

Balanced Scorecard to improve strategic management control at School of Mines and Energy, Universidad Politécnica de Madrid

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We studied the situation in Spanish public universities regarding the use of the Balanced Scorecard (BSC), as an instrument of control and strategic management. Also, we studied its application to the School of Mines and Energy at Universidad Politécnica de Madrid. The main advantage of the BSC is that improves the organizational structure of the workplace and the achievement of the objectives that ensure long-term success. First we review the strategy for success used in the Spanish educational system and specifically in the Spanish public universities. Then using the BSC and applying the main strategic lines for the successful management of the School of Mines and Energy at Universidad Politécnica de Madrid. The strategic lines affect all the college groups and the success of the BSC tool is to increase communication between the faculties, personal auxiliary, students and society in general that make up the university. First we performed a SWOT analysis (DAFO in Spanish) there are proposed different perspectives that focus the long-term strategic objectives. The BSC is designed based on the strategic objectives that set the direction through using indicators and initiatives, the goals are achieved up to the programmed schedule. In the perspective of teaching, objectives are set to update facilities and increase partnerships with other universities and businesses, encouraging ongoing training of staff and improved coordination and internal communication. The internal process perspective aims at improving the marketing, the promotion of the international dimension of the school through strategic alliances, better mobility for students and professors and improved teaching and research quality results. It continues with improving the image of the school between customer's perspective, the quality perceived by students and the loyalty of the teaching staff by retaining talent. Finally, the financial perspective which should contain costs without harming the quality, improving the employability of students and achieve relevant jobs at teaching and research through international measurement standards.

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1. Introduction

The changes to be made in Spanish public universities should be considered from a strategic perspective. This requires of development tools, implementation and control in relation to the development of the mission of universities. To achieve consistency between the expected results, available resources and goals to establish explicit commitments at all levels of the organization, it is necessary to implement a strategy from a theoretical formulation of the management team to permeate throughout the organization and become a real strategy (Ambras and Tamosiunas, 2010). To achieve this cohesion between the strategic plan and the concrete actions at all levels we will use the Balanced Scorecard (BSC).

The aim of this work is to develop a BSC to allow the successful implementation of the strategy in universities. This will define the strategic lines to follow, indicators and their interrelationships and the expected goals, to finally reach a strategic map applicable to any particular college and also to the School of Mines and Energy, Universidad Politécnica de Madrid.

The process begins with an assessment of the environment, ie the forces on which to develop the university system in the coming years, with particular interest in the European Higher Education Area, as well as a general analysis of the Public Universities in Spain, generally identifying their strengths, weaknesses, opportunities and threats. Later, we proceed to explain the methodology used to design, implement and manage a strategy successfully in universities: the Balanced Scorecard (BSC). Below is a proposed BSC for a Spanish Public University to finally adapt to the specific case of the School of Mines and Energy, Universidad Politécnica de Madrid.

2. Current situation of the Spanish Public Universities

Educational renewal arises with the implementation of the EEES which is based on the renewal of the teaching-learning process (González, 2010). In order to perform this renewal is necessary to know the functioning of the current university system to identify areas that require improvement and change and what must be remain and enhanced (Castejón et al., 2008; González and Sánchez, 2010).

The main weaknesses of the Spanish university system are summarized in the following points:

- Degrees with low occupation.
- Syllabus designed only with the participation of teachers. Lack of comprehensive training and humanistic one.
- Poor quality of teaching.
- Degrees little student-oriented and therefore offer few services beyond teaching.
- Little use of the research being conducted, often published only in academic journals and is useful only for internal promotion of teachers.
- The system places as teachers achieving results in the absence of incentive policies and achievement of objectives and stiffness recruitment systems prevent quick adaptation to changes.
- Decision making and management are very complex, bureaucratic.

3. Methodology. Balanced Scorecard (BSC)

Traditionally, systems to measure the strategy were based on accounting and financial parameters, but new technologies and new production processes have highlighted the need for new systems for the management and strategic planning (Núñez and Alonso, 2012).

The BSC is a tool for information and control of management that has existed for decades and its use is widespread in many organizations and private companies. However, most traditional dashboards are composed of a number of indicators that are not clear the connections between them. This is why Kaplan and Norton developed the BSC after a study in several American companies in the early 90s in which highlighted the need for companies to expand the vision of creating a control systems model join financial indicators and operational non-financial aspects to achieve a balance (Kaplan and Norton, 1997).

