Business intelligence governance framework in a university: Universidad de la costa case study

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ABSTRACT

Universities and companies have decision-making processes that allow to achieve institutional objectives. Currently, data analysis has an important role in generating knowledge, obtaining important patterns and predictions for formulating strategies. This article presents the design of a business intelligence governance framework for the Universidad de la Costa, easily replicable in other institutions. For this purpose, a diagnosis was made to identify the level of maturity in analytics. From this baseline, a model was designed to strengthen organizational culture, infrastructure, data management, data analysis and governance. The proposal contemplates the definition of a governance framework, guiding principles, strategies, policies, processes, decision-making body and roles. Therefore, the framework is designed to implement effective controls that ensure the success of business intelligence projects, achieving an alignment of the objectives of the development plan with the analytical vision of the institution.

1. Introduction

The implementation of information technologies (IT) in senior management is a strategy that is gaining strength when it comes to analyzing data and making decisions (Cody, Kreulen, Krishna, & Spangler, 2002). The companies have opted for the use of computer tools in the search for options for process management, hand in hand with Business Intelligence (BI) (Paschek, Luminosu, & Draghici, 2017). Creating a new research scenario, faced with the need to ensure an IT government focused on BI, in order to generate coordinated actions based on the exploitation of data that is collected on a daily basis for the creation of corporate strategies.

The Universidad de la Costa has implemented several business intelligence projects, but some of them did not obtain the expected results; and that is why, rectory has been leading a process of closing technological gaps to generate advantages of the solutions provided by IT solutions. Currently, the university has several software packages to perform predictive statistical analysis, which provides an opportunity for the execution of data mining projects. However, their implementation has reports that sometimes do not meet the expectations of the business. In addition, the development of new indicators and reports demand hiring and additional processes.

For this reason, this study presents the application of BI in a university governance framework, using as a case study the Universidad de la Costa, for the diagnosis of BI management in this type of business and establish the design of the proposal of model in business intelligence for decision making.

2. Theoretical foundation

2.1. Business Intelligence (BI)

The concept of Business Intelligence was popularized in 1989, when Howard Dresner defined it as an umbrella term to describe a set of concepts and methods for decision making, based on captured information (Cano, 2007). The main objective of Business Intelligence is to provide information effectively so that the organization achieves the proposed objectives and strategies (Salinas La Rosa, 2010), based on the decision making that promotes a competitive advantage in the market. In addition, the BI strategy facilitates the handling of information from the grouping of data from different departments (Regidor, 2015), such as marketing, sales, human resources, finance, among others.

Within the architecture of the BI it is important that a correct interaction between its components is given. Brannon (2010) describes the importance of four components for this platform, which are explained below:

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- **Systems Source:** Collect data resulting from the transaction of products and / or services.
- **Acquisition of data:** Consists of a process of extracting, transforming and loading data into a single repository (ETL, for its acronym in English extract, transform, load).
- **Data Warehouse:** This is the repository where the information that was acquired by the ETL is stored. BI developed effectively, involves having a single reliable data source (Eckert & Sakiri, 2015).
- **Reporting and Analysis Tools:** Tools that allow analyzing information, from standard reports, ad hoc reports, control panels, dynamic analysis processes (OLAP, for its acronym in English of online analytical processing), statistical or predictive analysis.

2.2. BI in universities

Higher education institutions around the world are operating today in a very complex and dynamic environment. The processes of globalization and the rapid development of information technologies have led to a very strong competition. The universities are aware that now it is urgent the need to analyze in depth the available data, in order to obtain a greater knowledge of the students, in such a way that they can better understand their learning characteristics and educational needs (Kabakchieva, 2015).

Typically, top university management does not know what is going on in each department or faculty, and to solve these problems and improve performance could take years, but the competition can move faster (Hemsley-Brown, 2005). However, there is currently the possibility of accessing BI tools in the cloud, which can reduce system costs, limiting expenses to implementation and software support (Akhmetov, Izbassova, & Akhmetov, 2012). Innovation plays a crucial role in the evolution of Universities (Niño & Ortega, 2016).

