.115      | 27.004      | <0.001 |
| BI16     | 0.292 | 0.360       | 0.0897     | 10.585      | 0.002  |

Under *Market style*, 71.30% of the variability of use of BIS is explained by variables BI11, associated with currency of information and BI14, associated with global assessment of IQ, which is considered a good power of explanation.

#### 4.1.2.3. Hierarchy style

The resultant model is:

$$Y = 0.309 + 0.623BI4 + 0.427 BI18$$

$$R^2 = 0.877$$

Variables in Model:

N - 25

| Group    | Coef. | Std. Coeff. | Std. Error | F-to-Remove | P      |
|----------|-------|-------------|------------|-------------|--------|
| Constant | 0.309 |             | 0.438      |             |        |
| IQI4     | 0.623 | 0.570       | 0.132      | 22.446      | <0.001 |
| IQI18    | 0.427 | 0.421       | 0.122      | 12.223      | 0.002  |

Under *Hierarchy style*, 87.70% of the variability of use of BIS is explained by variables BI4, associated with format of information and BI18, associated with global assessment of IQ, which is considered a good power of explanation.

#### 4.1.2.4. *Adhocracy style*

The resultant model is:

$$Y = -1.202 + 1.226BI10$$

$$R^2 = 0.892$$

Variables in Model:

N - 8

| Group    | Coef.  | Std. Coeff. | Std. Error | F-to-Remove | P     |
|----------|--------|-------------|------------|-------------|-------|
| Constant | -1.202 |             | 1.432      |             |       |
| BI10     | 1.226  | 0,892       | 0.253      | 23.471      | 0.003 |

Under *Adhocracy style*, 89.20% of the variability of use of BIS is explained by variables BI10, associated with information currency, which is considered a good power of explanation.

#### 4.1.3. Discussion of the results

The culture under which the best model was developed is hierarchy, where IQ dimension format, was very significant to explain the use of BIS. Under such culture style, where there is a major concern on rules and procedures, error detection, measurements and control, information format appears to rise as a critical factor on use of BIS. Overall assessment of IQ was also significant to explain use of BIS, which is desirable under a culture that targets smooth-running operations.

Under clan culture, use of BIS is much related to format and relevance. These results suggest that in a collaborative work environment, with employees highly committed, information format ( $p=0.004$ ) and relevance ( $p=0.01$ ) might be the information dimension more important to users in what regards BIS use.

Market results suggest that in a competitive environment, focused on productivity improvement, current information appears to rise as a critical factor on use of BIS. Highly rating BIS in what relates with the quality of information it provides, seems to explain as well the use of BIS.

Adhocracy results suggest that in an innovative environment, focused on continuous improvement and anticipating needs, information currency appears to rise as a critical factor on use of BIS, although these results are presented as an indication or possible trend to further explore, once the sample was very small.

A resume of all models generated under the four different culture styles, are presented on Table 7.

Table 7 - Summary of the regression models

| Culture Style | IQ dimension                   | p-values | Model R <sup>2</sup> |
|---------------|--------------------------------|----------|----------------------|
| Clan          | Format; relevance              | <0,001   | 76.70%               |
| Adhocracy     | Currency                       | 0.003    | 89.20%               |
| Market        | Currency; Global IQ assessment | <0.001   | 71.30%               |
| Hierarchy     | Format; Global IQ assessment   | <0.001   | 87.70%               |

#### 4.2. OCAI analysis to medium and large organizations operating in Portugal

In order to assess organizational culture on the universe under study, *Organizational Culture Assessment Instrument* (OCAI) has been used (Cameron & Quinn, 2006b; Tharp, 2009). On a global point of view, we can observe the results obtained on the six dimensions of organization culture, according to Tharp (2009). The distribution of responses by sector of activity is resumed on Table 8, so different sectors of activity have actually different impacts on global results. Manufacturing with 23.97% of responses has more influence on the global results than Information and Communication does (0.68%).

Table 8 - Percentage of responses by sector of activity

| Sector                                                                   | % Responses |
|--------------------------------------------------------------------------|-------------|
| C - Manufacturing                                                        | 23.97%      |
| G - Wholesale and retail trade; repair of motor vehicles and motorcycles | 16.44%      |
| S – Other service activities                                             | 13.01%      |
| Q - Human health and social work activities                              | 8.90%       |
| F - Construction                                                         | 7.53%       |
| H - Transportation and storage                                           | 6.16%       |
| I - Accommodation and food service activities                            | 6.16%       |
| E - Water supply, sewerage, waste management and remediation activities  | 4.79%       |
| M - Professional, scientific and technical activities                    | 2.74%       |
| D - Electricity, gas, steam and air conditioning supply                  | 2.74%       |
| N - Administrative and support service activities                        | 2.05%       |
| O - Public administration and defense; compulsory social security        | 1.37%       |
| K - Financial and insurance activities                                   | 1.37%       |
| R - Arts, entertainment and recreation                                   | 0.68%       |
| A - Agriculture, forestry and fishing                                    | 0.68%       |
| J – Information and communication                                        | 0.68%       |
| Unknown                                                                  | 0.68%       |

As Quinn and Cameron stated (2006), most organizations have a dominant culture style, although a combination of the four organizational cultures, Clan, Adhocracy, Market and Hierarchy, occurs in almost all organizations. Their specific combination is what differentiates each organizational culture. Knowing organizational culture is nowadays a competitive advantage in a global market, allowing organizations

to design new strategies, using their strengths more efficiently and perform risk assessment to their weaknesses and opportunities.