Because the BSC has become more than a measurement system or operational tactics, innovative organizations began to use it as a strategic management system to implement the following management processes that are considered critical to success in any organization (Kaplan and Norton, 1997):

- Setting the strategy and its conversion into a concrete action program
- Establishment of the relationship between strategic objectives and measures and their transfer to employees at all levels of the organization.
- Planning, setting specific targets and adopting strategic initiatives and their communication to employees at all levels of the organization.
- Building on feedback from the strategy and development.

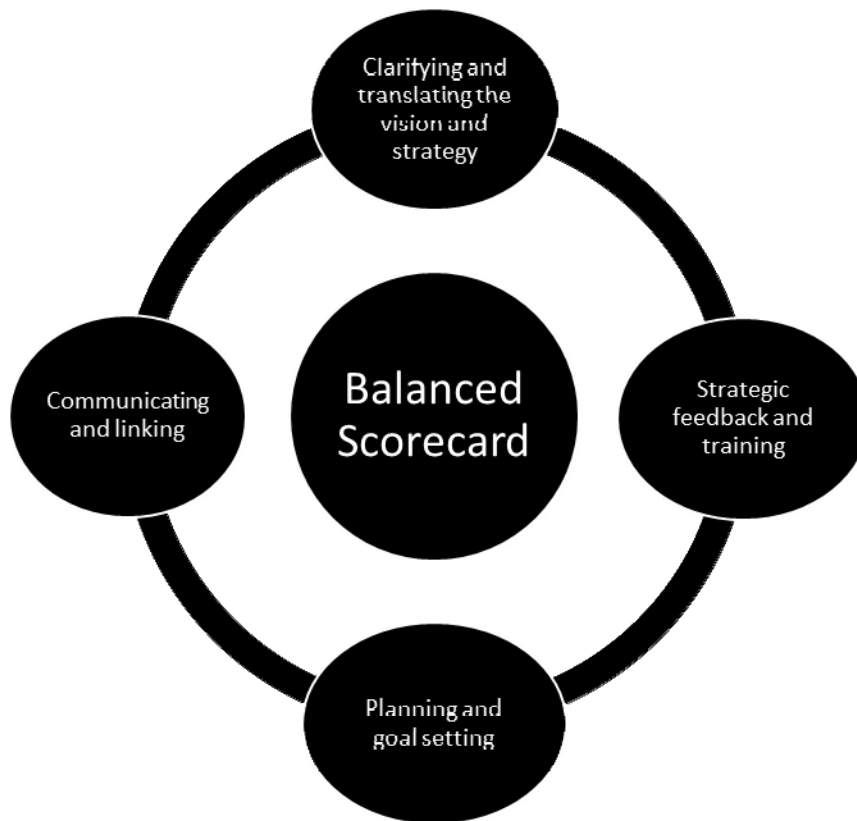


Figure 1: Using BSC as strategic management system

To get an overview of the company and strike a balance, set out to assess the performance of the company's business in four perspectives: financial / value of customers, internal processes and resources, which helped to explain the financial results and anticipate potential future problems (González, 2011). These four perspectives allow the balance between the short-and long-term, the different types of indicators, and the interests of shareholders and customers, employees and internal processes.

The introduction of the concept of strategy maps in Kaplan and Norton's book "The Strategy Focused Organization" (Kaplan and Norton, 2000) was a revolution because it can translate the vision and strategy of a company into measurable objectives and easily communicated, interconnected by causal relationships and effect, explaining the company's strategy and how it will create value. Thus, the methodology goes from being a tool of management control to a strategic implementation tool in organizations, allowing leaders to easily communicate the strategy, key organizational change behaviors, align people with the strategic objectives of the company, anticipate problems strategically allocate resources, streamline decision-making: what ultimately is maximized and strategic management of the company.

The BSC is integrated, balanced and strategic (Urrea et al., 2012). It is an integrated system that uses the four essential perspectives for viewing the project as a whole. It is a balanced system because it is essential that the strategy is clear and consistent with the indicators that have to maintain a balance between them. It is a strategic system because the objectives to be achieved must be interrelated and thus go translating the project strategy in a map of causal links.

3.1 Elements of the BSC

Briefly, the BSC it is composed of:



Figure 2: Elements of the BSC

3.2 Proposed development methodology of the BSC

According to Kaplan and Norton, the development process for any organization BSC has four main phases: planning, design, implementation and monitoring.

