

Value of BI projects with Delphi Method

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Abstract

Management and evaluation of benefits in Business Intelligence projects is a recurrent and growing concern in competitive companies, although it is still a poorly explored subject.

Given this shortcoming, the focus of this work is to develop a methodical and procedural approach to do it, as well as to make available and assess the main indicators (KPIs) that can contribute to this management and evaluation processes.

This research used techniques of the Delphi method to collect and analyses data obtained from an inquiry. Questions were about indicators observed in a literature review in the area, analyzing the main methods used and known KPIs.

According to the collected answers, the KPIs collected during the study were indeed essential in the evaluation of BI projects and in particular in analyzing 4 specific factors: Innovation Characteristics, Characteristics of the Organization, Characteristics of the Environment, and Satisfaction / Effectiveness of the project with the users involved we are able to measure the success and benefits of a project with due care. Our conclusions can be influenced by some external factors difficult to measure considering the environment of the case study we explored.

1 INTRODUCTION

1.1 CONTEXT

Over the past few years, especially in the last two decades, there has been an expansion for the implementation of Business Intelligence information systems by organizations, this need being independent of business areas. The implementation of these technological systems should be aligned with all the planning, objectives, business and strategy evolution of the respective organizations. (Luftman,2000)

Taking into account the adoption and speed of adaptation with which the market is responding to these new technologies today, companies seek to be in line with the technological forefront. As a result,

the investment made by companies in IT/IS systems has increased, reaching millions of euros annually. (Ward, De Hergoth & Viane, 2007)

With this increase in investment emerges the need to perceive the benefits and the specific value that these information systems really bring to each organization. The process of organizing and managing the implementation of these systems is such that the potential benefits arising from the use of IS/IT are actually realized. (Ward & Daniel, 2012)

1.2 GOALS

Following the presented scenario and the research carried out we could understand the challenge that has recurrently been placed on organizations that seek to evolve their information systems and perceive the value of the available information. This challenge involves the development of processes that can transform information into value, generating benefits for the organization, as it is the case with Business Intelligence (BI) projects.

The implementation of such BI systems leads us to the question of how to perform benefits management in order to obtain the expected results and to frame the projects with the entire organization in order to realize if the benefits that were initially targeted were in fact effective and were effectively obtained.

This study intends to answer the following research questions: How to measure the true value of BI projects for organizations? What are the key KPIs that allow measuring the realization of the benefits of a BI project? We intend to equate a model that can be used to evaluate the benefits realized through the implementation of BI projects.

2 PROBLEM ANALYSIS

The search for benefits through information systems that analyze and process primary and secondary information of organizations is not something new. In recent years, there has been a clear tendency for companies to reinforce their value-based approach to information systems (Ashurst, 2003).

IBM Tech Trends Report (2011), an inquiry with more than 4000 TI professionals of 93 countries and 25 sectors, concluded that Business Analytics (a part of BI) was appointed as one of the four main tendencies with the highest growth in the world of TIs.

To respond to this growing demand for technological solutions that take advantage of the information that the organizations generate, great investments have been made. The Gartner Worldwide IT Spending Forecast, see Figure 3, released in January 2016, displayed an investment forecast of around \$ 3.54 billion for that year and an estimated average growth of 2.5% over the next 4 years worldwide. But it should be realized that, however great the investment is, there is no anticipated guarantee of success. This is because it is not the systems, the technology itself, the tools by themselves that ensure success, but its implementation, adoption and fundamentally good use. In this particular topic the truth is that the performance of the developed projects continues to disappoint its stakeholders (Cooke-Davies, 2000).

Companies are now seeking to have their Business Intelligence projects succeed in improving data analysis. Thus, we perceive the importance of developing tools such as the one this dissertation studies, in order to be able to take advantage of this new paradigm.

3 STATE OF ART

3.1 BI

Information Systems projects have evolved over the last few years. Many companies over the past two decades have been unable to manage data from their operational information systems in order to take advantage of them. Newer communication technologies have increased the possibilities for how people can send and receive information. Social media are one such technology that has seen increased usage as an information source, Pepitone (2010) in Westerman, Spence & Van Der Heide (2013). To take advantage of this valuable information comes the Business Intelligence (BI) systems that combine the data of the operating systems with analytical tools, aiming to improve the quality of information and the decision time of all agents responsible for decision making in organizations, See Figure 1 (Negash, 2004).