To my best knowledge, this is the first survey submitted to Portuguese medium and large organizations to assess organizational culture, so no future desired culture is tackled. Further studies can use this data to evaluate preferences and foresee future scenarios.

#### 4.2.1. Dominant culture

Dominant culture (Figure 7) results shows that medium and large organizations in Portugal, covering different sectors of activity, are very balanced in what concerns the four culture-types, being hierarchy culture more relevant than clan and adhocracy cultures, although market has a stronger influence on global culture (Figure 7). Stability and control are the dominant values. Another important indicator on Portuguese business environment might be the ability to adapt to changes, given the balance found on global culture assessment results.

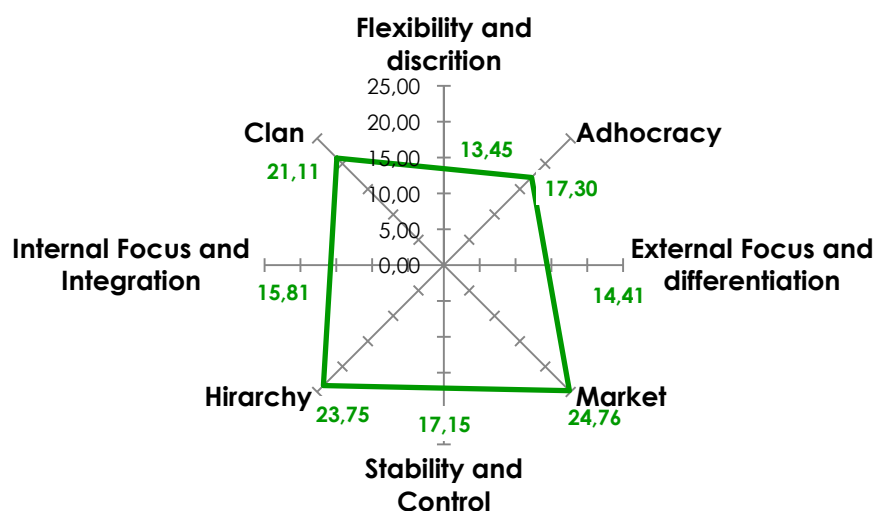


Figure 7 – Dominant culture

#### 4.2.2. Dominant Characteristics

The results obtained to the total of responses including all sectors of activity, are represented on the graph below (Figure 8).

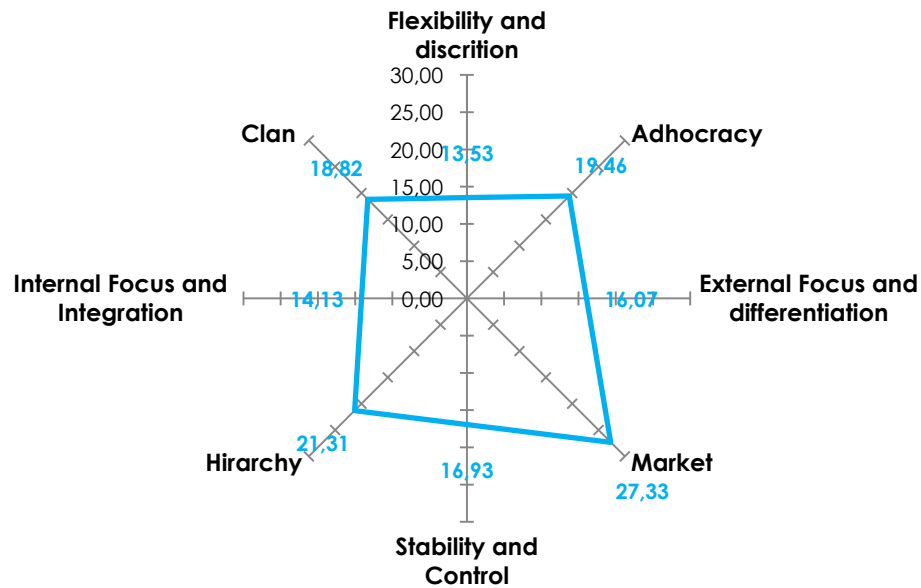


Figure 8 – Dominant Characteristics

The analysis of results gives us some important information. There is a clear trend, previously shown on dominant culture that matches dominant characteristics, as expected, though the values vary. Market culture presents a higher score (27.33), meaning that in a global way organizations are very competitive and goal-oriented, where market share and penetration are major concerns. The other cultural types with lower scores are, hierarchy (21.31), emphasising stability and control values, adhocracy (19.46) which means that creativity and innovation are not the primary objectives, and clan (18.82), the least scored, shows that human resources and team building as an organizational resource represent the values organizations care less.