3.2.1 Preplanning phase

Before starting a project design, implementation and commissioning of a BSC is required prior training to all senior executives, to be sure to define the direction to follow and establish the basic concepts.

3.2.2 Design phase: content development

To design the content of the BSC, we first must clarify the mission, values and vision of the organization (Kaplan & Norton, 1997). To identify these aspects, we can ask questions to members of the teams that are established. Thus, for the determination of the mission should answer questions such as: What products or services do we offer? Why it is important that product or service, and what are intended to be or offer our products or services?, What does the company / organization to society? To determine the values, you must answer the following questions: what values advocates in their work and explain to others, and what values you as a worker brings to the company in ways that are central to his work?, The values of your Company should always keep although occasionally impair the competitiveness of the company? To determine the vision we can answer questions

such as: why succeeded in the past and what were your mistakes? Why is proud to belong to your company?, What do you expect customers, suppliers, employees, shareholders, ... of the company?, what are or will be the best skills, how can the company carrying on a business in the future?

3.2.3 Commissioning phase: integration into the organization

Once designed the BSC should be implemented in the organization, however, before operating the BSC is very important to record that all parties know it perfectly, that there is a permanent support same both physical / computer as a team. In addition, BSC should review all of the different units, areas or departments, making sure to follow the guidelines of the strategy and are aligned with each other. Finally, there must be stipulated procedures for monitoring and control and the system must be prepared to receive you data, process them and send them to different parties.

The implementation of a BSC involves changes both in the organization and in information systems. These changes may have an effect on other aspects such as budgets and incentives you need to monitor and control.

3.2.4 Monitoring phase

To continue the operation of the BSC the head has to ensure that this instrument is the tool key management control, and serve as a guide for all managers and people involved. Moreover, you should get the BSC is the tool used to strategic management in both the short and long term.

4. BSC Development for a Spanish Public University

The Spanish university system has progressed and has contributed greatly to the cultural, social and economic development. However, in these times of crisis and rapid change, it is necessary that universities are prepared to meet them from the best possible position. As the passage of time has shown, not all the problems are economic universities, although these are also very relevant. For a country like Spain, with limited natural resources, have an excellent university system is essential: "much of the Spanish economy should be based on knowledge and innovation and, in it, universities must play a dominant role" (Miras-Portugal et al., 2013).

4.1 BSC Development for School of Mines and Energy, Universidad Politécnica de Madrid

As we have seen, the development of a BSC consists of 4 phases. In this article, we will focus on the first two: planning and design.

4.1.1 Planning phase

To start developing a BSC for the School of Mines and Energy, we must first create awareness at all levels of the organization of the need for their knowledge and get the cooperation of all the groups that make up the school. We suggest conducting initial training seminar for all managers who have to make a commitment to the project as they will be those who shall transmit the information and educate the rest of the staff.

Strengths

- 100% of occupation of the places offered in June with the new grades.
- Innovation with the addition of new younger teachers.
- Specialization and differentiation.

Weaknesses:

- Curricula with little guidance to work.
- Teaching techniques are not always adapted to the means available and updated methods (poor quality).
- Practices theoretical unhelpful or insufficient.
- Accommodation of the teachers in their jobs.
- Lack of information on the life of the school, both for students and for the rest of society.
- Lack of information on all activities, resources and opportunities available to students.
- Very outdated facilities.
- Duration of the studies above planned.

Opportunities

- Research areas currently booming.
- Increased collaboration with companies.
- Reduced dropout rate in first and second grade.
- Integrating research and teaching.
- Internationalization of students and PDI.
- Cooperation between universities.
- New ways of funding.

Threats

- Excessive Regulation and difficult decision-making processes.
- Complex bureaucratic processes.
- Very tight budgets.
- Limitations to establish new funding.
- Insufficient attention to companies
- Insufficient theoretical basis for students at the beginning of the studies.
- Obsolescence in certain internal processes such publications notes on bulletin boards, insufficient use of available computing resources and outdated teaching techniques.

Once clarified the strengths and weaknesses of the school, we must know the general objectives of this institution. These can be viewed on their website and can be classified into three major groups:

- Get a quality education, whose purpose is to prepare our students to become the best professionals in the field of Energy Engineering, Geology, Metallurgy, Mining and Environmental Engineering, able to adapt to the constant changes in technology and to meet the increasing social demands.
- Support the scientific and technical development in the field of Mining Engineering, Energy and Geological through applied research projects and in line with the demands of

various industries, defined through a close relationship with companies and other agents active.