In this sense, universities are one of the types of organizations that have the most needs that can be addressed based on data-based decisions, as we can see in the contribution made by different authors, where we identify a variety of developed solutions. Among these is Piedade and Santos (2010), who proposed a technological platform to manage relationships with students supported with BI. On the other hand, Falakmasir, Shahrouz, Abolhassani, & Habibi conducted a study in 2010 at the Iran University of Science and Technology, aimed at applying BI with OLAP tools in virtual teaching processes. As for the Arab International University (AIU), they carried out a study in the search of integrating data from different sources, such as: academic, financial, human resources and quality (Alnoukari, 2009). In turn, the Tarapacá University (UTA) implemented a datamart (with ETL) focused on the Admission and Enrollment area, using an OLAP tool to visualize the analysis (Fuentes & Valdivia, 2010). Finally, Narváez, Monsalve, Bustamante, Galvis, & Gómez proposed in the year (2013) a BI solution for the management of resources and physical spaces at the Universidad del Magdalena.

3. BI governance

To ensure the success of BI projects, it is important to have a vision. In other words, for BI to be useful in a company, it must be promoted from top management, provide the necessary resources and encourage decision-making based on information (Chen, Chiang, & Storey, 2012). The BI Government addresses many important issues, including alignment, funding, project prioritization, project management and data quality. If you have government, the BI can be a powerful facilitator of the business strategy (Watson & Wixom, 2007). In fact, BI can directly impact the financial aspects of the organization. The best practices in BI governance, based on guidelines, rules and recommendations to monitor the value of BI initiatives and projects, have led to a higher return on investment (Muntean, Muntean, & Cabau, 2013).

In 2004, Matney & Larson (Matney & Larson, 2004) defined 4 necessary components for the governance of BI: The creation of a "BI

governance committee", defining a "framework for the life cycle of BI", configuring a support structure for the end user implementation of a review process of the BI programs (evaluation and follow-up). However, the success of BI depends on the fact that stakeholders must prioritize the organizational dimension ahead of other factors (Yeoh & Popovič, 2016), which makes it important to have a staff responsible for ensuring the success of BI.

The Business Intelligence Competency Center (BICC) is a group of business, IT and information analysts, working together to define the business intelligence strategies and needs of the entire organization (Hostmann, 2007). It is a fundamental organ for the success of BI, because it effectively addresses resource management, procurement and planning; as well as ensuring that BI projects integrate the business requirements, data and priorities of the organization (Gartner, 2003). A typical BI project may fail because it expects to meet the internal needs of the company, rather than the customer's needs and the market situation; In addition, failures may exist due to a large gap between the project developers and the actual users of the BI system. For this reason, a BICC is necessary in order to ensure: management, data quality, data efficiency, data management, rapid implementation, reliable investments, efficient data analysis and finally technical factors (Safeer & Zafar, 2011).

Next, we can see the main competences and skills that the members of the BICC should have (Fig. 1):

In the previous figure we can see three important profiles that must conform the BICC. The expert in business, the analyst and the information technology. The first must know the business needs, how the organization and its processes work. The second is able to perform a detailed analysis of the processes and determine their requirements. The last profile knows the tools and applications to manage the data.

On the other hand BOGZA and ZAHARIE (2008), mention 5 principles for the function of BICC:

- BI must reach all interested parties.
- Technology and functions of the organization must be combined.
- The BI platform must be uninterrupted.
- Must provide mechanisms to perform an analysis to date.
- The data must be accurate and high quality.
- Intelligent storage must be done.

3.1. BI governance in companies

The use of business intelligence governance has become increasingly important in recent years, to the point of not only taking universities but also public and private companies.

An example of the use of BI Governances is the case at KrauseMcMahon LLP in an area of self-service BI and Big Data. This case is presented in an era of sophisticated analytics and Big Data where corporate data integrity and data quality may be at risk (Riggins & Klamm, 2017).

KrauseMcMahon is a large certified public accounting and business consulting firm, faces a tradeoff of increasing control of the company's data assets versus unleashing end user innovation due to the proliferation of self-service business intelligence tools. Thanks to the correct implementation of BI governance, this company has successfully managed the various BI tools applied to the information of its clients in order to guarantee an adequate interpretation of the financial data information (Riggins & Klamm, 2017).