### 4.2.3. Organizational leadership

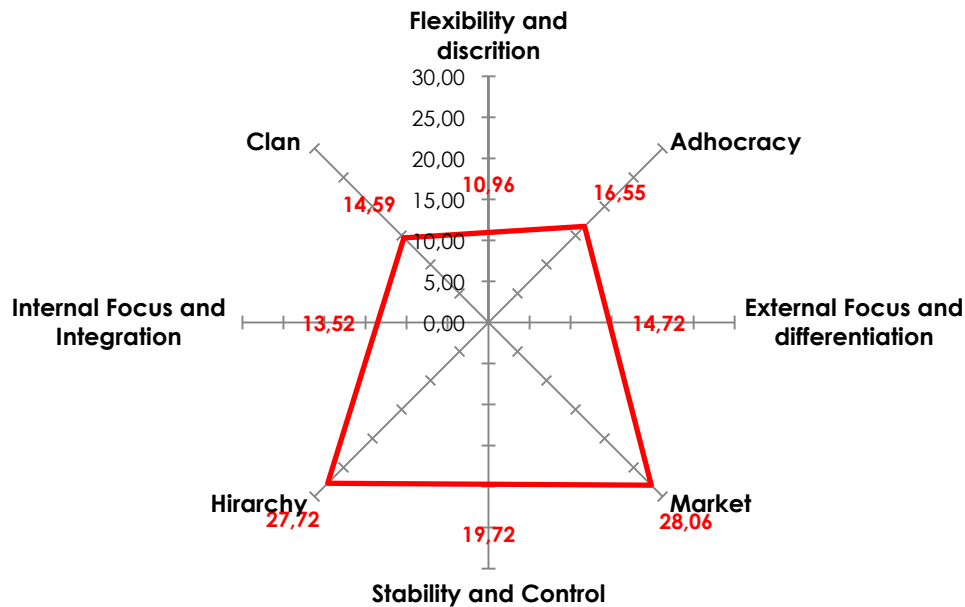


Figure 9 – Organizational leadership

In what regards organizational leadership (Figure 9), stability and control have stronger global influence as happened with dominant characteristics previously. Leadership is more focused on market and its clients and hierarchy culture (27.72), where leaders are typically good coordinators and organizers. The higher score is registered on market culture, meaning that leadership will encourage goal achievement and profitability. The other cultural types with lower scores are adhocracy (16.55) and clan (14.59). Leadership promotes essentially stability and control values to enhance competitiveness, creating partnerships and improving productivity.

#### 4.2.4. Management of employees

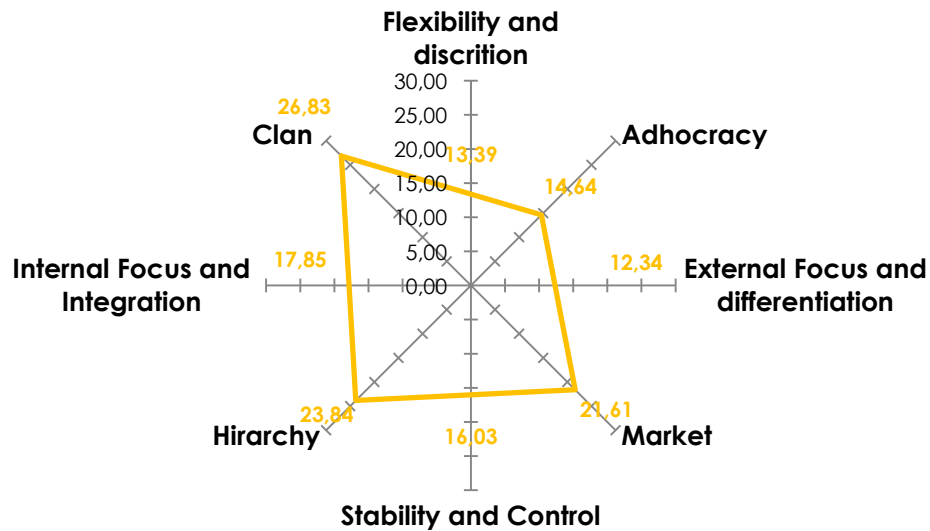


Figure 10 - Management of employees

Management of employees is typically characterized by clan culture, with a score of 26.83, as Figure 10 - Management of employees shows. This kind of environment is characterized by a pleasant place to work, mentoring by leaders and strong team capabilities. Internal focus and integration are major values in what regards management of employees, were hierarchy culture, with a score of 23.84 expose the importance of formal rules and procedures. Market culture has also a strong influence on management of employees (21.61) and indicator that employees are driven to pursuit profitability. The lower score is verified to adhocracy (14.64), where innovative and creative processes are not engaged.