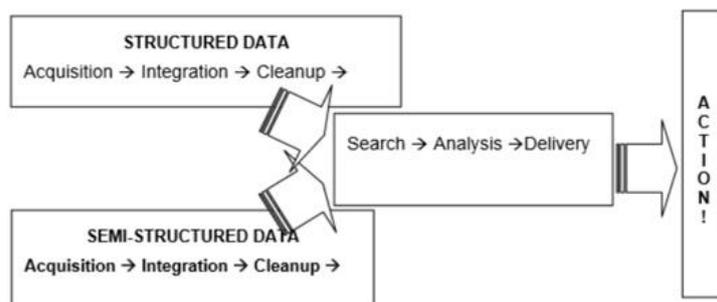


Figure 1: BI Workflow (Negash,2004)

Therefore, we perceive that BI includes a set of processes that focus on two primary activities, collecting information from source systems still in a state of low maturation, and working and returning this information, transforming it into something with value and possible to be used to support and facilitate decision taking (Watson & Wixom, 2007). Despite all these possible advantages BI projects always require a great investment by organizations. However managing and measuring the realization of benefits in a BI project has always presented many difficulties over the years.

In 1999 Premkumar & Roberts divides the characteristics of a Business Intelligence project into 3 large groups, see Figure 2.

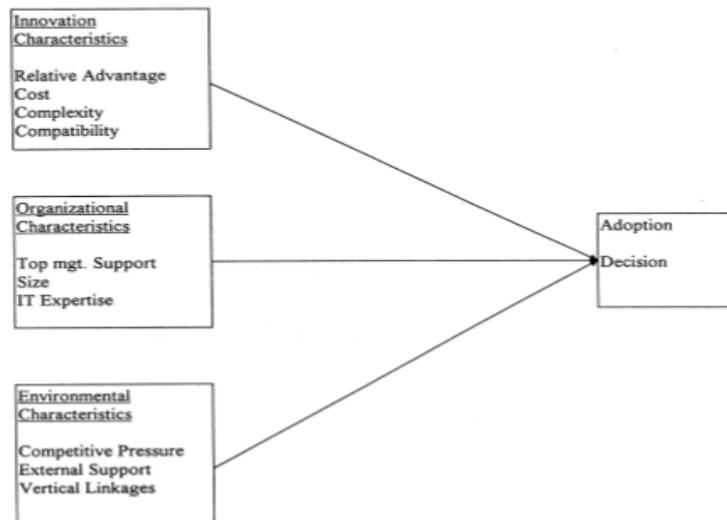


Figure 2: KPI's Indicators (Premkumar & Roberts,1999)

Inspired by the study by Premkumar & Roberts in 1999, the following list of primal KPI's was made by Hung, Huang, Tarn, Lin & Chen, 2016 to analyze the success of a Business Intelligence project.

The list of these KPIs was: Definition of the relative advantage, Cost, Complexity, Compatibility, Top management support, Size of organization, Knowledge integration, Competitive Pressure, Ability / Know How, Formation, User Satisfaction, Overall system effectiveness.

3.2 BENEFITS

Through this list of KPIs, this study sought to measure the benefits of the projects and the characteristics that were necessary to evaluate those benefits. The process refers to obtaining the expected benefits in the business through the changes brought about by a Business Intelligence project.

This process requires focus on what business benefits brought about through project-driven changes throughout the life cycle of the project(Manwani, 2008). The benefits can be seen as the delta of what we intend to achieve as compared with the current situation. For example, if what you want to achieve from a project is a reduction of employees - the benefit will be the cost saving by reducing employees (Dhillon,2000).

3.3 BENEFIT MANAGEMENT PROCESSES

In an attempt to respond to the increasing investment by companies in creating strategic and operational value through their ISs Ward et al. (1996) developed and tested a model with 5 stages of benefits management.

In order to see the dynamics of these five states (that later became 6) look at Figure 3 where we can: Identify the potential benefits, Plan the realization of the benefits, Execute the benefits plan, Review and evaluate the results and Potentiate future benefits.