Dell is another company has amplified governance through a three-tiered approach to designing its analytics environment. Each tier has ownership rules for content and governance. IT owns the content and governs all aspects of the production tier. There are strict standards of compliance to data governance policies. IT provides service level agreements (SLAs) and operational support for this tier, which contains the mission critical applications that keep the enterprise running and the lights turned on. The semi-production tier is also owned by IT. It is
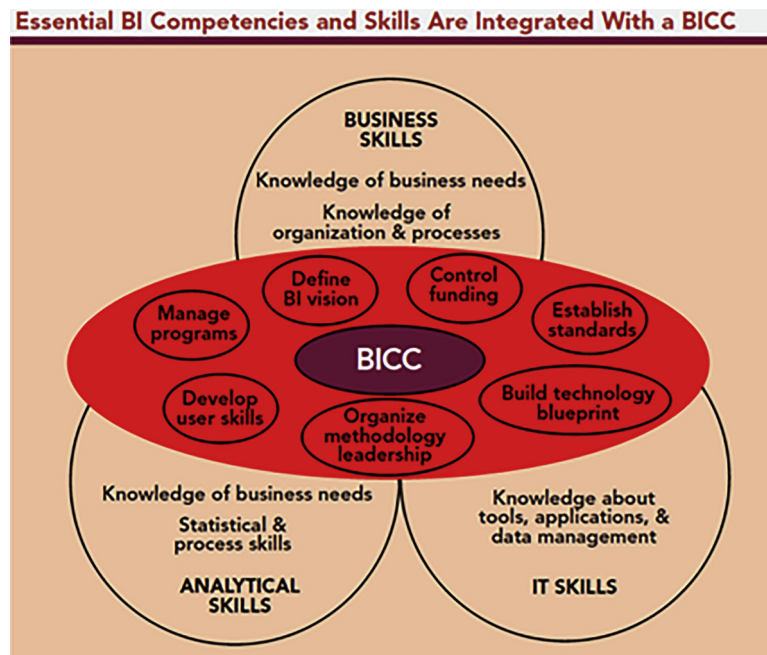
Fig. 1. Competencies and essential skills that the members of the BICC should have. (Hostmann, 2007).

for analytics solutions that have passed proof-of-concept muster and are ready to be institutionalized and infused into business processes and applications. This is where new analytics innovations are hardened and become standardized, replicable, and stable across the enterprise. Significant testing is required to ensure that performance times meet business requirements. IT provisions, automates, monitors, and recommends optimizations in this tier. The third tier, the sandbox, is owned by the business. It provides an area for data exploration, discovery, and what-if analyses. IT provides infrastructure, tools support, and monitoring, so that sandbox tier workspaces can be created by the business using self-service capabilities (Goul, Santanam, & St Louis, 2018).

Adidas launched an ambitious consumer DNA (CDNA) project to capture transaction and interaction data on millions of its customers. Data came from both sales systems and web analytics. The project's goals were to provide the right information at the right time to the right customers, and to select the right target for the right offer at the right time. Data scientists analogized consumer data as akin to a DNA protein base. Complex customer analytics records contain information on a customer's preferred communication time, communication lifecycle, the position of the marketing calendar, and whether the customer had a local vs. global campaign relevant to a context. Since pilots of the approach proved successful, CDNA project leaders planned to seamlessly integrate the analytics solution into the CRM infrastructure using in-database capabilities. Prior to integration, the CDNA project was conducted using an independent campaign management platform. To integrate and automate the analytics solution, project leaders collaborated closely with IT. Governance enabled that coordination and cooperation (Goul et al., 2018).

Similar to Adidas' customer strategy, American Express sought to identify those customer conversations that truly matter. Data scientists felt confident they had the technological means to guide, assess, and dynamically adapt customer conversations. American Express project team leaders concluded they needed to align business strategy (e.g., the customer engagement strategy), data strategy (e.g., the speed of data collection, storage, aggregation), and analytics strategy (i.e., the measurement approach and methods for interactive interaction optimization assessments) (Goul et al., 2018).

In Korea, Big Data is a major concern for both the government and enterprises. In addition, IT -based marketing strategies are more actively implemented in South Korea than any other countries around the globe, as the South Korean government is leading the disclosure of data and supporting private enterprises to utilize the disclosed information to start new commercial services. However, there are some cases where Big Data solution providers advertise the exaggerated contents, which may cause some unreasonable expectations. This hyped expectation only led to paying too much money for the introduction of solutions, but the service effects fell far short of meeting the expectations. The heads of the IT organizations cannot be too careful in starting projects to introduce Big Data solutions due to the overblown expectations of the CEOs. From a viewpoint of an IT expert, more attention should be paid to how to operate Big Data solutions after the introduction (Kim & Cho, 2017)

4. Maturity model BI

Currently companies invest a lot of money in business intelligence, however this investment must be evaluated and justified, which requires a measurement and control of its commercial value, to make comparisons with similar systems in other companies. In this sense, a maturity model offers a baseline for making such a comparison, through levels of efficiency, management capacity and measurement. Additionally, a key factor to identify the alignment of the business and Business Intelligence is through the level of maturity of BI within the company, which should meet with the level of maturity of the company itself. The Business Intelligence maturity model helps organizations understand their current situation and how they can improve. That is, it offers a better understanding of questions such as: Where should the business analysis be carried out? Who is using the business reports, analysis and indicators of success? What drives BI in the organization? What strategies exist to develop business intelligence in the organization? What business value does BI bring (Hribar Rajteric, 2010)?