#### 4.2.5. Organizational Glue

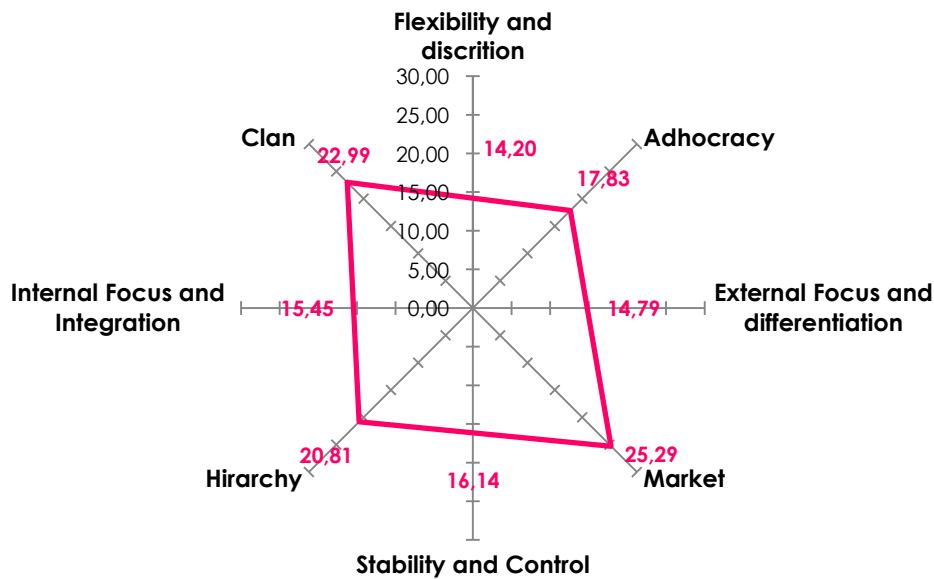


Figure 11- Organizational glue

The dominant culture on organization glue is, as presented on Figure 11, market culture (25.29), as verified on organizational leadership and dominant characteristics and criteria of success. Clan (22.99) and hierarchy (20.81) also present relevant scores. What stick people and organizational identity is customer focus, employee involvement and formal guidelines. Adhocracy obtained the lower score with 17.83, meaning cohesion is not acquired through innovative processes.

#### 4.2.6. Strategic Emphasis

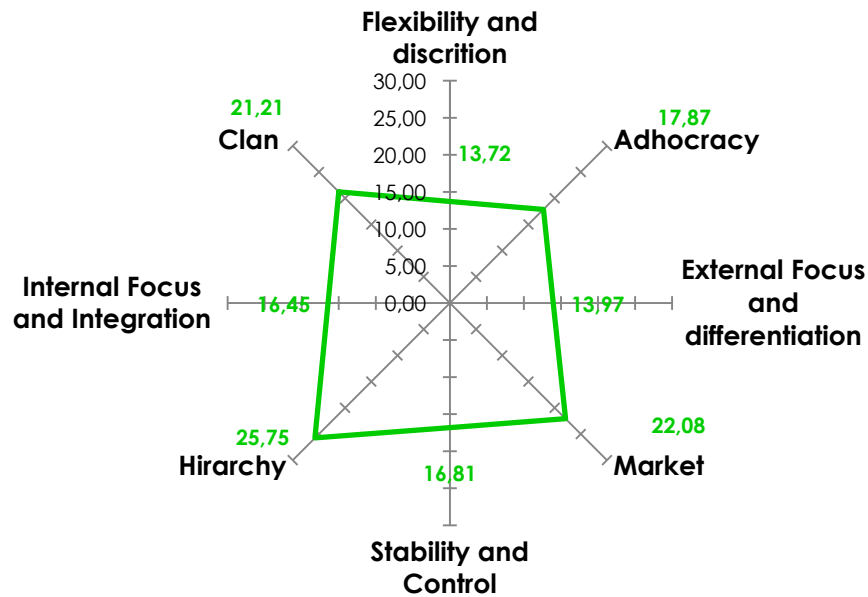


Figure 12 - Strategic emphasis

Figure 12 shows that Strategic emphasis are more influenced by hierarchy culture (25.75), meaning that the major strength comes from efficient smooth running operations and stability. The lower scores are observed in market (22.08), clan (21.21) and adhocracy (17.87). Stability and control are important values, more relevant than promoting innovation or reinforcing human capital.