In 1998 Dan Remenyi conducted a study where he described a process for the management of IS development projects. This process was concerned with realizing the business benefits of the implemented projects and was based on a principle referred to as Active Realization of Benefits (RAB). RAB process is not a conventional method of project management, where projects are usually seen as an end in itself. With RAB project management is not only provided and managed by the project management team but also by the IT department that develops it.



Figure 3: Project Lifecycle (Ward & Daniel, 2006 em Ward, De Hergoth & Viane,2007)

This method has a great openness involving all those interested parts (stakeholders) in the project and is based on a constant iteration of evaluations where all those involved are able to collaborate and express opinions.

3.4 DELPHI METHOD

The approach to any method of managing benefits requires a selected collection of adequate information.

The Delphi method is a technique that has become popular because it allows forecasting or adding advantage in decision making based on the opinion of several respondents (Landeta, 2005).

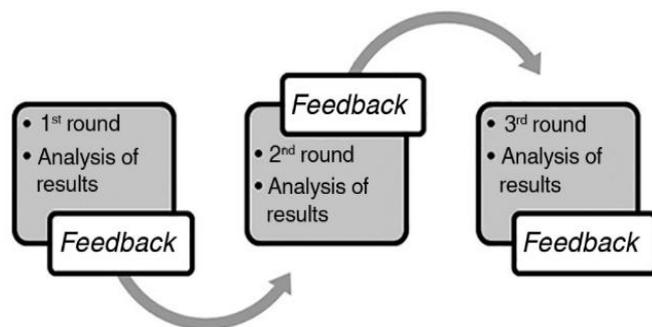


Figure 4: Delphi Method (Pereira & Alvim, 2015)

The Delphi method is a multiple-round approach that has always been widely and successfully used to gather expert opinions and to reach consensus on views of a given theme (Von Der Gratch, 2012).

Some key features of the Delphi method are repetition of rounds (the number of rounds that are defined define the number of iterations), it maintains the anonymity of participants', participants get feedback on the answers given by themselves and the other involved in an anonymous base (although this feedback may suffer limitations, by those who know the study to find the information to make relevant or not), at the end a statistical summary of the analysis is produced with a resultant intelligible of all the opinions. This and the fact the rounds promote consensus allows to decide on the actions to take.

4 METHOD

4.1 RESEARCH METHOD

The research process begun with the collection of data and information about the state of the art that allowed us to have a better idea of the works and investigations already carried out on the subject. This greater knowledge of the subject at an international level inspired decisions about how to conduct our

research and on what to research. After this we could define the core concepts that would be at the basis of our research work. So, information was gathered that allows us to formulate a method to support the collection of data and a process of analysis. To situate action, we defined a case study where we integrate all the topics to research within a real culture and organizational context.

According to Dooley (2002), the applicability to current situations and the contemporary contexts of organizational and daily life represent the main advantages of the case studies. According to Yin (2001) these singular case studies can be used to assert if a set of conclusions are being well carried out (Yin, 2005).

The collection of information in this dissertation was therefore carried out through a survey guided by a tool just developed (we were Beta users) - Welphi - that implements the Delphi method. The development of a case study was chosen as a research breakthrough because it is a flexible technique commonly used in research projects (Schell, 1992).

The approach using the Delphi method allowed the questionnaires to be evaluated with sound criteria, through a series of evolutionary interactions. This realization of several iterations fits the RAB method.

4.2 DATA COLLECTION

The sample population was referenced by an average organization (about 80/90 employees). The Organization belonging to a holding company of a large economic group, which has already developed several Business Intelligence projects. For the present case study our choice was to implement a single exploratory case study, according to the classification Yin depicted in 1993, represented in table 1.

	Single	Multiple
Exploratory	Single Exploratory	Multiple Exploratory
Descriptive	Single Description	Multiple Descriptive
Explanatory	Single Explanatory	Multiple Explanatory

Table 1: Case of Studies's Types (Yin, 1993)

Within the group of 80 individuals that make up the company, a sample of 10 company departments was selected to participate in the study. This is a sample for convenience, which means that not all individuals were selected but those relevant to the analysis to be performed. The selected data collection technique was the questionnaire. This technique is characterized by being an ordered series of questions that will be answered by the population of the sample without the presence of the researcher. A Likert scale was used to answer the questionnaire.