- To promote continuous improvement of the Centre, through the establishment of a quality system to guarantee compliance to assess human resources, material resources and services of the Center

4.1.2 Design phase

As seen above, to design a BSC for any organization must be clear in the first place, the mission, vision and values that govern the organization. In the case of the School of Mines and Energy these are defined and can be found on the website of the School.

Mission

Train Engineers in the fields of Energy, Geology, Metallurgy, Mining, and Environmental Engineering, providing quality educational provision that meets the challenges of knowledge and that responds to the needs of society, not only through transmission of knowledge, but to demonstrate its commitment to social progress.

View

The School of Mines and Energy is a medium-term future as a developing center within the following areas:

1. In the field of education:

- Offering graduate degrees and competitive, that respond to the demands of society and training program in line with European accreditation guidelines and other internationally recognized authorities in the field of engineering.

In the field of research:

- Promoting research activities, promoting active participation and presence of teachers and students in the research groups of the Universidad Politécnica de Madrid, in research and development cooperation programs and national and international exchange.

2. In the field of Human Resources:

- Having qualified teachers, able to connect between their teaching and research activities, projecting these achievements in training programs and educational innovation in the scientific and technology transfer and development cooperation. Also, with a staff of trained and Services Administration and renowned professional who serves as support in achieving the objectives of the school because he knows and performs its functions well and feels part of it.

3. In the field of Material Resources:

- Managing resources efficiently and promote actions that increase the sustainability of the Centre. In addition, having facilities such as library, classrooms, laboratories, work or dining rooms, among others, according to the standards of quality and safety, accessibility, occupational health and environmental friendliness.

In the area of services:

- Developing policies for continuous updating of infrastructure for teaching, research and service and incorporating cutting edge technologies and innovative programs linked to the activities of the Centre.

4. In the area of quality:

- Promoting the achievement of excellence in teaching and research through the development and implementation of improvement plans reviewed and corrected systematically.

Values

The School of Mining and Energy considered fundamental in the development of its mission the following values:

- Commitment to training and professional development of students, faculty and administrative staff and services.
- Active Respect for others, encouraging participation, confidence, responsibility, cooperation, solidarity and joint action.
- Professional integrity.
- Defense of equal rights and opportunities.
- Contribution to scientific, economic, cultural and social.
- Projecting the image of the School and the University.
- Communication between the school and its environment.
- Transparency and accountability management.
- Fostering a culture of quality policies and objectives based on known and publicly accessible.

Perspectives

In this case we use the four perspectives that we have defined for a Spanish Public University: financial / value, customers, internal processes and learning / training / growth.

Strategic objectives

From the general objectives of the School, we will define a set of specific strategic objectives related to the four perspectives that we have established:

Table 1: Strategic goals by School of Mines and Energy perspective

Perspective financial/value	F1 Improving employability of graduates
	F2 Being a school leader in teaching and research
Perspective of clients	C1 Improve the quality perceived by students [7]
	C2 Loyalty to teaching / retain talent
Perspective of internal process	P1 Promote national and international dimension of the School
	P2 Being excellent in quality teaching and research
	P3 Improve efficiency of processes and resources for the whole school cross
Perspective of learning, formation and growth	A1 Modernize facilities, resources and procedures
	A2 Promote and deepen partnerships with companies and other universities
	A3 Adapt syllabus
	A4 Encourage staff training
	A5 Improve coordination and internal communication

Indicators

For every perspective and every strategic objective we defined in Table 1, we will establish a set of indicators that will serve as tools to measure achievement of the strategic objectives we have defined.

Indicators: Financial/value perspective

Table 2: Indicators of financial/value perspective School of Mines and Energy

Objectives	Indicators
F1 Improving employability of graduates	Percentage of graduates in the workforce within 2 years.
	Percentage of graduates with work commensurate with their training before 2 years.
	Professionals in important positions / professional graduates
	Average salary of graduates
	Number of annual meetings with alumni
	Number of students hired in the company where they made the practices (if any)
F2 Being a school leader in teaching and research	Percentage of PDI with over six years
	Number of investigations conducted each year
	Number of awards given to the development of new investigations per year
	Number of international students
	Number of foreign PDI
	Number of programs in teaching and research innovation introduced / year
	Degree of implementation of innovation programs
	Number of meetings per year to establish development plans.
	Annual investment to improve the quality of teaching
	Number of subjects available in English / year

