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Defining KPI'S for an SME According to CMMI Dev 2 and MoProSoft

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Abstract: ***A strategy whit much growth in the technological sector is the application of business intelligence (BI) to discover relevant aspects inside of the organization, this article that is developed as a knowledge base obtained in an SME in the technology sector certified whit the international standard CMMI and the Mexican standard MoProSoft, both destined for the assurance of quality and responsible for responsible for providing sufficient information to know the indicators of the projects developed, these indicators will give way to the formulation of KPIS that will be used later in the stages of ETL, Dataware and Exploitation of information for the complete implementation of BI.***

Keywords: KPIS, BI, SME, CMMI, MOPROSOFT

1. Introduction

The Business Intelligence (BI) area arises from the needs of companies to plan their operations from past experiences and future projections; this may involve a decision-making process based on the information generated as part of the operations and the environment. BI proposes, as a strategy, the application of technology to streamline the handling of information and processing of the most relevant data of the company. The objective is to use computer tools together with strategies to discover useful information and business indicators that guide the decision-making process.

A "Key Performance Indicator" (KPI, key performance indicator) is a measure associated with the result of some key action that leads to the fulfillment of a certain objective. For example: What is the total number of customers satisfied with the product? This KPI can help measure the quality of service offered by the organization and know if there is a loss or gain of customers. Therefore, it can help detect threats in the non-compliance of the product development that generates financial losses and alerts the person to take the appropriate measures.

The KPIs are important to determine the necessary actions that lead to the success of a company given its compliance or non-compliance. To address this problem, the specific case of a SME (small and medium-sized company) dedicated to information technology (IT) sector was analyzed, in which it was decided to implement a BI strategy in order to strengthen its strategic planning and operation process. And To guarantee the success of each project developed in the company, we have two certifications both at a level 2 maturity: MoProSoft (Mexican standard for the IT sector) and CMMi Dev 2 (focused on the processes involved in the development of projects). Both certifications generate a quantity of relevant data and that is why we intend to make use of KPIs in order to detect through these two standards important data that can contribute to the growth of the company.

2. Key Performance Indicators

KPIs measure the level of performance of a given process, focusing on "how" and indicating how effective the processes are, so that the target can be achieved. KPIs are financial or non-financial metrics, used to quantify objectives that reflect the performance of an organization, and which are generally included in your strategic plan. These are overturned in the Integral Scorecard that collects and displays them, usually with a color code (red, yellow or green), providing information on compliance and not on the fixed objective. KPI's are "communication vehicles"; that allow the management of the organization to communicate the mission and vision of the company to employees, directly involving all employees in achieving the strategic objectives of the company. (ISOTools, 2017)

For an online marketing manager who has to define KPI'S for the company's website, some possible examples are presented (Gomez, 2015):

- Total number of unique visitors, analyze not only the volume but the type of traffic.
- Whether it is recurring traffic or not, it is important to know who and why you repeat a visit
- Average stay time, key factor to know if the generated traffic is of quality or not.
- Conversion percentage, if the objective is online sales or the capture of leads, we can establish KPI to measure the percentage of visitors who have "clicked".

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3. Definition of KPI's for SME

3.1 KPI`S for MoProSoft

The Process Model for the Software Industry (MoProsoft) in Mexico promotes the standardization of its operation through the incorporation of the best practices in software engineering and management. To determine KPI'S in MoProsoft you must first mention the categories that comprise it. In the company in which the analysis was carried out, there is a process area that does not establish the standard, "FINANCE", but this is essential for any decision making, according to the needs of the SME and based on the two certifications it has, to detect KPI'S in MoProsoft the following areas are taken into account.

- GN: Business Management.
- GP: Process Management.
- GR: Resource Management.
- GPY: Project Management.
- BSI: Goods, Services and Infrastructure.
- RHAT: Human Resources and Work Environment.
- CO: Knowledge of the Organization.
- GF: Financial Management.

Once the process areas to be worked under the MoProSoft standard have been determined, the templates dictated by the standard should be analyzed to determine which are the most important for decision-making. It is worth mentioning that what the norm establishes is not enough since each area manager carries out extra documents or activities to carry out the entire process. For example, the GPY KPI'S and Finance Management are presented below.
Considering the 4 business lines:

- Which of them generates more projects per year?
- What is the sales executive that generates the most opportunities for the SME?
- What are the most frequent customers of the SME?
- How much has been invested in travel expenses?
- How much was invested in payroll?
- How much is the profit of each of the projects developed in the last quarter?
- What was the money invested in the last 6 months?

These are just some examples of KPI'S for two specific areas. The values of the KPIs are determined based on the information gathered in the SME, which has been generated by the experts in the areas. In addition, from time to time the area managers of the company take some time to determine the current situation of the SME, this consumes too much time, that is why the objective of these KPI'S is to make an adequate data extraction that favors the growth of the company and solves everything that concerns. Those responsible must be able to carry out the decision making.

3.2 KPI`S for CMMI

The scheme of good practices for development (CMMI DEV) at its maturity level 2 establishes seven process areas through which the guidelines required for the efficient development of projects are established. Next, six of the process areas levels 2 are listed because they are those that are established in the organization:

- PP-Project Planning
- PMC-Project Monitoring and Control
- REQM-Requirements Management
- PPQA-Process and Product Quality Assurance
- MA-Measurement and Analysis
- CM-Configuration Management

These processes bring together the tasks, objectives and goals of the processes involved in a project to analyze and document the aspects that may arise in the course of development, whether the events that affect or benefit the achievement of objectives contemplating the different stages.

Therefore, it is necessary to control projects to obtain relevant information to detect alerts in the evolution of development and for management it is vital to know what happens in the company to be able to exercise good decision making, delimit or maintain a project.

