A theoretical model for the evaluation of IT governance in Regional Education Academies and its impact on the performance of information systems

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***Abstract*—in recent years, Information Technology (IT) and Information Systems (IS) have played a crucial role in the management of the education sector in Morocco. Aware of the importance of these technologies, the Ministry of Education in Morocco has launched an information technology governance charter aimed at streamlining IT practices and activities.**

This paper aims to propose a theoretical framework to evaluate the implementation of IT governance in regional education academies and its impact on the performance of information systems.

Keywords—IT governance, regional education academy, performance, information systems (IS)

I. INTRODUCTION

In recent years, Morocco has launched an advanced regionalization project. This project is considered as a locomotive of social, cultural and economic development. To support this orientation, the Moroccan Ministry of National Education has put in place legal and structural measures. These include: the creation of new regional academies and provincial directorates following the new administrative division, as well as the establishment of new organic structures for regional academies and provincial education and training directorates [1].

Information technologies (IT) are omnipresent and play a predominant role in the management of the Moroccan education sector. Moreover, it is necessary to renew their governance models to support the changes brought about by advanced regionalization.

In this perspective, the Moroccan Ministry of Education has adopted an IT governance framework that aims to streamline IT practices and activities through the implementation of tools and rules to ensure IT control and optimize IT investments made [1].

The objective of this article is to develop a preliminary theoretical framework based on the De Haes and Van Grembergen model [2] to evaluate the implementation of IT governance within regional education academies and its impact on IS performance.

In this article, we will stop in a first step on the concept of IT governance, its elements, and the performance of information systems. Those are the constructs of the theoretical framework of our research model. And in a second step, we state the question and the hypotheses of research and we present the research methodology envisaged to complete our work.

II. IT GOVERNANCE

According to Brown and Grant [3], the concept of IT governance has its origins in the 1960s when researchers delineated a number of fundamental concepts that directly reflect the definition of IT governance. Nevertheless, scientific articles using the word "IT governance" in their title appeared only in the late 1990s [4].

IT governance is an integral part of corporate governance [5] [6]. It is commonly referred to as a "subset" of corporate governance [7].

Academic and professional research has advanced a multitude of definitions of the concept of IT governance [4]. Currently, there is no understanding how IT governance can be accurately defined [8]. Indeed, a single and common definition of this concept is difficult to formulate [3].

We retain in this article the following definitions:

According to ITGI [5] « IT governance is the responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organisational structures and processes that ensure that the organisation's IT sustains and extends the organisation's strategy and objectives ».

Karoc-kakabadse and kakabadse [9] see that « the information technology governance corresponds to a set of

structures and processes to ensure that IT support and adequately maximize the business objectives and strategies of the organisations, adding value to the service delivered, weigh the risks and getting a return on investment in IT ».

For Van Grembergen [10] « IT governance is the organizational capacity exercised by the board, executive management and IT Management to control the formation and implementation of IT strategy and in this way ensure the fusion of business and IT ».

Another definition that we find useful in developing our theoretical model is that of Segars and Crovers [11]: « IT governance is the system of structures and processes for directing and controlling information systems ».

The definitions provided by the researchers focus on the ultimate goal behind the establishment of an IT governance framework, which is the strategic alignment of information technologies with the overall strategy of the organization, allowing the company to create value [10] [4] [12].

The notion of IT value is fundamental. Because the implementation of IT governance is considered as a solution for valuing IT investments and contributions to the performance of the organization. As for the IT risk, its pure and simple elimination is an old, inaccessible dream [13]. In addition, IT governance seeks to reduce risk and bring it back to a manageable situation.

III. Elements of IT Governance

Many researchers have attempted to answer the question of the effective implementation of IT governance [14] [15] [16]. For these authors, IT governance can be deployed using a mixture and marriage of structures (connection), processes (coordination) and relational mechanisms (participation and collaboration).

