

Strategic direction aligned with information technologies for secondary education in Ocaña, Colombia

B M Velasco Burgos¹, W S Muñoz², and L Arévalo Sánchez³

¹ Grupo de investigación Rotá, Universidad Francisco de Paula Santander Seccional Ocaña, Colombia

² Grupo de Investigación en Tecnología y Desarrollo en Ingeniería, Universidad Francisco de Paula Santander Seccional Ocaña, Colombia

³ Grupo de Investigación en Desarrollo Socioempresarial, Universidad Francisco de Paula Santander Seccional Ocaña, Colombia

E-mail: bmvelasco@ufpso.edu.co, piliscasan@hotmail.com

Abstract. Faced with the need for secondary education institutions in Ocaña, Norte de Santander, Colombia to have the strategic information technology plan for the efficient achievement of educational management objectives, the present study of quantitative approach and descriptive, which allows, through the integrated information technology scorecard model, the design and application of a generic technological tool and the organization of an information technology area to support in the control and evaluation of pedagogical, financial and capital variables human of these institutions.

1. Introduction

The strategic direction is the process that establishes the guidelines by which the organization seeks to position itself in the market and obtain a competitive advantage that allows it to meet the objectives set [1]. The constant changes of a competitive market lead to organizations offering higher quality goods and services, therefore they must reconsider their internal and external processes, as well as their strategies, for this, the integral balanced scorecard (IBC) is an important strategic management tool that allows all those measures that represent the key variables to run a business to be under control and related [2].

The IBC provides high benefits for organizations such as alignment of employees towards the vision of the company, improvement of communication to all personnel of the objectives and their fulfillment, redefinition of the strategy according to results, translation of the vision and strategy in action, orientation towards the creation of value, integration of information from the various business areas and improvement of the analysis and decision-making capacity [3]. The IBC has been introduced in the literature and has been used in management practice as a useful tool to assist in the implementation of an organization's strategy [4].

According to [3], the elements of the IBC related to the strategic map are: The four perspectives, the cause-effect relationships between objectives, the indicators, the goals of those responsible and the projects that will measure the success of the organization in its process of implementing the strategy.

The IBC not only tries to solve problems that allow determining the value of companies, it is increasingly focused on intangible assets versus tangible assets; a strategy little implemented at all levels of the organization, therefore, to obtain good results in the implementation of the IBC it is



essential to align this strategy with information technology (IT). IT and IBC complement each other perfectly to grant strategic benefits to organizations, the lack of technological tools and tools represents a problem for institutions, as it prevents them from observing the important points where technology and knowledge converge [5]. IT undoubtedly contributes to adding value to the business processes of an organization and currently for many companies the information and technology that supports it represents extremely valuable assets [6].

A model is formed with the objective of providing an abstract representation of the set of interactions that are conceptually and methodologically defined as an object of knowledge. In this way, it becomes a resource that allows articulating and interacting with the epistemological, theoretical and operational elements of the incorporation of technologies and communication in education [7].

The need to properly manage an educational institution is necessary, the fact of coordinating pedagogical efforts, material resources, financial resources, personnel, and information requires technical administrative management to improve its results [8]. The model of the balanced scorecard of information technologies, applied to the institutions of secondary education in the city of Ocaña, Colombia, allows guiding educational strategies, by addressing each of the perspectives which results in the use of educational resources. Likewise, performance indicators allow the evaluation, improvement, and innovation of actions to achieve the primary objective, such as the provision of quality educational services and technologies.

2. Methodology

The research was carried out with a quantitative paradigm since it included a set of sequential processes for data collection, feasible to have a statistical treatment. The reaching of the descriptive type that seeks to specify the properties, characteristics of people, groups or communities. The IBC or integral balanced scorecard created in [8] was taken as the mainframe of reference [9], under which the generic information technology integral scorecard (generic IBC IT) model was designed for the educational institutions of Ocaña, then a generic strategic information technology plan (PETI) was constructed, using the technical guide G.ES.06 IT architecture Colombia as a frame of reference [10]. To obtain the information, interviews were applied to the rectors of the sixteen secondary education institutions of Ocaña in order to obtain a diagnosis to identify the strategic direction and IT strategies of the entity.

3. Results and discussion

A generic IBC IT model is structured for the development of the research, for the institutions of secondary education in the city of Ocaña, taking into account the requirements that the 21st century proposes to society and that new technologies require giving meaning and location to the strategies that are generated in educational establishments. The IBC IT, seeks improvement in the quality of the educational institutions of Ocaña, Colombia, with efficient management of its administrative, technical and human resources.

