Empirical Study on the Interaction and Workflow Management between Information System and Business Departments of an Organization to Integrate IT GRC Processes: Case of Moroccan organizations

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***Abstract*— the integration of governance, risk and compliance (GRC) activities has gained importance over the last years. The objective of this paper is to examine the interaction between IS and business departments of an organization in order to integrate IT GRC processes. Action design research is used to organize the research in order to assess IT GRC activities. This study focused on the perception of interactions and communications with business functions in different organizations by 51 Moroccan mangers of high level. Analysis of the results allowed us to measure this perception and identify new models simplified which aims to manage workflows effectively.**

***Index Terms*— Information system, IT GRC, communication, Processes, Framework, workflow management, Morocco, interaction, perception**

I. INTRODUCTION

Over the last years the pressure on information system (IS) has steadily increased. The auditing profession observes a trend away from the examination of outcomes towards assurance of the processes that produce these outcomes (PricewaterhouseCoopers, 2012). Hence the growing importance of information technology (IT) in enabling business processes has shifted the focus of auditors towards information systems. In an attempt to control increasing complexity, the acronym "GRC" has emerged. It describes an integrated approach to governance, risk management and compliance. When restricted to GRC activities for IT operations, the term "IT GRC" is used (N.Racz, 2010), (IT Policy Compliance Group, 2008). IT GRC thus comprises IT governance (ITG), IT risk management (ITRM) and IT compliance (ITC). According to ISO/IEC 38500:2008, ITG is "the system by which the current and future use of IT is directed and controlled. It involves evaluating and directing the plans for the use of IT to support the organization and monitoring this use to achieve plans. It includes the strategy and policies for using IT within an organization". ITRM in our research is seen as a part of enterprise risk management (ERM), which is "a process, effected by entity's board of directors, management and other personal, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives" (COSO, 2004). ITC describes processes to assure the adherence of an organization's information technologies to laws, regulations, contracts and other obligations (M. Rath, 2004). Dozens of software vendors have developed applications that facilitate GRC management (M. Othersen,2010). However, all these developments occur almost unnoticed by scientific research (N.Racz,2010), especially in regard to IS and its interaction with other business departments. For this reason the authors of this paper started to engage in perception of interaction and communication research where the relevance of scientific IS research for the targeted environment has to be ensured. The involvement of people, the use of technology, strategies and processes in the environment have to be considered. So far we hardly know anything about effort to integrate GRC approach in IT departments. As research lags behind the industry, an analysis of IT GRC in business practice is a good starting point to catch up. A review of prior research will help outline the research gap in order to formulate a precise research question.

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II. PRIOR RESEARCH

1. The work of the research related to IT GRC

As one of the first contributions to the field of IT GRC, Samuel Dipiazza jr., CEO to price water house coopeers International Limited (PWC) noted: "GRC is not new. Governance, risk management and compliance are fundamental concerns of the company and its executives. What is new is an emerging perception of GRC as an integrated set of concepts that, when is applied holistically

within an organization, can add significant value and provide a competitive before age "(PWC, 2005).
A rare definition of academically motivated approaches was provided by Racez, weippl Seufert and (Racz, N, 2011) which conducted a comprehensive study on the understanding of the GRC by putting the different aspects together. Their approach was iteratively modified and validated by many experts in the field of the GRC. They defined GRC as "an integrated and holistic approach to organization-wide governance, risk management and compliance, ensuring that the organization act ethically with correct manner and in accordance with risk, internal policies and external regulations through the alignment of strategy processes, technology and people, improving the efficiency and effectiveness ".