The following figure contains examples of structures, processes, and relational mechanisms:

Structures: Roles and responsibilities, IT organisation structure, CIO on Board, IT strategy committee, IT steering committee(s)
Processes: Strategic Information Systems Planning, Balanced (IT) scorecards, Information Economics, Service Level Agreements, COBIT and ITIL, IT alignment / governance maturity models
Relational mechanisms: Active participation and collaboration between principle stakeholders, Partnership rewards and incentives, Business/IT collocation, Cross-functional business/IT training and rotation

[a.] Based on: PETERSON, R. 2003, Information strategies and tactics for information technology governance, in Strategies for information technology governance, book edited by Van Grembergen W., Idea Group Publishing [15].

Fig. 1. Structures, processes and relational mechanism for IT governance.

Several models can be adopted to study the IT governance phenomenon, such as Scott-Morton's model [17] (Technology, Structure, Strategy) or Géorgel's model [13] (User, Process, Technology). In this research, we adopt the three elements (structures, processes, relational mechanisms) following the research done by De Haes and Van Grembergen [2].

A. *Structures*

The study of structures is an area of interest to several researchers in the field of IT governance [18] [6]. The structures represent formal and informal mechanisms that "encourage contact and socialization among stakeholder groups" [19].

In addition, they understand how the IT function is organized. They also concern defining IT activities (IT decision areas), identifying the models and archetypes assigned for these activities, as well as a clear definition of the roles and responsibilities of the various parties involved in the IT governance framework.

The IT strategy committee should help manage and oversee the company's IT issues [20]. Its main role is to ensure IT alignment with the company's overall strategy.

B. *Processes*

IT governance encompasses a set of processes to control the alignment of IT strategy with strategic business objectives and adjust business decisions and those of IT.

Among these processes is the Balanced Scorecard (BSC) control instrument developed in 1992 by Robert Kaplan and David Norton [21]. It measures organizational performance from four perspectives (financial performance, customer satisfaction measurement, internal process, innovation capacity and organizational learning). In addition, the Balanced Scorecard is considered the most effective way to measure alignment between IT and business [5]. Furthermore, Van Grembergen and al. [22] used the BSC to adapt and apply it to the IT processes thus giving the IT BSC version.

Service level management is a real control process. It is responsible for training the requirements and needs of customers and users through the implementation of Service Level Agreements (SLAs) thus improving the quality of IT service delivery. ITIL proposes, within this IT governance framework, a process (Service Level Management) that provides written agreements committing the customer on what he expects and the supplier on what he delivers, and to ensure that the necessary quality of service is financially justifiable and regularly improved.

Otherwise, CobiT (Control Objectives for Information and related Technology, developed and published by ISACA and ITGI) provides a reference framework for controlling and auditing IT processes. To be effective, the organization today depends on its IT resources (information, applications, infrastructures and personnel). This is why IT activity must be continuously monitored and audited. In addition, CobiT offers a set of means to guarantee the business processes information that meets their expectations by establishing a set of operational requirements to determine the relevance of the

information provided. These are the criteria for controlling information (effectiveness, efficiency, confidentiality, integrity, availability, compliance and reliability). In addition, CobiT offers 34 IT processes grouped into four areas (Plan and Organize, Acquire and Implement, Deliver and Support, Monitor and Evaluate).

In a more operational perspective, the Information Technology Infrastructure Library (ITIL) consists of a set of books which are repeated and referenced many practices, procedures and methods whose objective is to provide a quality computer service to users of the information system and customers of the company.

In short, CobiT presents itself as a unifying framework. Indeed, with its 34 processes, it can easily be coupled with other market standards (CMMI, ITIL, Val IT, ISO 27001...), by building a reference framework satisfying all requirements [23].

C. *Relational mecanisms*

Relational mechanisms are very important in the implementation of effective IT governance. However, an organization may have all the necessary processes and structures, but this may not work because of a lack of agility and collaboration between the IT function and the rest of the organization, or there may be little IT appreciation on the part of the trade [20]. Thus, to achieve effective IT governance, two-way communication, good participation and collaboration between IT staff and all stakeholders is necessary [24] [25] [26].

Moreover, the relationship between the IT function and the organization has long been characterized by conflict [27]. Therefore, the establishment and implementation of relational mechanisms facilitate a continuous sharing of knowledge between the IT function and the organization's departments is essential for IT alignment.

Finally, Business/IT training and rotation (Job rotation) (i.e. The work of IT staff in business units and the work of business managers at the IT function) also aim to encourage sharing and collaborative behaviour within the organization.