4.1. TDWI analytics maturity model

Transforming Data with Intelligence (TDWI) developed a maturity model in 2004, and during 2014 it has been renewed, incorporating trends such as big data, government, unstructured data, machine
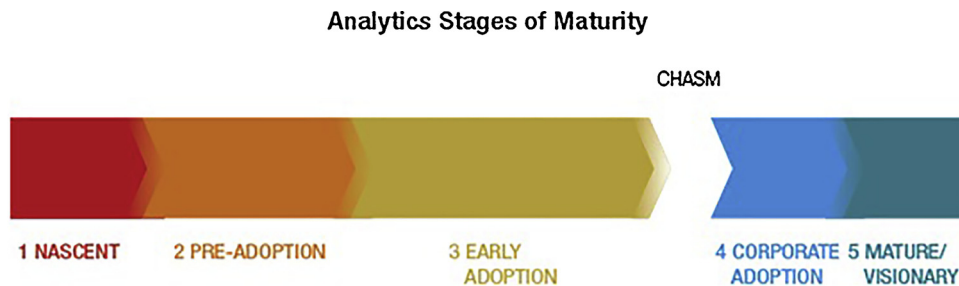
Analytics Stages of Maturity

CHASM

1 NASCENT 2 PRE-ADOPTION 3 EARLY ADOPTION 4 CORPORATE ADOPTION 5 MATURE/ VISIONARY

Fig. 2. Stages of the Analytics Maturity Model (Taken from tdwi.org).

learning, data mining, analysis culture, software free, cloud computing, mobility, agile methodologies, internet of things, democratization of analytics, among other aspects. TDWI has provided a framework for companies to understand where they are, where they have been, and where they need to be strengthened. Added to this, the company offers on its website an evaluation tool accessible for free (Halper & Stodder, 2014).

To guarantee a correct evaluation, the Maturity model of TDWI Analytics proposes 35 questions divided into 5 dimensions to evaluate which are: Organization, Infrastructure, Data Management, Analysis and Governance. Additionally, it consists of five stages: incipient, pre-adoption, early adoption, corporate adoption, and mature / visionaries. As we see in the following figure there is a chasm between stage 3 and 4. Below is a description of each stage (Halper & Stodder, 2014) (Fig. 2).

- **Incipient:** At this stage, most companies are not using analytics, except in spreadsheets. The organization does not have a commitment or culture of BI. In addition to this there is no data management.
- **Pre-Adoption:** Staff is reading about the topic and maybe attending seminars or conferences. Some organizations in this stage invest in a BI technology, data mining, data mart or data warehouse. People are beginning to understand the power of analysis to improve decisions and ultimately, business results.
- **Early Adoption:** The organization incorporates methodologies for analysis, being aware of the importance of data management, generation of reports and scorecards. IT and the business begin to work together, focusing on the fact that business problems require more analysis for decision making. In addition, the government of BI takes greater relevance.
- **The abyss:** BI and analytics is incorporated by the different departments, wishing to make a leap to corporate adoption. However, taking this step takes a longer time because difficulties may manifest themselves, such as: which department owns the data? What particular vision is implemented?
- **Corporate Adoption:** Analytics impacts business results to a large extent. BI moves throughout the organization. The company is aware that BI gives them a differentiating factor and they start to be competitive. IT and the Business are part of the same team. In addition, the organization has a center of excellence where data scientists are incorporated.
- **Mature / Visionary:** Few organizations are in this stage. They have an infrastructure highly tuned to the demands of business and established governance. Analytics drives innovation in the organization.

5. Method

For the scope of the main objective of this study, 3 phases were proposed to be developed. Next, each of them is described:

Phase I: Theoretical foundation of the concepts to order: BI Governance, Business Intelligence, BICC and BI Maturity Models. In addition, a review of the state of universities in the context of BI is presented.