2. Standards and frameworks of good practices

In recent years, a variety of models of best practices (ITIL: IT library Infrastructure) or COBIT (control objective for IT and related technologies) and internal standard (MOF: Microsoft framwork operations, ITSM: IT service management Hewlett -PACKARD and ITPM: IBM IT process model) have been developed. These standards, which are also summarized under the theme of governance of information technology, describe the objectives, processes and organizational aspects of the management and control of IT (Goeken, M., 2008). These best practice models were developed based on practical experiences in IT organizations. These numerous repositories that are on the market optimize the functioning of the information .They offer considerable contribution system, but also a large number of items do not apply in some scenarios some organization some systems. As reported by Johannsen and croeken (Johannsen, W, 2007) (See Figure 2) are multiple repositories for interdependence and some of their appearance overlap. However, it is important to identify the appropriate standard to provide support to the high level of needs for IT GRC by examples:

- Assist IT manager in making the right decision.
- Define and regulate the service management process.
- Deploy these processes and the required procedures, instructions of work and monitoring functions.

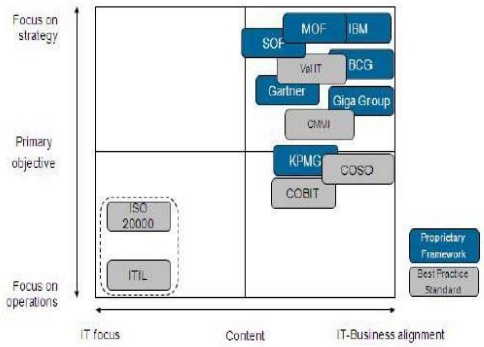

Figure 1: Classification standards for best practices and IT governance frameworks as Knahl (Knahl, M., 2009)

3. Perception of the interaction between information system and enterprise business departments

A lot of research work, dealing in different areas of managing interactions, can be found in various literatures. Each research area has its own specifications and requirements to manage a processing request. Managing the flow of information is important for the use and sharing of resources in a distributed environment composed of several business departments (which must interact with the SI) to establish meaningful communication. A communication system is to interconnect and implement business processes of the various departments in order to effectively address the problems faced by companies in terms of reusability, interoperability and reduction of coupling between the various systems that implement their systems of information. Thus, ensuring interoperable interaction between different functions of the company is the main problem to build good governance SI. The technical management of workflow could meet these requirements. Furthermore, management of workflow is a mechanism whereby a process of composite and implemented as an interconnection less complicated tasks.

III. METHODOLOGY

The chosen state-of-the-art methodology is called “action design research” (ADR), an approach recently presented at the Australian conference of Information System. It combines design research and action research to enlarge the focus of research on entreprises, helping obtain technological rigor and organizational relevance.

1) Research hypotheses

Les organisations ne tirent pas profit de leur SI pour mettre en place une approche IT GRC et établir une interaction efficace entre ce dernier et les départements métiers de l’entreprise. This affects la gestion des flux informationnel efficacement afin de répondre aux besoins métiers en termes de processus. To validate this hypothesis, we conducted an empirical study by Moroccan managers.

2) Research methodology

We realized during the month of March 2016, the first large scale study on information system in Organizations in Morocco. Organizations of study are 51. The sample was constructed using the quota method. Were taken into account 3 criteria: Size [less than 100 employees, 100 and 500, 500-1000, over 1000], Type of organization [Enterprise, Administration,] and Activity [Activities represented in the official High Commission for Plan in Morocco (HCP, 2010)].
The primary data was collected through a standardized questionnaire. This last one was designed to hold three question group: the first group treated strategic aspect of IT GRC within enterprises, gaining basic information such as the existence of IS, the budget devoted to the DSI, personal involved or technology used. The second group consisted of questions about the decision making and frameworks followed. In the third group, we pose questions on communication and interaction between IT department and other business departments. We focused on horizontal and vertical workflow management in order to integrate business processes and generate action plans.

IV. ANALYSIS

1. Disposition SI by organizations and companies in Morocco

We will analyze the results obtained from the provision of an information system by organizations and companies in different industries: Selected variables: business activity, Existence of IS.