Likert scales are composed of a set of items in which the subject is asked to express the degree of agreement from the totally disagree (level 0 or 1) to the full agreement (level 5, 7 or 11) (Soczka , 1983 in Cunha, 2007)

This questionnaire has two key points, the first with questions that will be used to confirm the KPIs that will allow to formulate and validate which aspects should be taken into account when analyzing the benefits of a BI project. The questionnaire in the first point will be divided into groups of questions, which are supported by the KPI, a model presented by Premkumar & Roberts (1999), Characteristics of innovation, organizational characteristics, characteristics of the environment and other group based on the work of Louis Raymond (1990) On the relationship satisfaction/effectiveness. The second point will

be a fifth group which will refer specifically to the case study project. In this case study we used an online platform based on a tool already mentioned - Welphi. Over time, some academic studies have compared the effectiveness of the various methods, and the online questionnaire method was considered one of the most advantageous methods, mostly because it is not intrusive in the participants' agenda (Wright, 2005).

5 ANALYSIS OF THE RESULTS

As already stated the case study presented fits into a single exploratory case study, this exploration of singular cases is aligned with a growing tendency in the academy to recognize the isolated case as a way of providing reflection and producing relevant and Adjusted theory. For example, Kathleen Eisenhardt (Eisenhardt & Graebner, 2007) shows her consideration of the isolated case, recognizing the power of an investigation based on a single case, although in 1989, in the paper 'Building Theories From Case Study Research' - (Eisenhardt, 1989), has made the elegy of the metrics and triangulations made based on different cases. In fact, in a case, the environment and its surroundings (situated case) are defined very well, and by preceding to the analysis-reflection strategies, models and approaches can be justified.

In 2005 Yin explores the general characteristics of potential case studies from the principle that they can be single or multiple, while being either holistic (with a unit of analysis) or incorporated (several units of analysis). Our case fits In the first case.

In our study, 10 respondents answered the questionnaire in the first and second round, 1 responded to 2 groups in the first round of the questionnaire, and 2 did not respond. All responses from the 11 participants who answered the complete questionnaire were considered valid.

1st Round

For this first round we considered the responses of 11 users, out of the 13 respondents initially. It should be noted that one of the users answered only the first two groups. In order to understand the weight of each of the groups we performed the calculations to obtain the average Likert scale of each one. So we get an overview of the importance of each of the groups. In Table 2 we were able to obtain a general summary of the KPIs that highlight the characteristics of the environment, 70% answered 'Absolutely Agree' (5) and satisfaction / effectiveness, 64% responded 'Absolutely Agree' (5), such as KPIs More impact on the return value of a BI project For the organization.

Which in my opinion makes a project of B.I. Valuable for the organization?

	1	2	3	4	5
Innovation Characteristics	0,75%	4,5%	9,0%	39,33%	46,17%
Organization Characteristics	0,9%	5,4%	9,9%	39,0%	44,6%
Characteristics of the Environment	0%	0%	3,0%	27,0%	70,0%
Satisfaction / effectiveness	0%	4,0%	6,0%	26,0%	64,0%

Table 2: Own Table, 1st Round General Results(1 Absolutily Disagre, 5 Completily Agree)

The heading 'Characteristics of the Environment' is still the only one that in this first round of the method to which none of the respondents responded in a discordant way.

Rubrics such as the characteristic of innovation and characteristics of the organization were shown with more discrepant answers, being mainly dubious if the respondents consider knowing the costs that involve the project or the size of the organization as relevant factors for the success of the same.

2ndRound

In this second round, we obtained, as would be expected given the Delphi method, a greater agreement on the responses of the participants in the study, as can be seen in table 3.

O que na minha opinião torna um projecto de B.I. valioso para a organização?

	1	2	3	4	5
Innovation Characteristics	0%	2,0%	9,0%	40,7%	57,4%
Organization Characteristics	0%	2,2%	2,2%	34,4%	61,1%
Characteristics of the Environment	0%	0%	0%	15,5%	84,4%
Satisfaction / effectiveness	0%	0%	0%	11,1%	88,8%

Tabela 3: Own Table, 2nd Round General Results(1 Absolutly Disagre, 5 Completly Agree)

In Table 3 we can see the weight that the characteristics of the environment and the satisfaction/ effectiveness of the project have in the opinion of those who work with the systems and develop them is very significant.

