6th International Conference on Industrial Engineering and Industrial Management.
XVI Congreso de Ingeniería de Organización. Vigo, July 18-20, 2012

Evaluation of the business process management practices: an application in the company of oil and gas exploration and production

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Abstract This paper presents a group of criteria and observable variables to evaluate the maturity of the business process management practices. From the review of the literature about the attributes used by the maturity models, a group of desirable criteria and observable variables was defined to evaluate the maturity of the business process management. In the context of a case study held in a company of oil and gas exploration and production, the group of criteria and observable variables suggested was used to evaluate the business process management practices of the company. The data for the evaluation were obtained within a survey conducted with the company collaborators who had experience with business process management in the exploration and production of oil and gas. The results of the evaluation indicates that the practices related to the Process Mapping and Indicators criteria were evaluated positively and can be considered strong points of the process management of the company. While the practices related to the Process Improvement, Process Manager, People Management and Leadership criteria presented several opportunities of improvement.

Keywords: process, management, maturity, evaluation, oil.

1.1 Introduction

Especially since the 1990s, as the result of the augment of the organizations interest in the business process management, several maturity models were designed

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and improved. The main goal of an evaluation maturity model is to identify the level of maturity in the practices of business process management, in terms of the capacity of the business processes to be defined, used, managed and repeated, contributing to their results to be continuously improved (Quintella, 2007). These models use attributes to the business processes evaluation and, by the analysis of the stage in which the organization is compared to these attributes, arrangements can be taken and action plans can be designed in order to reach the excellency of the business processes.

In this context, the present paper has the goal to present the results of a qualitative research about the evaluation of the business process management practices of a large company of oil and gas exploration and production in relation with a group of criteria and observable variables for the evaluation of the maturity of the business process management.different ways to improve their results, either by reducing cost and investment.

1.2 Literature Review

The bibliographical research aims to identify the attributes used by the main-evaluation models used to evaluate the maturity business processes in the literature. This study sought to explore the full potential of the bibliographic database available and the tools of the information technology for its treatment. The next items will present the main results of the literature review.

1.2.1 The main models to evaluate the maturity

The first maturity model mentioned was developed by Crosby (1985) and was called the "Quality Management Maturity Grid" (QMMG). For its generic nature and intrinsic structure of evolution, the Crosby (1985) model became reference for several maturity models (Valadares, 2001). The main principles were adapted by SEI (Software Engineering Institute) to develop the CMM (Capability Maturity Model) to evaluate the software development processes.

Based on the CMM, an abundance of models guided to the measurement of the maturity of the process management were launched. The main models identified in the literature were (CIP E&P, 2009):

- Maturity models for Quality Management
  - QMMG (Quality Management Maturity Grid)
- Maturity models for Software Process Management
  - CMMI (Capability Maturity Model Integration)

- Maturity models for Business Process Management
  - PEMM (Process and Enterprise Maturity Model)
  - BPMM (Business Process Maturity Model)
  - CEMO (Checklist for Evaluating the Maturity of an Organization/Process)
  - BPOMM (Business Process Orientation Maturity Model)
  - BPMM (Business Process Maturity Model)
- Maturity models for Management Projects
  - OPM3 (Organizational project management maturity model) – PMI (2008)
  - PMMM (Project Management Maturity Model)
- Maturity models for the Chain of Supply Management
  - SCOR (Supply Chain Operations Reference).

1.2.2 Criteria for the maturity evaluation

Among the ten models identified in the literature, four were selected to serve as base for the definition of the criteria for the evaluation of the business process management maturity: the CMMI, the PEMM, the BPMM and the BPOMM. These models were selected because they have a clear set of attributes for the specific evaluation of the business process management.

From the analysis of the attributes used by the four selected models, were defined six criteria for the evaluation of the maturity for the business process management Process Mapping, Indicators, Process Improvement, Process Manager, People Management e Leadership.

1.3 Methodology

In this item will be presented phases of research. The universe of the research is defined and the procedures to select the sample and the data collection are presented, the instrument for data collection and the profile of the respondents. Next will be explained the procedures used to the treatment and analysis of the collected data.

The research was divided into four stages. During the first stage was made a bibliographical research to identify the attributes used in the main maturity models and to define a group of criteria and observable variables to evaluate the maturity of the business process management. During the second stage, from the defined criteria was created a research instrument to evaluate the business process management practices of a large company of oil and gas exploration and production.

During the third stage, initially was applied a pilot test with the purpose to evaluate the research instrument and make the final adjustments needed. Next was selected a sample and was performed a data collection. Finally the data collected were processed and treated statistically, was performed an evaluation of the validity and reliability of the constructs and was presented the synopsis of the data, using simple statistics, together with a descriptive synthesis of qualitative nature.

1.3.1 Universe of the research and sample

The main goal of this research was to collect information about the perception of the collaborators of the company in relation to the practices of business process management. The studied universe was defined with the group of collaborators of the company.

After the definition of the universe to be researched, the procedures to the selection of the sample were defined. In this study was chose a non-probability convenience sample, because was used the database of the process management area of the company, in other words, only the members of this base had the opportunity to participate of this research. The size of the sample was set at about one hundred and sixty two respondents, which correspond to the collaborators, with the knowledge of the process management practices in the field of exploration and production of oil and gas indicated by the leadership of company.