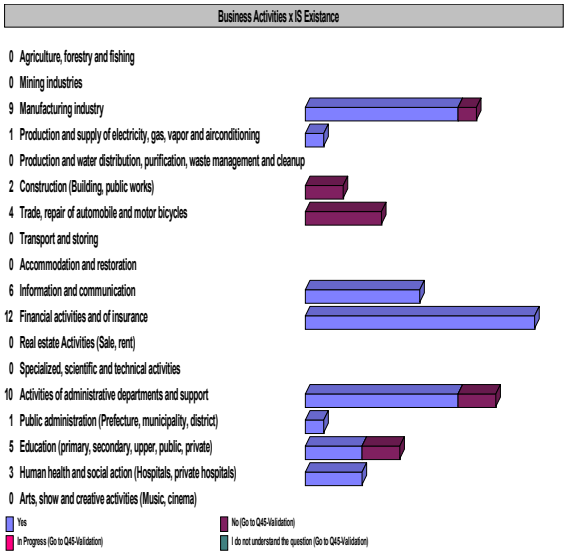

Figure 1: the industries that set up an SI

Several business sectors (which are taken from the nomenclature HCP) have an information system. The results of the study that we conducted in organizations and companies in Morocco show that the sector of financial and insurance activities present the most dominant sector in terms of provision of information system, monitoring of areas of 'manufacturing and administrative activities and support sector. This result is justified by the nature of the business operations requirements in organizations and companies in these sectors.

On the other hand, we find that some companies in sectors that are still strategic (Production of water ... sanitation; Transportation and Warehousing; accommodation and catering; Commercial activities of real estate, specialized technical activities ...) do not put in place a system of information. Unfortunately, many companies have now difficulties to organize and update their management tools. Indeed it announces fiscal cost and change management with staff to implement a new information system. The two diagrams below will be illustrated through two examples of companies. The first example of a company having difficulty setting up an information system adapted to its service and its needs. The information is not transmitted between services, creating complications for both internal and external stakeholders of the company. The second company in turn, shows a "good" example of its information management organization.

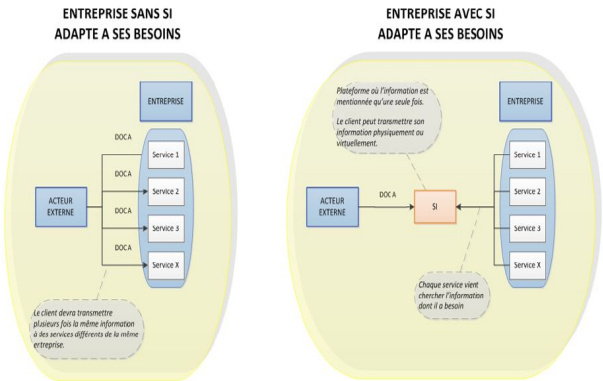

Figure 2: establishment of an SI in a business

2. Interactions between business departments and management of information workflows

We wish to analyze the interactions between departments (functions) of the different departments within organizations and enterprises and the impact of these interactions on the management of information flows between applications that meet business needs of these departments.

Selected variables: Interactions SI, management of information workflows

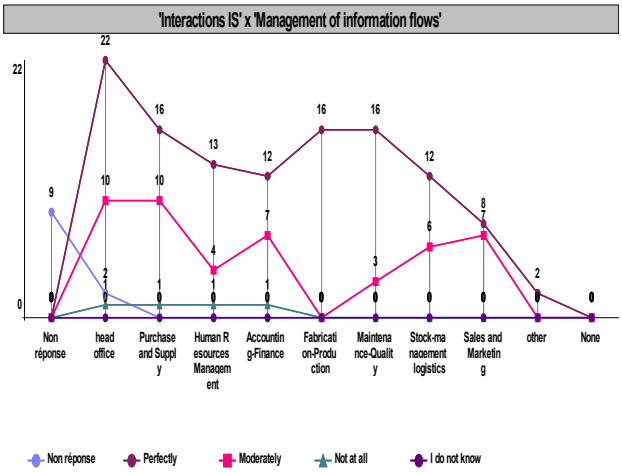

Figure 3: Interactions between business departments and management of information flows

The previous graph shows the result, it shows that the department with which the SI interacts in most organizations and businesses is the general direction, with perfect management of information flow between the applications used in this department and the SI. This result proves that:

- One side, the IS in Moroccan companies are not as mature to perfectly manage the interactions between all company departments with an efficient information flow management between business applications of these departments.
- On the other hand the strategic position they occupy at the highest levels of the corporate hierarchy. This indicates the direction "Governance" is attributed to the IS function in Moroccan organizations. This meaning is no longer limited solely to technical management concern, but rather a dimension of governance in the modern sense

Composition of an enterprise information system

a. Classical Composition

In the works for years 1980 - 1990, composition "classic" of an information system of a company was a pyramid of information systems that reflected the corporate hierarchy. Systems handling basic transactions (GST) at the bottom of the pyramid, followed by systems for information management (MIS), and after the decision support systems (DSS) and ending with the systems information used by the most senior management (EIS) at the top.

Although the pyramid model is still useful, a number of new technologies have been developed and some new categories of information systems have emerged and no longer correspond to different parts of the pyramid model.

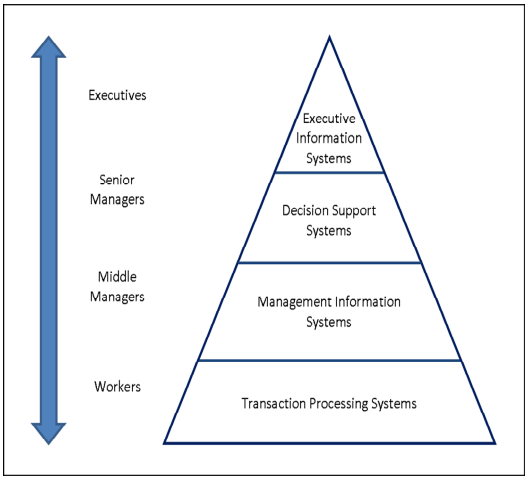

Figure 4: Classic composition of information system

b. Current composition

In information system of a big company is:

ERP - Enterprise Resource Planning which theoretically includes all transactional information systems whose operating methods are now well known to computer scientists and men of art of each business. ERP to support the operation of the business; so-called called other systems integrated business where verticalized who are business software packages, which cover both the front office, the middle and the back office and not design house, but were built by a specialized publisher on a trade and whose modes software follow best practices observed at one point in the most efficient in their sector of excellence; the remaining systems called "specific" (or: no standards, design "house" custom developed, not found on the market, etc.), which are met with more applications in the fields of computing costs, billing, production aid, or related functions.

The ratio of specific ERP systems varies from one company to another.

Urbanization deals with the mapping of business systems and thus how to organize its information system to achieve the evolve-looking manner, consistent with the overall strategy of the company. The strategy of the company is conducted by senior management and urbanization allows to conduct IS alignment on strategy. In ERP, there are modules covering different areas of activity (such as production management, management of the commercial relationship with customers, human resources management, accounting, finance, mergers, accounting integrations recent acquisitions, etc.) around a common, unified database.

It is common that a company is equipped with several different software packages according to their areas of activity. In this case, the packages are not fully integrated in such a PGI, but interfaced between themselves and with specific applications. For example can be found, applications: Customer Relationship Management (CRM or CRM for customer relationship management): includes all functions for integrating customers into the company information system. Management of the extended relationship (XRM for extended relationship management: corporate reporting system, designed by Nelis XRM in 2005, including the relational processes is the foundation of the organization of information. supply chain management (SCM or SCM for supply chain management): includes all functions to integrate suppliers and logistics enterprise information system

Information System of Human Resources (HRMS) for human resources management (HRM) HRM or to human resource management. Product data management (PDM or PDM product data management.. storage aid functions and product data management Especially used by consultants in fact the PDM is the evolution of the function PDM until new way to manage the data lifecycle.

Managing the life cycle of the product (PLM for product lifecycle management: concept and includes in addition to the PDM, design and support for innovation, and the end of life of the product, so its recycling).

3. The interest of the establishment of an information system and how to manage operations with respect of the response time

We wish to analyze why companies and organizations establish a IS and how it manages the operations of the departments focusing on response time.