IV. INFORMATION SYSTEM PERFORMANCE

Today, information systems play a vital role in organizations. This is why managers are constantly looking for their performance.

According to the literature, performance is a multidimensional concept. An information system is considered efficient when it allows the organization to better exercise its profession [28]. For Reix and al. [29], to say that an IS is efficient depends on the quality of the entities and respondents (IT technicians, general management, users, etc.). Moreover, the performance of the IS can be assessed according to different criteria. Thus, the study by DeLone and McLean [30] allowed them to identify more than 100 IS measures and success criteria. These authors conclude that the quality of the system, the quality of the information, the degree of use, the satisfaction of the user, the individual and organizational impact are the most important elements to judge the success of the IS.

This model was modified in 2003 [31] following research carried out. Indeed, the quality model was supported by the quality of the service. Another modification specifies that the impact of the IS is not only individual and organizational but also an impact at the level of a group of individuals, users and consumers. The authors suggest retaining the concept of net benefits, as the impacts of IS are very numerous.

According to the literature, IS performance can take two forms. A first, called quantitative or financial, allows the IT department to measure the success of the information system by defining indicators relating to costs (application maintenance costs, operating costs, etc.) and other indicators such as the bug rate, production quality, etc.

ROI (return on investment) is a measure of financial performance, but it is done upstream, it is a way of selling a project to general management by showing the expected returns of such an investment [28]. And a second, called qualitative, depends on several non-quantifiable and non-measurable elements relating to IT department management practices and its relationship with stakeholders [28].

V. THEORETICAL MODEL

Based on the above, we state the following research question: *What is the impact of effective IT governance on information system performance?* In addition, we put forward the following research hypotheses:

Hypothesis 1: Effective IT governance depends on the organization of the IT function and the definition of the roles and responsibilities of all stakeholders

Hypothesis 2: Effective IT governance depends on the use of frameworks of best practices and the implementation of appropriate control and monitoring instruments.

Hypothesis 3: Effective IT governance depends on relational mechanisms that facilitate active collaboration between all stakeholders.

Hypothesis 4: The implementation of effective IT governance positively influences the performance of information systems.

Thus, we propose the theoretical model connecting the constructs and the relations between them in figure 2:

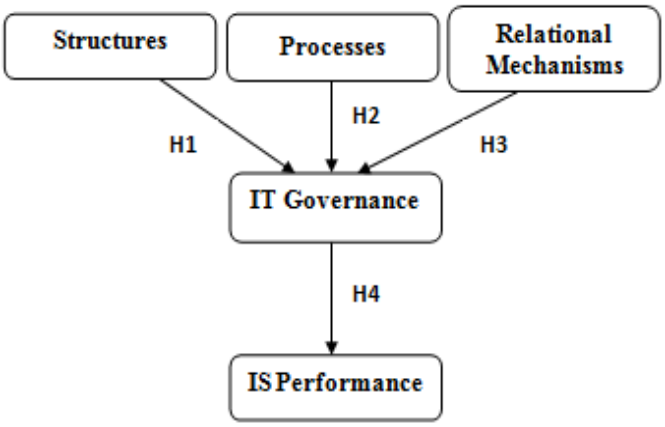

Fig. 2. Proposed theoretical research model

VI. METHODOLOGY

After having built the preliminary research model based on the theory, we intend to use an exploratory case study to contextualize the model developed. Our interviews will target IT governance authorities within a regional education academy (Director of the IS Regional Center, IS Project Director, IT managers and users).

This essential step in a research project will allow us to refine our analytical framework and to release a final research model. Once our model is validated, we will conduct qualitative research with a sample of regional education academies to test the hypotheses previously mentioned.

VII. CONCLUSION

Today, information systems occupy an indispensable place in the management of the Moroccan education sector. However, a lack of agility and efficiency of these systems will have fatal repercussions on the proper functioning of business activities.

The decision to implement an IT governance framework is proving to be a proven solution in private and public organizations, given the achievement of the objectives assigned to it.

The objective of this article is to propose a research model to evaluate the implementation of the IT governance framework within regional education academies and to measure its impact on the performance of information systems. Indeed, the exploratory research that we intend to conduct will allow us to refine and validate the proposed model.

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