#### 4.2.7. Criteria of Success

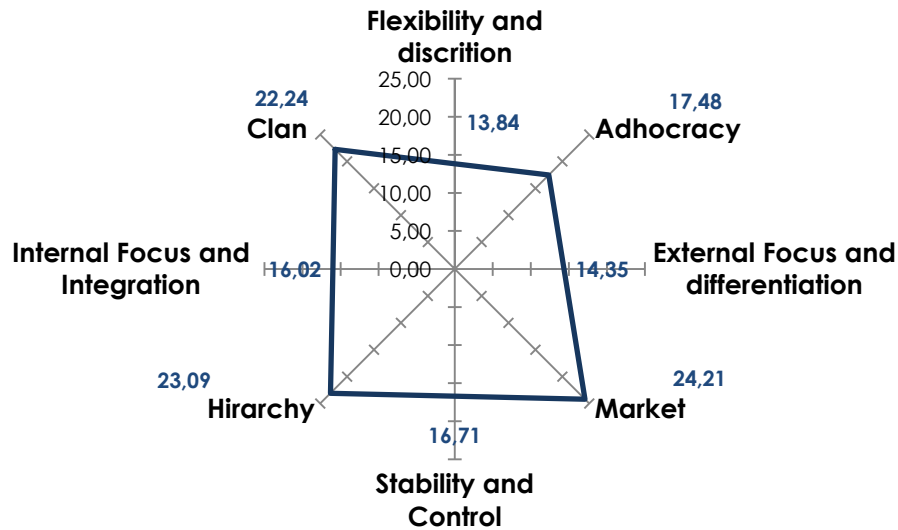


Figure 13 - Criteria of success

Market culture stands out in criteria of success dimension (24.21), meaning that success is measured by market share and penetration, with competitive pricing and market leadership (see Figure 13). Once hierarchy appears with a high score too (23.09), success may be seen also as a result of well-established rules and procedures. Clan (22.24) and adhocracy (17.48) obtained lower scores, showing that stability and control are values to pursuit, rather than flexibility and discretion.

Table 9 resumes the prevailing cultures for all dimension of organization culture that have been studied.

Table 9 - Resume of culture dimensions results

| Culture Dimension         | Prevailing Culture |
|---------------------------|--------------------|
| Dominant characteristics  | Market             |
| Organizational Leadership | Market             |
| Management of employees   | Clan               |
| Organizational glue       | Market             |
| Strategic Emphasis        | Hierarchy          |
| Criteria of Success       | Market             |

### 4.3. Interpretation of OCAI Results

The **Type** of culture that prevails among medium to large organizations in Portugal is **Market Culture**, where organizations are focused on the external positioning, needing stability and control. These are result-oriented organizations, with competitive and goal-oriented people and strong and demanding leaders. Winning is what promotes organizational cohesion. Common concerns are reputation and success. Long-term strategies focus competitive actions and achievement of measurable goals and targets. Success is measured in terms of market share and penetration. The organizational style can be defined as hard-driving competitiveness.

The **Strength** of a specific culture is deeply associated to business environment where they act. In a highly competitive business environment, market dominant culture with strong representation can constitute in fact an advantage. What is observable in medium to large scale organizations operating in Portugal is that market is the dominant culture, yet scores for hierarchy and clan culture are not very distant from the market ones. So it cannot be said that culture is strong, because none of the culture styles stands out expressively, being more a mix of different culture types. This might allow adaptability, but little differentiation.

Culture **Congruence** is higher when different culture dimensions are aligned and plots of different dimensions are similar. In this particular case, we have similar plots, namely for dominant culture, dominant characteristics, organizational leadership and criteria of success. Yet management of employees and strategic emphasis present dissimilar plots and profiles. This means that congruence is not fulfilled in every dimension of organizations or that exist relevant culture differences among organizations under scope that are contributing to this effect. Being high performance more frequent among congruent organizations, they should then analyze their own culture congruence and its possible impacts, being aware that incongruences might lead to differences in perspectives and goals, and differences in strategies within organization.

Cameron and Quinn (2006) observed a large number of organizations and **trends** have emerged. Top managers tend to rate more organization culture with clan focus, comparing with middle managers, a trend that this study could not verify, once the premises of the survey did not account for the identification of the surveyed functional

level. Adhocracy is frequently rated with the lowest score, as it is less common organizations exhibiting dominant adhocracy cultures. This profile was confirmed in Portuguese business environment. Results suggest that organizations of different sectors of activity share the same attitude towards adhocracy culture values, and given the low scores obtained, it might be said that adhocracy style doesn't fit organizations profile.

Organizations shift frequently culture style over time between hierarchy and market, but once they are established in the lower quadrants, changes into other culture styles are less frequent to observe. To verify this particular trend in Portugal further studies should be assessed, particularly when crossing a major financial crisis, where it is a possibility that organizations might be pushed to take risks or vanish.

Finally, they conclude that organizations can behave flexibly and often in contradictory ways. These trends fit the observed information among medium to large organizations in Portugal, as it can be observed that market however the prevailing culture on almost every dimensions, has not a strong implementation, allowing flexibility, as other culture styles, namely clan and hierarchy, reach close scores. Management of employees and criteria of success results have shown little consensus among organizations, traduced by a higher variability. Also, it can be verified in dominant characteristics and organization leadership dimensions that clan culture exhibits the lower score, but the same style claims top score in management of employees and second top in organizational glue. Some controversial points of view among staff might lead to these scores.