According to [11], the IBC, as a management control tool it was introduced in the business field since [8] and its application to the IT field was initially described by Van Grembergen and Van Bruggen (1997) and Van Grembergen and Timmerman (1998). The adaptations made by these authors generated a generic scorecard for IT known in the literature as integral balanced scorecard (IT BSC) [11].

For the design of the model, the adaptation of the perspectives of traditional IBC to IT by Saull, Ronald, was taken, as shown in Table 1.

The design of the generic IBC IT model for middle school institutions in the city of Ocaña was carried out in two phases: One of preparation, where the educational sector is contextualized, the strategic direction of the secondary education of the city of Ocaña is identified, the IT strategies of the educational institutions are identified, ending with the structuring of the Matrix of crossing of strategic objectives IT and business. Another of the design of the generic IBC TI, in which the mission and

vision is established for each perspective, strategic objectives are established, the strategic map is designed, indicators, goals and action plans are established, and the generic IBC IT is represented graphically for the education sector.

Table 1. Organizational IBC and IT IBC perspectives by Van Grembergen and Van Bruggen [12].

IBC Traditional business	IBC TI
Financial perspective	Business contribution perspective
Customer perspective	Customer orientation perspective
The perspective of internal business processes	The perspective of operational excellence of IT processes
Learning and development perspective	Future orientation perspective. (Technological perspective)

Phase 1 (preparation), begins with the contextualization of the Educational Sector, it was identified that in the city of Ocaña there are 16 educational establishments (8 in the urban area and 7 in the rural area), the strategic direction continues, which is conceived by the mission, vision, strategic objectives, strategies, strategic map, process map, indicators, key success factors and organizational chart of the secondary education establishments of the city of Ocaña, Colombia, who are contemplated in the educational project institutional. Subsequently, the IT strategies are identified, through interviews with the rectors of the schools, where it was evidenced that the educational institutions do not have a PETI, therefore it was necessary to design a generic model, for which the guide G.ES.06 of the reference framework architecture IT Colombia [10] was used, through three stages: Analysis of the current situation (stage 1), business model (stage 2), strategic planning (stage 3).

In the stage of the analysis of the current situation (stage 1), the IT management capabilities of the 6 domains of the G.ES.06 guide were assessed, then the level of technological maturity in the educational institutions is known, information that was obtained through the application of a questionnaire, obtaining a result of 0.70 in the 6 domains, which places the institutions at the "Inexistent" level, since it is below 1 and according to as stipulated in the guide, this indicates a total absence of a recognizable process. The organization has not even recognized that there is a problem to solve.

In the stage of the business model (stage 2) for the construction of the PETI, which aims at the strategic understanding that involves the analysis of the main characteristics of the Institutions of secondary education, facing its mission, describes the high level operation of the entity, once the improvement actions regarding the mission, vision, and organizational structure have been reviewed, in accordance with the parameters established in the objectives of the educational institution, and proposing to make progress in the institutions in accordance with IT governance, it is proposed to create new roles that optimize the performance of the institutions in the use and allocation of technological resources, tending to achieve good IT governance practices, such as: information technology steering committee and information technology committee.

In the strategic planning stage (stage 3) for the construction of the PETI in the educational institutions of the city of Ocaña, it was necessary to define the strategic vision and the formulation of the strengths, opportunities, weaknesses and threats (SWOT matrix), where the following critical IT success factors were identified: Addressing the IT area in the institution, creating an IT management model, aligned with the strategic Addressing of the institution, efficiently manage IT services, and implementation of technology solutions, implementation of a technology route. After identifying the critical success factors for the secondary education institutions in the city of Ocaña, the strategic IT objectives are determined and aligned with the SWOT Matrix; This results in the matrix of contrast of the critical factors of success (FCE), to identify the incidents that information technologies can have with these strategic objectives of the educational institutions of the city of Ocaña, Colombia [13].

With the culmination of the design of the PETI, information technology projects for educational institutions are proposed, in order to use the strategies. Phase 1 is completed with the construction of

an interrelation map based on the relationship among projects, strategies, and objectives as a macro-strategic description for IT management.

Phase 1 is completed with the construction of the interrelation map based on the relationship between projects (P), strategies (E) and objectives (O) as a macro-strategic description for IT management, formulating four projects for this purpose, five objectives and fifteen strategies as seen in Table 2 and Figure 1.