In order to analyze the life cycle of each project under development, KPIs are required, that is, project indicators. These are obtained from the information generated in regard to the CMMI dev 2 standards, in order to obtain indicators, it is necessary to analyze each documented file in the process of developing a specific task.

The KPIs of the DMS and APE area (areas defined under the Moprosoft standard) are identified under the CMMi process areas; therefore, the analysis of these 6 areas defines that for the effective control of projects it is important to respond to the following questions:

- What is the current status of a project?
- How many complaints have been generated during the development of the project?
- What are the skills required for the work team?
- How many people are needed to develop a project?
- What type of technology worked best for the development of a specific project?
- What is the effectiveness in the execution of projects?

Some of these questions require historical information generated in successful projects of the company, therefore, it is necessary to know the documentation of previously developed projects. In this way, it will fulfill the main objective that is the implementation of business intelligence oriented mainly to the resolution of the KPIS presented in this article for both quality standards.

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4. Table of MoProSoft and CMMI relations for the SME

For the design of this table, the relationship and the information requested of each of the
Processes were studied; this will allow the extraction of the specific information of each process.

Table 1: Proposal of KPI'S

KPI´S	CMMI					MOPROSOFT										
	PP	PMC	REQM	PPQA	MA	CM	GN	GP	GPY	GR	RHAT	BSI	CO	APE	DMS	FINANCES
1. What is the profit of each of the projects developed?	X		X						X						X	X
2. Who is the sales executive that generates more opportunities?	X								X		X				X	X
3. How much was invested in payroll in the projects?	X										X					X
4. What were the total revenues?																X
5. What is the total amount of the invoices charged?																X
6. How much is invested in Memberships?																X
7. How much is invested in training?																X
8. How much was invested in incentives?																X
9. How much is invested in IMSS payroll?																X
10. How much is estimated for gifts for outsourcing partners?																X
11. How much is estimated in gifts from the CAAS collaborators?																X
12 .How much training was requested?											X					
13. How much training do the collaborators receive?											X					
14. What is the duration Period of the trainings for each of the areas?											X					
15. What is the average time to achieve training objectives?											X					
16. What is the turnover rate of personnel?											X					
17. What is the rate of absenteeism?											X					
18. What is the average time of covered vacancies?											X					
19. What is the cost and time for hiring?											X					
20. What is the Talent Retention Index?											X					
21. What is the variation of the programmed unit cost compared to the one executed?									X							X
23. How much external training has been taught?									X		X					
24. How much internal training has been imparted?									X		X					
25. What is the number of satisfied customers?		X	X	X					X					X		
26. What is the effectiveness in the execution of projects?	X	X		X										X	X	
27. What is the current status of a project?	X	X												X	X	
28. How many complaints have been generated during the development of the project?		X	X	X					X					X		
29 What are the skills that are required for the work team?	X										X			X		
30. What type of technology	X	X	X	X												

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worked best for the development of a specific project?																
31. What risk is the one that can most affect the development of the project?	X			X				X						X		
32. How many meetings have you had with the client to present progress?	X		X			X		X						X	X	
33. What is the quality of the completed project?				X		X								X	X	
34. What is the adequacy of the project to use?	X			X										X	X	
35. What is the percentage of user acceptance to the project?	X			X				X						X	X	
36. What is the percentage of project use ease?	X					X								X	X	
37. What is the percentage of development capacity dedicated to strategic projects?								X						X		
38. What has been the investment that has been assigned to new or innovation projects?								X								X
39. Which development process requires more effort on the part of: APE?	X					X								X		
40. In which phase of the project do you have more problems?	X		X			X								X		
41. What is the average effort in the stages?	X		X			X										
42. What is the project's execution time?	X					X			X					X		
43. What is the rate of activity compliance?	X								X					X		
44. What is the percentage of projects with follow-up actions?						X			X					X		
45. What is the progress in time of the project?	X	X				X			X					X		
46. What is the partial amount of the resources executed?									X							X
47. What is the total amount of resources executed?									X							X
48. What is the Budget executed compared to the budget allocated?									X							X
49. What is the number of change requests?			X						X					X		

5. Conclusions

After the extensive analysis that involved getting involved in Business Intelligence theory as a growth strategy for SMEs, there was a significant advance in the identification of proposals for the definition of KPIs, which can answer the questions that arise in the company and they can be answered through the documentation that is generated in the quality standards with which the SME has, in turn, the processes involved in the generation of that information are identified. All this is done to improve strategies and to obtain a greater benefit for the company.

References

[1] B. Marr, G. Schiuma, A. Neely, “Intellectual capital – defining key performance indicators for organizational knowledge assets”. Business Process Management Journal, 10 No. 5, 551-569. (2004)

[2] Ž. Antolić R&D Center, “An Example of Using Key Performance Indicators for Software Development Process Efficiency Evaluation” 2018, de Ericsson Nikola Tesla d.d (2014).

[3] A. Selmeci; I. Orosz; G. Györök; T. Orosz. (2012). Key Performance Indicators used in ERP performance measurement applications. IEEE 10th Jubilee International Symposium on Intelligent Systems and Informatics, 1, 43 - 48. 2018, IEEE

[4] K.Letrache, O. Beggar; M.Ramdani, “Modeling and creating KPIs in MDA approach. IEEE International Colloquium on Information Science and Technology” (CiSt), 4, 222 - 227. 2018,IEEE (2016).

[5] P.Ruivo, M. Neto, “Sustainable enterprise KPIs and ERP post adoption”, Iberian Conference on Information Systems and Technologies (CISTI 2011), 1, 1-7. 2018, IEEE (2011).

[6] www.isotools.org

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[7] Gómez "¿Qué es un KPI en marketing?" URL https://laculturadelmarketing.com/que-es-un-kpi-en-marketing/ (2015)

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