Indicators: Perspective clients/users

Table 3: Indicators perspective clients/users School of Mines and Energy

Objectives	Indicators
C1 Improve the quality perceived by students	Student surveys rating
	Dropout during the first and second year of study
	Number of surveys received by students who have dropped / interrupted their studies
	Degree of absenteeism in school subjects
	Number of Classes practices with respect to the previous year
	Total years to complete their studies / year curriculum
	Degree of integration of educational innovation projects.
	Degree of participation in the Mentor Project
	Extent of use of sports grounds
C2 Loyalty to teaching / retain talent	Number of IDPs with certificates of excellence
	Percentage PDI satisfaction surveys regarding academics and teachers
	Percentage PDI satisfaction surveys regarding work environment and working conditions.
	Teacher recruitment rate
	Degree of connection between subjects taught and research in the School

Indicators: Perspective of inner processes

Table 4: Indicators of perspective of inner processes School of Mines and Energy

Objectives	Indicators
P1 To promote the international dimension of the School	Number of pupils with stays abroad
	Number of IDPs to stay abroad for teaching and research
	Number of foreign students doing complete studies
	Number of foreign teachers.
	Number of new partnerships with institutions and universities annually
P2 Being excellent in quality teaching and research	Student surveys rating
	Ratio of students enrolled / submitted / approved in each subject
	Number of investigations with seal of excellence
	Number of references to the university in national and international publications
P3 Improve efficiency of processes and resources for the whole school cross	Development time of each process
	Utilization rate of resources in the service of PAS and students
	Number of monthly updates from the School website
	Number of documents or publications delivered to students and teachers each year.
	Rating PDI surveys of students and administration and services
	Number of meetings teacher / student and student / staff member per year

Indicators: Perspective learning, training and growth

Table 5: Perspective indicators learning, training and growth School of Mines and Energy

Objectives	Indicators
A1 Modernize facilities, resources and procedures	Amount invested in new facilities and physical infrastructure
	Amount invested in maintenance and renovation of green / common.
	Satisfaction degree new teachers / old
	Degree of utilization of available resources
	Number of complaints to the office of Quality for computer services, maintenance and audiovisual.
	Process efficiency
A2 Promote and deepen partnerships with companies and other universities	Number of new agreements with companies and universities
	Number of activities per year in conferences or seminars involving other institutions
	Number of students with internships stays
	Number of IDPs to stay in private companies
	Number of PhD students with placements in enterprises
	Satisfaction of businesses with School graduates
	Number of Cátedras. Empresa created / year
	Degree of participation in Chairs-Enterprise
A3 Adapt syllabuses	Number of professionals invited as teachers
	Review curriculum / year
	Degree of specialization of graduates
	Participation of different groups in the changes in curricula
A4 Encourage staff training	Development studies / courses through the web.
	Number of courses and seminars made by PAS and PDI
	Number of IDPs with external research grants to university
A5 Improve coordination and internal communication	Amount allocated to remuneration and incentives research
	Time spent managing administrative tasks
	Level of implementation of the management tools developed
	Number of organized recreational activities annually.

Initiatives

From general initiatives defined for a Spanish public university, we will develop and adapt to the strategic objectives of the School of Mines and Energy.

Initiatives: Financial/value perspective

- F1: Improving the employability of graduates
 - Establish effective feedback mechanisms of the labor market, both by companies and alumni. To this end, we propose the implementation of a tracking job of graduates for a period of two years (García-Berro et al, 2010).
 - Link more closely or college and encouraging greater industry collaboration of companies in all aspects of the School.
- F2: Being a school leader in teaching and research
 - Apply and encourage pioneering new techniques and strategies in teaching and research, both technological and innovative programs.
 - Increase the quality of the scientific, humanistic, and technological pedagogical teaching.
 - Supporting the achievement of presidential administrations from the PDI and economic incentives for obtaining.

Initiatives: Perspective clients/users

- C1: Improve the quality perceived by students
 - Create programs to attract teachers of excellence (externally funded programs encouraging given the university).
 - Establish standards for students remain flexible, ensuring compliance, taking into account personal circumstances (part time, work or family).
 - Reduce absenteeism certain subjects or all of them, knowing the reasons that lead to its abandonment.
 - Reduce college dropout and particularly those that are taught in the School of Mines and Energy.
 - Continue the dissemination and development of the Mentor Project, whose main objective is to obtain continuous improvement of results of acceptance and support of first year students.
 - Improve the quality and student participation in extracurricular activities. [10]
- C2: Loyalty to teaching / retain talent
 - Fully integrate the research activities of the departments of the university.
 - Performing satisfaction survey to teachers.