The fact that these are the aspects that have obtained a greater consensus and which end up having greater expression among the answers of the sample of the organization chosen by us, reveals the importance that the alignment between the technology strategy and business strategy (IT-Business Alignment) has for all the actors.

Project Evaluation

After collecting the data on the most relevant KPIs for the evaluation of a project of this type, a questionnaire was carried out in order to evaluate the project developed and to be used by the organization that served as a case study.

This project, called 'Forecast Project', was a project of B.I. Developed by the IT team of the organization and was chosen due to the fact that it is used daily and transversally by 5 different departments of the company, which allowed to have a more significant sample and to make a departmental sample of the obtained results, see Table 3.

Project Evaluation					
Indicator	Disagree Absolutely	Disagree	Don't agree or disagree	Agree	Absolutely agree
1 - I feel that the project has brought dynamics to my work, allowing me to be more competitive			10%	50%	40%
2 - I got more involved in this project because I knew the cost that he had for the company		20%	30%	10%	40%
3 - I feel that the project was easy to use.		10%	20%	50%	20%
4 - The project was fully integrated into my tasks.		10%	10%	70%	10%
5 - I felt that management supported the project.		10%		40%	50%
6 - The project had the size adjusted to what was intended.		10%		60%	30%

7 - Knowledge of the tool was sufficient for success in its use.			20%	40%	40%
8 - I felt some pressure to be successful in using the tool.			40%	20%	40%
9 - The know-how within the organization was sufficient for the adoption of this project.			20%	40%	40%
10 - Does the project fulfill what it was proposed for?				70%	30%
11 - At the individual level I am satisfied with the contribution that the adoption of this project has had for my day-to-day life.		10%	10%	30%	50%
12 - Did this project boost benefits in the organization's processes?				40%	60%
13 - In general it is felt that the adoption of the project was positive.				50%	50%

Tabela 3: Own Table, Project Evaluation General Results(1 Absolutly Disagre, 5 Completily Agree)

At the end of this analysis, then we can conclude that in fact the project was a success. In the light of the data collected when the KPIs were surveyed, we noticed that the fact that we had questions about the 'Satisfaction / Effectiveness' and 'Environment Characteristics' items answered in a positive way (100% agreement on the responses to the Questions 10 and 12 and 90% in question 11) indicates a satisfaction and a level of effectiveness of the project that make it a success.

6 CONCLUSION

By analyzing the data collected in organizational contexts it is confirmed the importance of extending the evaluation of benefits to all users and project managers, which is visible through the dispersion that exists for example when analyzing the departmental responses between the top management positions and the remaining departments.

After analyzing and processing the data, this study confirms the KPIs raised by Hung et al, 2016 and Premkumar & Roberts, 1999 in published articles that defined variables for analyzing the success of a Business Intelligence project. Also the two groups created and agglutinated to these, based on the work of Louis Raymond (1990) were also confirmed.

Therefore, we analyzed the main KPIs that must be measured by the management of benefits of a project of this nature. Thus, analyzing 4 factors such as: Innovation Characteristics, Characteristics of the Organization, Characteristics of the Environment and Satisfaction/effectiveness of the users involved. Through this analysis we were able to measure the success and benefits of the project in a way that can be extrapolated to other projects.

After the analysis of the results it was verified that all the KPI's chosen and used in our investigation are essential and important in the evaluation of the success of a BI project, but there are two that stand out. These are the 'Characteristics of the Environment' 'Satisfaction/Effectiveness'. These indicators lead us to conclude that for the success of this type of projects it is essential that they meet the requirements of the user, albeit in a way necessarily aligned with the company's strategy.

In addition to the evaluation of the case under study, the importance of the method described and used was highlighted. The application of the Delphi method as an information collection and treatment methodology proved to be a useful method that allowed the results to be more precise and tangible, since the method from the first to the second round made the answers more consensual and less dispersed.

It should be emphasized that the object of focus of the work has several subjective variables, which must be duly framed as appropriate, because external factors such as the environment in which they are found may be key aspects and will have to be taken into account in the interpretation of the facts and Formulation of any conclusion. These subjective variables present themselves as limitations to the observed results and the conclusions obtained in this study, we are aware of this. But with these facts or without them, the research aims to make a contribution to the discussion and study of an area that as referred in the motivations of the work still needs to be explored and deepened.

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