Phase II: Diagnosis of business intelligence management at the Universidad de la Costa through a maturity model to identify weak points (diagnostic evaluation of how the university's analytics are governed).

Phase III: Design of the proposed model of government in Business Intelligence at the Universidad de la Costa, from 8 activities:

1. General Analysis of the Diagnosis
2. Design of the BI Governance Model, aligning BI objectives with the objectives of the university, in such a way that they are compliant within the BI governance framework.
3. Determine guiding principles, which will determine the institutional north in BI issues.
4. Determine Policies, defining the principles and key components for decision making and development of the framework.
5. Determine Decision Bodies, incorporating different key actors in the processes.
6. Determine Roles and functions, guaranteeing that each role has related the layer of the government model to which it belongs and its functions within it.
7. Determine Processes, diagrammed with BPMN (Business Process Model and Notation).
8. Determine Strategies, which guarantee compliance with the policies and the application of the governance framework.

To develop the diagnosis of BI in the university, it was decided to implement a BI maturity model. Most of the existing maturity models are qualitative, highly subjective and somewhat complex given the tangible and intangible benefits generated by BI systems. On the other hand, the models do not cover the entire BI, choosing to focus on specific points. The lack of documentation of maturity models prevents a comparative analysis and the construction of new models. However, despite this fact, Côrte-Real, Neto and Neves propose TDWI as the complete model; has the most complete documentation and covers more perspectives (organizational, functional and technical) (Côrte-Real, Neto, & Neves, 2012).

For the implementation of the model a survey was developed, which was extracted from "TDWI Analytics Maturity Model Assessment". This can be found posted on the website https://tdwi.org/research/2014/10/analytics-maturity-model-microstrategy.aspx. The tool makes an assessment of each category with a maximum score of 20. Presenting additional information such as the average score obtained by companies in the same sector and other sectors (Halper & Stodder, 2014).

Next, in Table 1, you can see the score scales related to each level of maturity. Depending on the score obtained in the survey, you can know what stage the organization is in.

6. Results and analysis

From the application of the TDWI evaluation in the University the following results are obtained:

Table 1
TDWI maturity levels with their corresponding rating scale (Created by authors).

Level	Score
4-7,1	Incipient
7.2–10.1	Pre-adoption
10.2–13.3	Early Adoption
13.4–16.6	Corporate adoption
16.7–20	Mature / Visionary

From the results obtained, the following graph has the effect:

After the evaluation and identification of the level of maturity in which the Universidad de la Costa is in the BI Government, the analysis is developed for each evaluated category, based on the results of Table 2 and Fig. 3, in order to identify what is desired to be strengthened with the intention of reach the level of objective maturity. Next, an analysis is presented for each category.

6.1. Organizational

In the organizational type assessment, a pre-adoption level was obtained with a score of 8.5 out of 20, placing CUC below the average obtained by other universities. However, it is one of the best qualified categories in the evaluation, which is mainly due to the level of awareness that had in analytical and IT issues. Besides having the great advantage of having the support of the rectory of the university, who has promoted the use of ICT for the implementation of the university strategy. Added to this, the planning department has a budget for university analytics.

In this sense, next step is to promote the sponsorship of IT and its work in conjunction with the business, which until now has focused more on supporting the infrastructure. To achieve this, it is necessary to unify the language, especially when communicating new BI trends (e.g. Big Data) that are unknown to them.

Below are listed other points that must be guaranteed through the government framework, through the following strategies:

- Within the process of building the annual budget, include an investment form for University Analytical projects.
- Include members of the academic council within the decision-making bodies of the BI government.
- Define BI as the main component for monitoring and compliance with the Institutional Development Plan.
- Definition of involved, roles and functions within the BI ecosystem. Also, train this human talent.

6.2. Infrastructure

For the BI Infrastructure component, it is observed that it is the category with the lowest score within the set of universities evaluated with the tool, and Universidad de la Costa is not the exception. With a score of 6.5 out of 20 the university is in a starting stage, and to reach an early adoption the following strategies are mainly required:

- Involve expert companies in BI infrastructure, consolidating them as strategic partners in the process.
- Promote collaborative work between the planning unit, university welfare and the IT area.
- Development of projects for the implementation of a data mart and dashboard, focused on the systems to intervene.
- Contemplate the use of external data, incorporating in the architecture, Bigdata platforms in public cloud.