## 5. CONCLUSIONS

The OCAI allows some assertions on the profile of Portuguese business environment.

Medium to large organizations in Portugal have a market prevailing culture, though it is not shared equally amongst all culture dimensions. Medium to large organizations in Portugal are focused on client's needs and put their efforts on market leadership and competitiveness. Leadership focus comprehends managing competitiveness and customer service and also stimulating employees towards their goals, under formal norms and control. Managers persist on being connected with the paradigm of stability and control (Bremer, 2012). Management of employees pointed out clan style, that does not meet the overall profile, yet it is commonly perceived by top managers, but not always perceived the same way by employees (Cameron & Quinn, 2006)

Market culture is perceived as the organizational glue that holds the organizations together and focused, yet strategic emphasis highlight measurements, processes control and error detection. Criteria of success is gain market share and pursuit market leadership, creating and reinforce partnerships.

Clan culture and particularly hierarchy culture have an overall influence on values and principles shared across organizations. Combining different cultures allows adaptability and flexibility and that might be a triumph factor, under a climate of financial crisis that persists in Portugal, however top managers and employees might not share the same beliefs in their views over organization translated into cultural differences, and some risk assessment should be considered. Good level of congruence had been found even considering that clan culture obtained highest scores on management of employees, which may be a result of how top managers see themselves. Hierarchy highest scores on criteria of success indicate an orientation towards stability and control values, shared by market cultures.

According to these study's results, it is important to promote a strong culture particularly in business environments where rivalry is high. Internal discrepancies are time and effort consuming, essential resources to input on organizations goals.

Is particular important to further assessing organizational changes in Portuguese business environment, once culture is a dynamic process and business variables are changing rapidly.

In assessing the effect of culture over the relationship between IQ and use of BIS, best explained models are obtained under hierarchy culture. This fact suggests that in hierarchic cultures, much supported on formal procedures and norms, with leaders that are good coordinators and organizers, efficiency minded, users are more complied to follow rules and organization policies, and therefore use BIS is not disregarded.

Is also possible to conclude that format dimension of IQ and overall assessment of information provided by BIS are the most critical factors for the use of BIS and users will use BIS if it offers information in the right format, according to organization policies and if it will support smooth running operations.

Under Clan and Hierarchy cultures, IQ is explained with high statistical significance by **format** dimension. Both this cultures represent internal focus and integration orientation. These results reinforce what organizations conducted by processes control and integration most value. The format of information must meet normative requirements.

Under Adhocracy and Market cultures, IQ is explained with statistical significance by **currency** dimension. Both this cultures are externally focused and search for differentiation. These results are coherent with OCAI framework in a sense that current information is crucial when organizations targets are outside organization, and opportunities for making a difference, by innovating or by developing a close tie with suppliers and customers must by grasped.

These results can be useful for organizations to focus on, while implementing BIS, accounting the known importance of IQ on BIS use, and tracking critical IQ dimensions that most match their prevailing culture.

This research offers an exploratory approach to organizational culture influence on use of BIS. BIS use seems to be influenced by organizational culture, where critical IQ dimension present coherency with organizational culture assessment through OCAI.

Further studies on the relationship between use of BIS and organizational culture, considering IQ, would be useful to confront these results, whilst providing more data to analyze, some new insights could stand out.

## 6. LIMITATIONS AND RECOMENDATIONS FOR FUTURE RESEARCH

A complete study of comparison between sectors was not possible to be conducted once few sectors were represented. Yet, there are indicators that suggest that differences can be found among sectors, leadership styles are more frequent to be present in some sectors than others where competitive environment might differ. Complementary surveys could provide important information on finding patterns amongst sectors of activity. Moreover, a future questionnaire should consider identifying different BIS users in orders to make more informed analysis on organizational congruence.

Although organizational culture assessment is not presented by sector of activity, given the fact that the low level of responses would bias results, there is a suggestion that organizations differ in what relates organizational glue and criteria of success dimensions. In fact, organizations differ more in what holds each organization together and what they define as success. This might indicate a certain level of incongruence in each organization's culture, but can be also a result of relevant differences among sectors of activity upon these dimensions. There is also an indication that congruent values between sectors might exist and no relevant differences will stand out. In all sectors of activity, market culture prevails. Given the fact these are all sectors where competition and rivalry are high, this culture might be adequate under such environment. Human health and social work activities appear to have a stronger Market culture type, comparing with the other sectors, suggesting more fierce competitive business environment within this sector of activity. None of the sectors reviewed appears to present a more congruent culture than other.

A second questionnaire under the same premises in the near future would supply dynamic information about Portuguese business environment, showing the evolutions taken by organizations, which, under a scenario of world financial crisis would be interesting to further explore and assess useful information for managers. It also could provide more data to reinforce regression models under adhocracy culture.