Selected Variables: utility of IS, Management IS, information department response time.

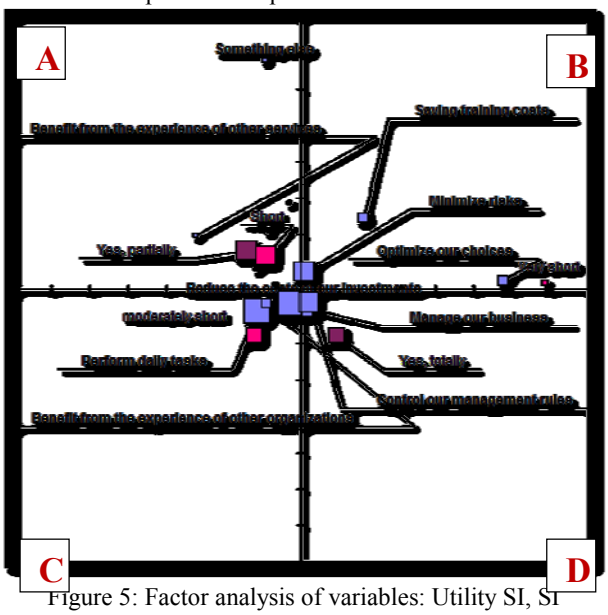

Figure 5: Factor analysis of variables: Utility SI, SI Management, DI response time

The mapping between these three variables allowed us to view the most used for the establishment of an information by the Moroccan companies and organizations which criteria are:

- Reduce costs of our investments;
- Carry out daily tasks;
- Manage our business;
- Minimize risks;
- Mastering our rules;
- Benefit from the experience of other organizations.

In the the dial A, there are those who find the interactions between the SI utility and the response time with a partial management, so they are consistent.

In the dial B and D, we found no correlation between the three variables.

In dial C, there are people who have found a relationship between the value of the IS and the response time of the IT department, but the perception in relation to the management of end to end process is minimal or nonexistent.

In particular, even if they take into consideration these criteria, departments of these companies operations management does not lead to a mature level as we see from the graph that this management remains partial or nonexistent. Similarly, the correlation between the establishment of criteria for SI and the latter response time to requests from other departments remains average.

4. The correlation between the use of standards and frameworks and IT management activities of a process

In this section we study the correlation between the use of IT standards and management activities of a process from beginning to end.

Selected variables: IT repository Choice, advanced treatment processes.

The following table shows the result of this study.

Advanced treatment processes / Choice IT Repository	Non réponse	Totally	Partially	Not at all	I do not know	TOTAL
Non réponse	9	3	0	0	0	12
Depending on the certifications of employees	0	1	4	0	0	5
Depending on the IT training organized	0	5	4	0	0	9
Depending on the costs required to deploy IT repository	0	5	8	0	0	13
A random choice	0	0	7	0	0	7
A choice imposed by the Director General	0	4	0	0	0	4
A choice imposed by stakeholders	1	0	8	0	0	9
I do not know	0	4	1	1	0	6
TOTAL	10	22	32	1	0	65

Figure 6: cross table of two variables: IT repository choice, advanced treatment processes

In the table, we see that IT repository selection criterion by companies is one that has to do with the costs required to deploy an IT framework. And in return, the advanced management of business process activities is done only partially in such companies. This shows that the choice of reference by businesses is not effective for it to completely manage the activities of a process for the expression of need to the implementation of its action plans.

V. PROPOSED SOLUTION

In order to overcomes the lack of efforts deployed to implement IT GRC approach and facilitate the interactions between IS and other business department of an organization, we have developed a solution which aims to combine IT GRC frameworks in an intelligent manner to take the right IT decision for business directives (S.Elhasnaoui, 2013), (S.Elhasnaoui, 2014), (H. IGUER, 2014).

It focuses on business objectives and proposes the best solution for an efficient IT management while facilitating interactions between IS and systems which manage business processes.