6.3. Data management

On the other hand, we found data management to be a strength of the university. This is mainly due to the fact that although there is no consolidated BI framework, the institution is aware of the importance of the data in the university's strategies. This factor is above the average obtained by other universities evaluated, and very close to the average taking into account all industries. In this way, the university is close to the level of maturity in "early adoption", in terms of data management. This is the result of the integration of multiple data sources to achieve the development of internal software, which has included the extraction of data from SICUC (academic system), the admissions process software and the institutional mobile application. In this sense, in order to continue growing and strengthening this category, the following strategies are proposed:

- Only structured data has been worked on, a leap must be made to multi-structured data and external sources.
- Prepare for the management of data in large quantities.
- Guarantee the quality of the data

6.4. Analytics

Regarding the analytical component, an evaluation of 6.5 of the 20 possible points was obtained. Like the infrastructure, it is in a "nascent" stage and below the average. What corresponds to an important challenge in the delivery of results and importance of analysis in decision making. The present advantage in this factor is that the business need is known. However, at present the strategies and decisions are not entirely designed from analytical, or at least evaluated. Therefore, the following strategies are defined:

- Adopt analytical techniques such as OLAP and predictive analysis from data mining. Currently the proposed models are statistical.
- Define processes for the management, design, implementation and testing of BI initiatives.
- Raise awareness among the academic council and founders that analytics is a tool with which to compete with other universities.
- The indicators must be generated by the business intelligence process.

6.5. Governance

Finally, there is "governance", the weakest component according to the evaluation carried out. The score obtained was 4.0 out of 20, which
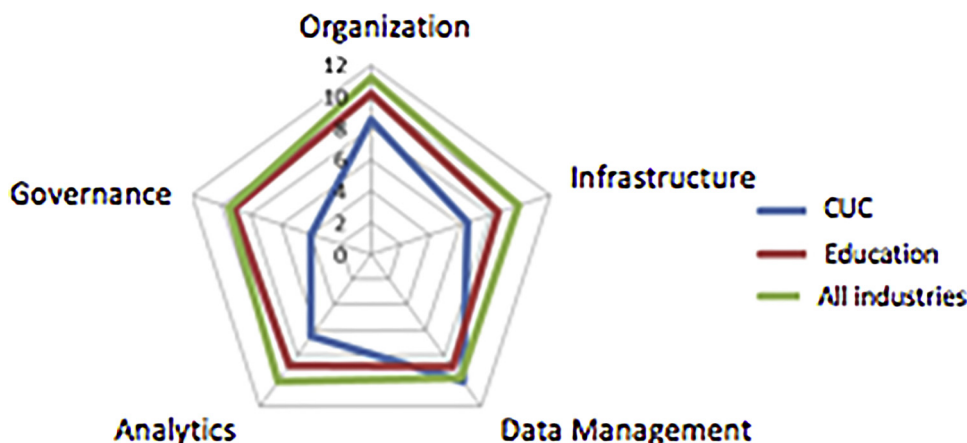
Table 2
Summary of results of the BI Maturity Model in the CUC (Created by authors).

Category	CUC	Average		Current Stage	Stage Objective
		Education	all Industries		
Organization	8,5	10,17	11,15	Pre-adoption	Early Adoption
Infrastructure	6,5	8,55	9,94	Nascent	Early Adoption
Data Management	10	8,89	9,77	Pre-adoption	Early Adoption
Analytics	6,5	8,77	9,99	Nascent	Early Adoption
Governance	4	9,17	9,47	Nascent	Early Adoption

Fig. 3. Comparative graph of BI Maturity Model of the CUC vs. Other Industries (Created by authors).

is well below average. Most institutions are in a pre-adoption, and the CUC has a governance in Birth. In this sense, it is the component that must be worked on, for which the following strategies are mainly recommended:

- Define principles and / or policies for BI management
- Creation of a BICC, integrated by representatives of the different departments involved in the processes.
- Define Roles and functions of this work team.
- Design a BI governance framework.
- Ensure that BI initiatives are aligned with the institutional development plan.

In general terms, the Universidad de la Costa, with a score of 7 out of 20, is located at the earliest stage for the incorporation of academic analytics; nevertheless, it is very close to the Pre-adoption stage, thanks to the fact that it is aware of the importance of BI and has experience in the use of data through transactional systems. For this reason, it is proposed to reach an early adoption of BI governance.