Initiatives: Perspective of internal processes

- P1: Promote national dimension / International School (Albert and Hernández, 2004):
 - Establish good knowledge requirements for senior English.
 - Encouraging foreign PhDs to create an open labor market, hiring college doctors after a period of 3-5 years.
 - Recruitment of staff, establishing a system of open and international contracts, reserving a quota template for providing foreign teachers salary supplements.
 - Internationalization of students favoring both temporary mobility of students own studies as full international students. This should offer classes in English and internationalize the faculty, offering at least two courses from each department in English which students can attend a very high level is not Castilian.
 - Promote the exchange of teachers and students between universities through cooperation agreements.

- P2: Being excellent in quality teaching and research
 - Is currently conducting surveys pertaining to the initiative DOCENTIA (Program Evaluation Support Staff Teaching Activity University), which evaluates the quality of teaching, guaranteed by both the quality of teachers. This program includes a self-evaluation report of each teacher and the student surveys about the quality of education received.
 - Take steps once results are received by the rector of students enrolled / tested / approved / call to prevent overcrowding of certain subjects or decompensating much difficulty between subjects of equal importance.
 - Controlling research and on excellence in each.
- P3: Improving the efficiency of processes and resources across the university transverse
 - Increasing the degree of professionalization of administrative and service staff (PAS), by improving the efficiency of selection and PAS. Introducing for selection criteria specific quality and performance.
 - Conducting surveys to all staff of the School: PAS and PDI on their satisfaction with working conditions and work environment.
 - Maintain updated website of the School with all educational activities, scientific, technological and social developed by the School.
 - Promote the use of the intranet, the website of the School and TICs.
 - Improving communication interestamental.

Initiatives: Perspective for learning, formation and growth

- A1: Modernize facilities, resources and procedures
 - Have the authority to hire, evaluate and promote staff.
 - Reorganization and restructuring of all resources before making new investments and in case they are needed, include them in the budget.
 - Establish new procedures for those processes that have become obsolete or need to be streamlined, such as publication of all grades through the "Politécnica Virtual"
- A2: To promote and deepen partnership agreements with companies and other universities
 - Encourage the implementation not only practical but also of doctorates in business.
 - Placements in enterprises to promote research professors.
 - Encourage the participation of professionals in the orientation of universities and their programs.
 - Develop ad hoc surveys among businesses and the labor market to track progress in the skills of professionals trained in the School of Mines and Energy.
 - Continue to promote Chairs-Enterprise. Currently the school has 13 Chairs-Company through establishing an ongoing collaboration between the school and certain leading companies.
 - Invite professionals to exercise as visiting professors.
 - Developing School-Business cooperative programs that allow students in college reconcile periods with periods in companies.
 - Incorporate training for entrepreneurs in university programs.

- Ensure that the school is permeable to the needs of the industry.
- A3: Adapt syllabuses
 - Further work by the specialization of the School in the areas in which it stresses.
 - Set a minimum number of students required for the delivery of a title.
 - Promote collaboration of teachers, professionals and students in the implementation and improvement of each curriculum.
- A4: Encourage staff training
 - Establish policies based incentive retraining of staff, both PAS and PDI.
 - Establish an academic culture more motivating to help and encourage young researchers and teachers to apply for grants for research on your own.
- A5: Improve coordination and internal communication
 - Intricate Reduction legal to allow greater flexibility and freedom in the management and decision-making at all levels.
 - Develop the necessary tools, both computer and procedures to improve and expedite the transmission of information between departments and between PDI and PAS.
 - Establish appropriate mechanisms to prevent the PDI perform administrative tasks they are entitled to PAS because of new technologies.
 - Develop user-friendly technology tools for all within the college to facilitate the tasks and the dissemination of academic and administrative information.

5. Conclusions

As we have seen, the Balanced Scorecard is a powerful tool for strategic management. We have developed the methodology for building this tool for any organization subsequently applying generally to a Spanish public university its entirety identifying both strategic and operational.

In this project we have focused on the design stage of the BSC to the School of Mines and Energy. This step serves to clarify the reasons for being in the school, where you're going and what you must do to achieve it. However, this is not an easy task and requires the participation of all areas of the organization.

It is understood that the model created in this project responds to a conceptual basis for the design of the BSC. It is possible that at the stage of implementation of the tool, there is a feedback that enables add or update certain parameters if necessary.

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