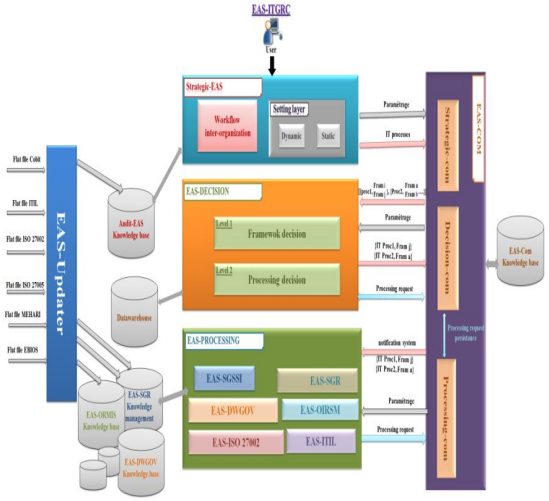

Figure 7: IT GRC platform: Overview of architecture

IT GRC Platform is an intelligent, distributed platform Governance Risk Compliance Multi framework Information Systems. This solution provides good governance, risk management and compliance of information technology and communication within a business, including a set of distributed systems:

• Ensures and assess intelligently align enterprise business goals with the goals and IT strategy,
• Manages IT processes
• Prioritizes IT investments in line with the contribution of business value.
• Manage IT risk and evaluate,
• Ensures compliance with the legal framework,
• Choose the best repository of Governance, Risk and Compliance Information Systems to perform the tasks listed above
• Update repositories according to the latest existing versions on the market,

The platform is based on the standards and methods of Governance, Risk and Compliance Information Systems (IT GRC), the most common (COBIT, ITIL, PMBOK, ISO27001, ISO27002, ISO27005, Mehari, EBIOS) The proposed solution using a massive undertaking, activity and Information System (SI) any, to manage its IT processes in line with its business strategy involving business managers with management information system. It can optimize IT investments by monitoring business strategies in order to create more value, making them more efficient IT processes and control risk and compliance related to SI. It deploys a variety of good practices of IT Governance and made a smart choice by the constraints and corporate settings best framework to evaluate the objectives and processes in question.

The platform communicates with stakeholders SI namely the Director of the Information System (DSI) and the business heads of each department, it has an intelligent semantic engine

for translating the objectives expressed by users in language understandable by frameworks to implement the adequate treatment IT GRC, a system of smart decision, multi-criteria for choosing the best framework for a given application, it encapsulates each repository in an expert system to make an assessment (IT GRC) end interactive way with the concerned user, logged and documented. These repositories are updated using an incremental system update. The various platform components communicate via a layer of intelligent communication which works in two synchronous and asynchronous modes.

IT GRC platform is composed of four principle layers:

- **Strategic layer:** based on COBIT framework; ensuring permanent alignment of IT and Business with stakeholders' participation. The output of this layer is the proposition of IT processes that must be managed.
- **Decision layer:** assures the choice of the best framework for each IT process and adds a decision-making aspect on every platform of the layer processing
- **Processing layer**: This layer is composed of different systems, which can be implemented; each of these systems relies on a precise IT framework for managing IT processes defined by the strategy layer
- **Communication layer**: It is responsible for all communications between layers of the IT GRC platform. It is a distributed system which is composed of three sub-system that ensures all communication between strategic, decision and processing layers

This last layer is the communication system, which is considered the main element of our study. It manages the interactions and information flows between the various components of our solution offers which in turn manage the workflows between the information system and business applications from other company departments.

CONCLUSION

In this paper, we have we conducted a study focused on the perception of interactions and communications with business functions in different organizations by 51 Moroccan mangers of high level. After, we have analyzed the results which allowed us to measure this perception and identify new models simplified which aims to manage workflows effectively. The proposed model is integrated within an IT GRC platform that aims to combine IT GRC frameworks in an intelligent manner to take the right IT decision for business directives. We have presented the communication system that allows establishing the interaction between IT GRC platform components. In our future publications, we will present the implementation of our proposed solution in order to validate our approach and test the IT GRC platform into a professional context to obtain experimental result.

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