6.6. Governance framework

The BI framework proposal for Universities is defined by 4 fundamental layers which are: Strategic Layer, Communication Layer, Process Layer and Operation Layer. The BICC mainly acts in the Strategic Layer, which is made up of one or more representatives of the academic council (ACR), the IT leader (CIO) and analysts or data scientists who are experts in the academic field (DSC). This body is mainly responsible for defining what the BI policies and strategy will be. This is achieved through the principles of BI, which ensure the alignment of the BI vision with the business requirements found in the institutional development plan. The BICC must also guarantee BI as a compliance tool; for this, the management of indicators will be necessary, which will be fed thanks to a monitoring and monitoring of the BI processes. Finally, this institution is also responsible for establishing a culture of BI in the university through awareness and training. For this, the Communication Layer is key, in which a language is unified that all the interested parties can understand, and technologies tools are defined to facilitate communication, such as wikis, bulletins, forums, etc.

Next, we find the process layer. These are categorized into two macroprocesses: those directed by the BICC and those that involve all other BI stakeholders. The BICC processes are: BICC services management and incident management of the BICC. Then we can find processes for the development of BI initiatives:

- Management of BI initiatives
- Analysis and design of the BI initiative

- Construction of the BI initiative
- BI tests
- Implementation of BI

Finally, the Operation Layer works from the standard granted by the previous layer. Within this we can find one side the users of BI and on the other side the Areas of BI. Within the areas of BI is the Data Management, responsible for acquiring, integrating and ensuring the quality of the data. On the other hand, other areas of BI called Infrastructure Management guarantee the availability, integrity and security of the institutional data warehouse (DWH).

Ultimately, the BI area for the delivery of information is responsible for the use of DWH through analytical projects (or data mining) and BI projects for the construction of dashboards. The models or patterns generated can be systematized through software. Regarding the control boards, these are accessed by the users, which can be: planning staff, the academic council, IT staff, analysts, parents, students, teachers and the different departments of the university. As you can see in the model, these are users of the applications that are data sources (Fig. 4).

On the other hand, 11 guiding principles have been proposed in order to determine the conduct of the information that the departments must have, in addition to articulating the common objectives of the decision-making bodies. Next, they are listed:

- Information as Active.
- Information Culture.
- Standardization of the Data.
- Alignment to the Business.
- Information Efficiency.
- Quality of Information.
- Veracity of the information.
- Ethics and Responsibility.
- Risk Management.
- Audit.
- Collaboration.

In this sense, a series of policies have been established to determine the guidelines and scope of the actions of the Government Framework created by BI, based on three groups: Government Policies of BI, Data Policies, and Infrastructure Policies.