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## 8. ANNEXES

## 8.1. ANNEX I – VARIABLES DESCRIPTION

### 8.1.1. Description of variables under scope

#### 8.1.1.1. *Assessment of use of BIS*

Table 10 - Use of BIS variables

|           |                           |                                        |
|-----------|---------------------------|----------------------------------------|
| Variables | Y<br>Average(AIII1,AIII3) | Use of Business Intelligence<br>System |
|-----------|---------------------------|----------------------------------------|

#### 8.1.1.2. *Assessment of IQ*

Table 11 - Quality of Information Provided by BIS variables

|           |             |                     |
|-----------|-------------|---------------------|
| Variables | BI1 - BI3   | Comprehensiveness   |
|           | BI4 - BI6   | Format              |
|           | BI7 - BI9   | Accuracy            |
|           | BI10 - BI12 | Currency            |
|           | BI13 - BI15 | Relevance           |
|           | BI16 - BI18 | Global appreciation |

#### 8.1.1.3. *Assessment of Organizational Culture*

Table 12 - Dominant characteristics variables

|           |     |           |
|-----------|-----|-----------|
| Variables | DI1 | Clan      |
|           | DI2 | Adhocracy |
|           | DI3 | Market    |
|           | DI4 | Hierarchy |

Table 13 - Organizacional leadership variables

|           |      |           |
|-----------|------|-----------|
| Variables | DII1 | Clan      |
|           | DII2 | Adhocracy |
|           | DII3 | Market    |
|           | DII4 | Hierarchy |

Table 14 - Management of employee's variables

|           |       |           |
|-----------|-------|-----------|
| Variables | DIII1 | Clan      |
|           | DIII2 | Adhocracy |
|           | DIII3 | Market    |
|           | DIII4 | Hierarchy |

Tablet 15 - Organizational glue variables

|           |       |           |
|-----------|-------|-----------|
| Variables | DIV1  | Clan      |
|           | DIV2  | Adhocracy |
|           | DIV3  | Market    |
|           | DIV 4 | Hierarchy |

Table 16 - Strategic emphasis variables

|           |     |           |
|-----------|-----|-----------|
| Variables | DV1 | Clan      |
|           | DV2 | Adhocracy |
|           | DV3 | Market    |
|           | DV4 | Hierarchy |

Table 17 - Criteria of success variables

|           |      |           |
|-----------|------|-----------|
| Variables | DVI1 | Clan      |
|           | DVI2 | Adhocracy |
|           | DVI3 | Market    |
|           | DVI4 | Hierarchy |

## **8.2. ANNEX II – SECTORS OF ACTIVITY**

- A – Agriculture, forestry and fishing
- B – Mining and quarrying
- C – Manufacturing
- D – Electricity, gas, steam and air conditioning supply
- E – Water supply, sewerage, waste management and remediation activities
- F – Construction
- G – Wholesale and retail trade; repair of motor vehicles and motorcycles
- H – Transportation and storage
- I – Accommodation and food service activities
- J – Information and communication
- K – Financial and insurance activities
- L – Real estate activities
- M – Professional, scientific and technical activities
- N – Administrative and support service activities
- O – Public administration and defense; compulsory social security
- P – Education
- Q – Human health and social work activities
- R – Arts, entertainment and recreation
- S – Other service activities
- T – Activities of households as employers; undifferentiated goods and services producing activities of households for own use
- U – Activities of extraterritorial organizations and bodies

### 8.3. ANNEX III – EXTRACT OF THE QUESTIONNAIRE (ENGLISH VERSION)

A Business Intelligence System (BIS) is an information system that transforms raw data into meaningful and useful information that is used to enable more effective strategic, tactical, and operational insights and analytical decision-making. It includes various technologies, such as data integration, data quality, data warehousing, master data management, analytical tools, on-line and paper reports, spreadsheets, alerts, dashboards, text analytics, and many others.

| A.III Use of Business Intelligence System                                                                               |                                                               |
|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Indicate to what extent you agree/disagree with the following statements regarding the use of BIS in your organization. | 1 = totally disagree;<br>7 = totally agree;<br>X = don't know |
| I intend to use BIS as a routine part of my job over the next year.                                                     | 1 2 3 4 5 6 7 X                                               |
| I intend to use BIS at every opportunity over the next year.                                                            | 1 2 3 4 5 6 7 X                                               |
| I plan to increase my use of BIS over the next year.                                                                    | 1 2 3 4 5 6 7 X                                               |