Table 2. Matrix of the interrelation of projects, objectives, and strategies for IT management

Strategic axis objective (O)	Information technology strategies (S)	IT project (P)
O1. Consolidate the Information Technology area as the governing body in ICT matters.	S1. Specify an information technology (IT) management model	P1. Generate an information technology (IT) innovation plan, applied to the processes of all areas of the educational institution. P2 Construction of a model for knowledge management. P3 Develop a plan to define technology policies and standards that help to efficiently manage IT services P4 Implement and launch new platforms.
	S2. Improve the commitment of the officials of the educational institution for the incorporation and improvement of ICT	
O2. Optimize the management model of (ICT), to achieve a level of excellence in information and communication technology (ICT) services; Timely and high quality for all users	S3. Evaluate the level of maturity of ICT management according to good practices	
	S4. Incorporate good practices in the management of (IT)	
	S5. Prepare a manual of processes/procedures for the management of (IT)	
	S6. Train information technology (IT) personnel, involved in IT services, as defined; including good practice topics	
O3. Correct the quality of internal ICT services in institutions for the benefit of operational excellence.	S7. Evaluate the level of maturity of ICT management according to good practices	
	S8. Define policies and technological standards for the entire institution	
	S9. Define and formulate the catalog of IT services, comply with them and improve the attention time permanently (continuous improvement)	
	S10. Specify policies and technological standards for the entire organization	
O4. Enter current technology platforms as appropriate to the institution	S11. Define common needs at the level of all areas of the institutions and raise awareness of the benefits of this practice	
	S12. Perform a detailed analysis of current technology platforms and define integration/standardization/homogenization strategies, as appropriate	
O5. Create a culture of coordination, integration and consolidation of interests and / or ICT needs within educational institutions	S13. Formulate and keep updated the IT strategic plan	
	S14. Strengthen the leadership of the IT area, in educational institutions	
	S15. Incorporate good practices in ICT management	

Based on the design of the generic IT strategic plan, Phase 2 is carried out. Design of the generic IT IBC for educational institutions in Ocaña, Colombia, starting with the establishment of strategic objectives, as shown in Table 3.

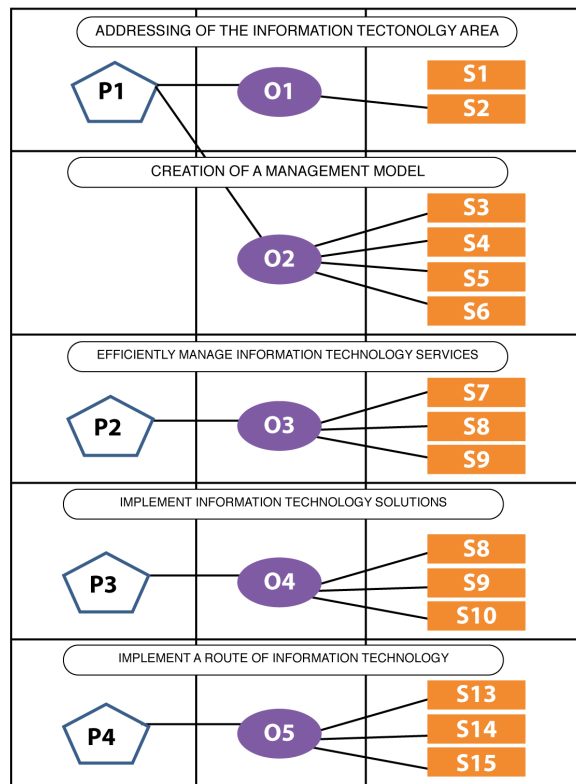


Figure 1. Interrelation map for information technology (IT) management. P: project, S: strategy, O: objective.

Table 3. Strategic objectives of educational institutions.

Strategic objectives educational institutions	Strategic objectives Proposed for IBC generic
Increase the level of maturity of ICT functions and processes. Formalize the ICT operational processes. Increase efficiency in ICT support and services.	Optimize efficiency in ICT support and services delivered to strategically important organizational processes and units. (User Orientation)
Increase user satisfaction regarding requirements, information needs, and ICT solutions.	Maximize user satisfaction regarding requirements, information needs and ICT solutions. (User Orientation)
Involve users in strategic ICT projects.	Increase the degree of user involvement in strategic ICT projects (alliance with users). (Operational excellence)
Optimally select equipment and software providers.	Increase the level of budget efficiency and costs in the acquisition of hardware, basic software, and computer supplies for institutions. (Business contribution)
Train users in the use of software and hardware, as appropriate.	Strengthen the skills and experience of technical personnel, with courses and technical certifications leading in the industry. (Future orientation)

After establishing the strategic objectives for each of the IBC's perspectives, the strategic map that should summarize the IT area strategy is designed. The graphic representation of the generic IT IBC is carried out with a strategic map or cause-effect diagram, which shows the different hypotheses on which the strategic objectives are based or the links between the different themes of each of the four perspectives and that represents how the educational institution expects to achieve the planned results to achieve its objectives, as shown in Figure 2. According to Kaplan, a vision describes the desired result, a strategy; however, it must describe how those results will be achieved [14].