In turn, a decision-making body is established to identify those who make decisions in the areas of BI. The members of this body should cover functional areas of the entire university and should be made up of business and IT people, with the aim of providing a balanced vision of the needs of the institution. The proposed model defines the BICC as the governing body of the BI, which ensures the correct delivery and management of the information, and if the architecture and tools of the
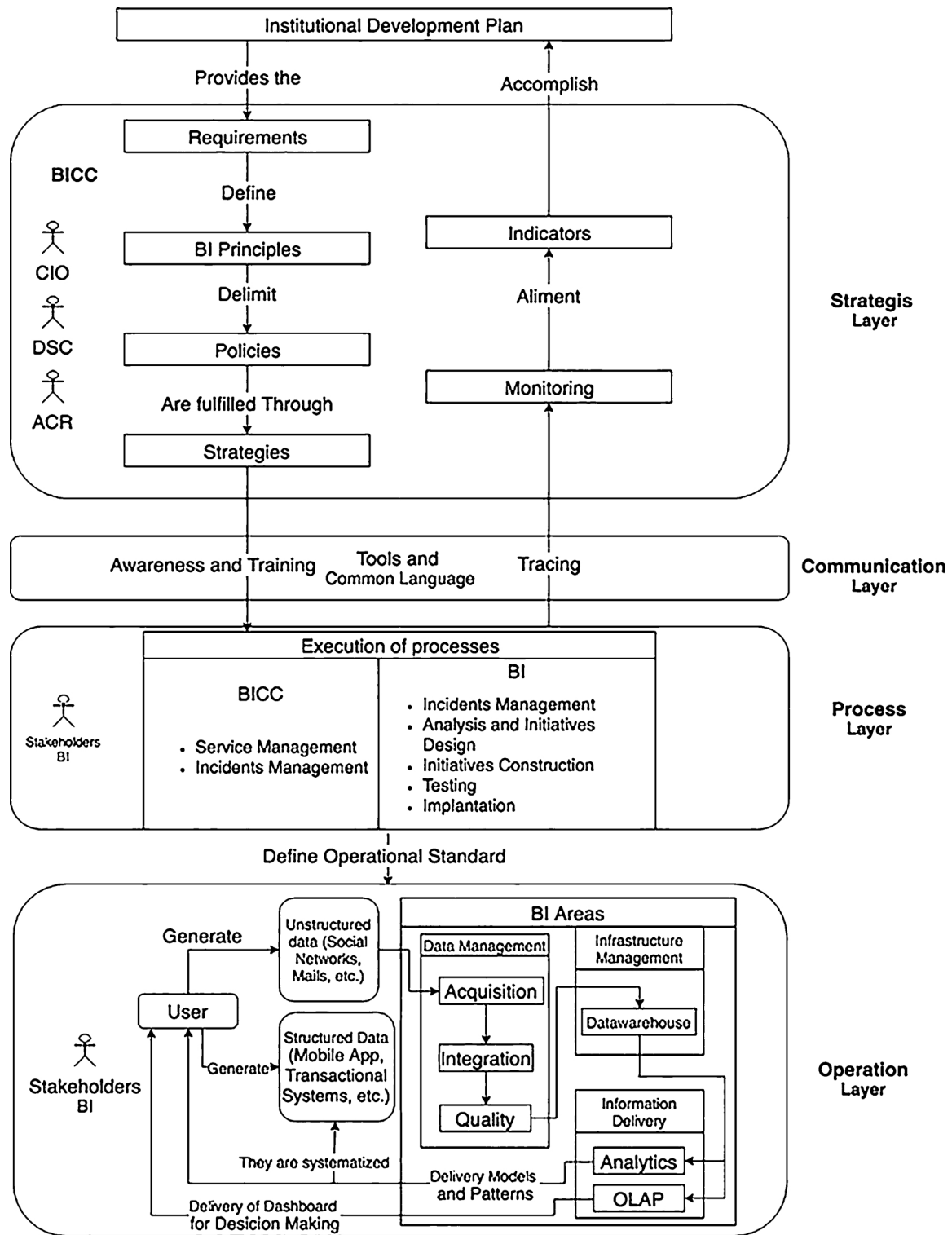
Fig. 4. BI Government Model proposed for the Universidad de La Costa (Created by authors).

BI are fulfilling their function.

The following table lists the roles and the decision-making body layer (Table 3):

7. Conclusions

This research allowed us to design a BI governance proposal totally aligned to the context and needs of the universities, encouraging the generation of Business Intelligence project initiatives, to satisfy the prevailing need for truthful information, which can be transformed to indispensable input for making decisions that generate value. A framework designed in such a way that it can be replicable in other institutions.

It was identified the great importance that has a Center of Competences in Business Intelligence (BICC) multifaceted or multifunctional with skills and competences in three verticals: Business, Analytics and IT, capable of carrying the responsibility of a correct management of BI Government in the interior of the Institution. Key

Table 3
Roles y responsibilities in Government BI (created by authors).

Role	Layer
BICC Director	BICC
Expert Analyst in University Dropout	BICC
Data Manager	Data Management
Tech Consultant	Data Management, Infrastructure Management, Information Delivery
Project Manager	BICC & BI Processes
BI Expert	BICC & BI Processes
DWH Architect	Data Management, Infrastructure Management,
BICC Secretary	BICC & BI Processes
Developer	, Infrastructure Management, Information Delivery
Data Scientist	Information Delivery
Directive Council Representative	BICC

organ in the design of the BI Governance Framework created, to achieve dynamically targets and results that stimulate the work teams, thus achieving the generation of new frontiers of analytical knowledge.

Additionally, it is meritorious to highlight the results obtained in the diagnostic phase, given that these showed that the main success of the BI solutions is given in the average of the constant and coordinated participation of those involved in the projects, as well as the commitment and support from senior managers. The framework is designed to implement effective controls to ensure the success of business intelligence projects, considering the actors and processes involved. Allowing an alignment of the objectives of the development plan with the analytical vision of the institution, and enabling the mechanisms of planning, appropriation, operation and monitoring of business intelligence dynamics.

As future work, we propose the implementation and evaluation of the proposed framework. In addition, to adapt the model of the present work, to other economic sectors.

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