| B. ASSESSMENT OF INFORMATION QUALITY AND USE                                                                                                        |                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| B.I                                                                                                                                                 | Quality of Information Provided by Business Intelligence System |
| Indicate to what extent you agree/disagree with the following statements regarding the quality of information provided by BIS in your organization. | 1 = totally disagree;<br>7 = totally agree;<br>X = don't know   |
| BIS provides me with a complete set of information.                                                                                                 | 1 2 3 4 5 6 7 X                                                 |
| BIS produces comprehensive information.                                                                                                             | 1 2 3 4 5 6 7 X                                                 |
| BIS provides me with all the information I need.                                                                                                    | 1 2 3 4 5 6 7 X                                                 |
| The information provided by BIS is well formatted.                                                                                                  | 1 2 3 4 5 6 7 X                                                 |
| The information provided by BIS is well laid out.                                                                                                   | 1 2 3 4 5 6 7 X                                                 |
| The information provided by BIS is clearly presented on the screen.                                                                                 | 1 2 3 4 5 6 7 X                                                 |
| BIS produces correct information.                                                                                                                   | 1 2 3 4 5 6 7 X                                                 |
| There are few errors in the information I obtain obtained from BIS.                                                                                 | 1 2 3 4 5 6 7 X                                                 |
| The information provided by BIS is accurate.                                                                                                        | 1 2 3 4 5 6 7 X                                                 |
| BIS provides me with the most recent information.                                                                                                   | 1 2 3 4 5 6 7 X                                                 |
| BIS produces the most current information.                                                                                                          | 1 2 3 4 5 6 7 X                                                 |
| The information from BIS is always up to date.                                                                                                      | 1 2 3 4 5 6 7 X                                                 |
| The scope of information from BIS is adequate (neither too much nor too little).                                                                    | 1 2 3 4 5 6<br>7 X                                              |
| The information from BIS is easily understandable to the target group.                                                                              | 1 2 3 4 5 6 7 X                                                 |
| The information from BIS is to the point, void of unnecessary elements.                                                                             | 1 2 3 4 5 6 7 X                                                 |
| Overall, I would give the information from BIS high marks.                                                                                          | 1 2 3 4 5 6 7 X                                                 |
| Overall, I would give the information provided by BIS a high rating in terms of quality.                                                            | 1 2 3 4 5 6 7 X                                                 |
| In general, BIS provides me with high-quality information.                                                                                          | 1 2 3 4 5 6 7 X                                                 |

|            |                                                                                                                                                                                                                                                     |  |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>D</b>   | <b>ASSESSMENT OF ORGANIZATIONAL CULTURE</b>                                                                                                                                                                                                         |  |
|            | Divide 10 points among four alternatives of each section below, depending on the extent to which each alternative is similar to your own organization. Give a higher number of points to the alternative that is most similar to your organization. |  |
| <b>D.1</b> | <b>Dominant Characteristics</b>                                                                                                                                                                                                                     |  |
|            | The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.                                                                                                                                 |  |
|            | The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.                                                                                                                               |  |
|            | The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.                                                                                                      |  |
|            | The organization is a very controlled and structured place. Formal procedures generally govern what people do.                                                                                                                                      |  |
| <b>D.2</b> | <b>Organizational Leadership</b>                                                                                                                                                                                                                    |  |
|            | The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing.                                                                                                                                      |  |
|            | The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking.                                                                                                                               |  |
|            | The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus.                                                                                                                          |  |
|            | The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency.                                                                                                                     |  |
| <b>D.3</b> | <b>Management of Employees</b>                                                                                                                                                                                                                      |  |
|            | The management style in the organization is characterized by teamwork, consensus, and participation.                                                                                                                                                |  |
|            | The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.                                                                                                                           |  |
|            | The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.                                                                                                                           |  |
|            | The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships.                                                                                                    |  |
| <b>D.4</b> | <b>Organization Glue</b>                                                                                                                                                                                                                            |  |
|            | The glue that holds the organization together is loyalty and mutual trust. Commitment to this organization runs high.                                                                                                                               |  |
|            | The glue that holds the organization together is commitment to innovation and development. There is an emphasis on being on the cutting edge.                                                                                                       |  |
|            | The glue that holds the organization together is the emphasis on achievement and goal accomplishment. Aggressiveness and winning are common themes.                                                                                                 |  |
|            | The glue that holds the organization together is formal rules and policies. Maintaining a smooth-running organization is important.                                                                                                                 |  |

|            |                                                                                                                                                  |  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>D.5</b> | <b>Strategic Emphases</b>                                                                                                                        |  |
|            | The organization emphasizes human development. High trust, openness, and participation persist.                                                  |  |
|            | The organization emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued. |  |
|            | The organization emphasizes competitive actions and achievement. Hitting stretch targets and winning in the marketplace are dominant.            |  |
|            | The organization emphasizes permanence and stability. Efficiency, control and smooth operations are important.                                   |  |
| <b>D.6</b> | <b>Criteria of Success</b>                                                                                                                       |  |
|            | The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.      |  |
|            | The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.                |  |
|            | The organization defines success on the basis of winning in the marketplace and outpacing the competition. Competitive market leadership is key. |  |
|            | The organization defines success on the basis of efficiency. Dependable delivery, smooth scheduling and low-cost production are critical.        |  |