Figure 2. Graphic Representation of the generic integral IT Scorecard for the educational institutions of the City of Ocaña, Colombia.

4. Conclusions

It was possible to demonstrate through the interviews and surveys carried out that the educational institutions of the city of Ocaña, Colombia, do not have an IT area or a PETI, which is, their technological resources are limited and depend directly on the decisions of the central level for any technological project that you want to implement.

There was an absence of control in the data processing centers, because each educational institution necessarily depends on the information it stores through the computer equipment and information systems, is very important to implement a CMI generic IT that allows interacting with current systems and thus maintain control, monitoring and security of information for the development and achievement of the objectives of the institutions.

The reference framework of guide G.ES.06, allowed to design a generic PETI, for all educational institutions in the city of Ocaña defining IT-based strategies to support mission objectives in order to acquire competitive advantages, improve the quality in the provision of its services and achieve the objectives set by the educational institutions of the city.

The generic CMI TI structured in a generic way for all educational institutions in the city of Ocaña, Colombia, contributed not only to demonstrate that IT is the essential instrument to create value for the institution; but also, a means to align the strategic objectives of the organization with the IT objectives.

References

- [1] Gutiérrez S 2016 *Direccionamiento estratégico en instituciones de salud de primer nivel de atención en Bogotá a través del balanced scorecard* (Bogota: Universidad Nacional de Colombia)
- [2] Sánchez J, Vélez J and Araujo P 2016 Balance Scorecard para emprendedores: Desde el modelo canvas al cuadro de mando integral *Revista Facultad de Ciencias Económicas: Investigación y Reflexión* **24(1)** 36
- [3] Martínez D and Milla A 2012 *Introducción al cuadro de mando integral* (Colombia: Ediciones Díaz de Santos)
- [4] Bisbe J and Barrubés J 2012 El cuadro de mando integral como instrumento para la evaluación y el seguimiento de la estrategia en las organizaciones sanitarias *Revista Española de Cardiología* **65(10)** 919
- [5] Méndez F, Domínguez O and Ortiz F 2011 Balanced scorecard para extraer conocimiento de la tecnología *Contaduría y Administración* **234** 33
- [6] Milián I 2010 *Diagnóstico de la gestión de las tecnologías de la información en la empresa comercializadora de combustibles CUPET V.C.* (Villa Clara: Universidad Central de las Villas Martha Abreu)
- [7] Ávila P and García G 2006 Propuesta de modelo integral para incorporación de las tecnologías de la información y la comunicación en la educación *Tecnología y Comunicación Educativas* **20(42-43)** 1
- [8] Juárez Martínez G D 2016 *Formación gerencial para la eficacia escolar* (España: Grupo Eumed)
- [9] Kaplan R and Norton D 2000 *El cuadro de mando integral: The balanced scorecard* (USA: Harvard Business Press)
- [10] Ministerio de Tecnologías de la Información y las Comunicaciones 2018 G.ES.06 *Guía cómo elaborar el plan estratégico de tecnologías de la información – PETI*. *Arquitectura TI Colombia* (Bogota: MINTIC)
- [11] Pérez P and García L 2014 La construcción de un cuadro de mando integral de tecnologías de la información en una empresa *Visión de Futuro* **18(2)** 154
- [12] Marchand-Niño W 2013 *Metodología de implantación del modelo balanced scorecard para la gestión estratégica de tic. Caso: Universidad Nacional Agraria de la Selva* (Piura: Universidad de Piura)
- [13] Baldeón J and Pinoargote J 2007 *Modelo para evaluación e implementación de un sistema de IT governance basado en IT BSC en la empresa ABC* (Sucre: Universidad Santa María)
- [14] Illia Y 2008 Sistemas de gestión compatibles: ISO 9001 y balance scorecard dentro de un operador logístico. *Holística Revista de Ingeniería Industrial* **3(8)** 23

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.