1.3.2 Research Instrument

The research instrument was elaborated from the defined criteria for the maturity evaluation of the process management and can be found at CIP E&P (2009). It was used to collect data about the perception of the collaborators related to the process management practices of the large company of oil and gas exploration and production.

The research instrument was divided into criteria and observable variables and, before its implementation, was adapted to the reality of the company. The research instrument has six criteria and forty three observable variables.

1.3.3 Respondents profile

The field research was held during the action of the authors of the Research Project in the CIP – Centro de Inovação e Produtividade (Innovation and Productivity Center) – in the Performance Evaluation Pillar (CIP E&P, 2009), particular-

ly in the perception of the business process management practices and the business process maturity evaluation inside a large company from the segment of oil and gas in Brazil.

The profile defined for the respondents was: collaborators with experience in applying the business process management practices in the exploration and production of oil and gas area. The company leadership provided one hundred and sixty collaborators with experience and knowledge in the application of the business process management practices to answer the questionnaire.

1.3.4 Gathering of data

In this study the gathering of data was chosen through a questionnaire available in the company's intranet. The instrument was provided in the intranet and all the respondents received an email inviting them to participate in this research.

The instrument was divided in two parts. The first one had as an objective the gathering personal data of the respondent. The second part had as an objective the gathering of respondent opinion in relation to a set of affirmatives related to the process management practices in the company.

The measurement scale used in the second part of the instrument was Likert's, with five points that goes from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). The scale was chosen because it is the most used in this type of research, because it reflects the variability of the values that result from the scale, and because it has greater reliability as it permits more options of answer as well as the possibility to determine the percentage of the positive and negative answers on the aspect evaluated.

1.3.5 Data processing and analysis

In this phase was possible to verify the impact of the missing data and of the extreme values and to evaluate the compliance with the premises of multivariate analysis, to ensure the validity of the results obtained.

The analysis process of the data was performed in three stages. In the first stage the collected data obtained in the pilot test were verified with the purpose to achieve an initial analysis of the understanding of the affirmatives and the evaluation of the reliability of the constructs.

In the second stage was verified the validity and the reliability of the proposed criteria.

In the third stage the results of the evaluation were presented using simple statistics, together with a descriptive synthesis of qualitative nature.

1.4 Results

In this item will be presented the main results of the evaluation. The results related to the data treatment and the evaluation of the reliability and validity of the criteria can be found at CIP E&P (2009).

The percentages presented in the Table 1.1 indicate the Agreement Degree (AD) that is the sum of the percentage of the respondents that selected the options "Agree" and "Strongly Agree".

The results were classified using the following percentage ranges: 80 - 100 % (Excellent); 70 - 79,9 % (Very Good); 60 - 69,9 % (Good); 50 - 59,9 % (Regular); 40 - 49,9% (Bad); and Below 40 % (Very Bad).

Table 1.1 Attributes used by the evaluation models of the business process management maturity

Criteria	Observable Variable (OV) – AD – Rating
Process Mapping	Average – 51,8% – Regular
Indicators	Average – 53,2% – Regular
Process Improvement	Average – 47,3% – Bad
Process Manager	Average – 49,9% – Bad
People Management	Average – 27,9% – Very Bad
Leadership	Average – 42,4% – Bad
	Average Geral – 47,16% Bad

The respondents made an overall negative evaluation of the process management practices of the company (overall average of the six criteria evaluated = 47,2%), result considered Bad.

Following will be presented the results of the evaluation of each one of the criteria evaluated.

Process Mapping

In this criteria the company had a positive evaluation (overall average of the observable variables = 51,8%), result considered Regular. From the results obtained in relation to these criteria, it can be concluded that the company clearly identified its processes and the collaborators can describe how they operate. However its IT systems aren't aligned with its processes and its process models, despite the fact that they were defined, they still weren't disseminated through the whole company, and weren't used for the definition of their priorities.

Indicators

The company obtained its best result in this criteria (overall average of the observable variables = 53,2%), result considered Regular. From the obtained results in relation to this criteria, it can be concluded that the process indicators from the company derivate from its strategy and its collaborators know the process indicators with which they work directly and use these indicators to measure the effi-

ciency and efficacy of the processes. However the indicator used don't seem to accomplish the the purpose for which they were created.

Process Improvement

The evaluation of this criteria was negative (overall average of the observable variables = 47,4%), result considered Bad. The results of the evaluation of this criteria practices reveal that the company uses regularly the teamwork in the organization and in the process improvement initiatives. Its collaborators have the habit to provide suggestions for the improvement. However the company hasn't adopted a methodology for the analysis and the process improvement. In the company there isn't a formal process for the capacitation in process management, mostly in improvement techniques and in tools to resolve problems.

Process Manager

In this criteria the company had a negative evaluation (overall average of the observable variables = 48,9%), result considered Bad. From the obtained results in relation to this criteria, it can be concluded that the process managers are engaged in the process improvement, have authority over the processes, participate in the allocation and validation of the personnel that work in their processes, evaluate, update and disseminate the results to their collaborators. They also use these results to detect performance flaws, identify and document their processes. However they don't have autonomy to assign the improvement teams of their processes, aren't formally nominated by the leadership, don't use comparative references of the processes with the strategic goals of the company and don't have control over the alteration projects and over the allocated budget for their processes.

People Management

The company obtained its worst result in this criteria (overall average of the observable variables = 27,3%), result considered Very Bad. The results of the evaluation of the practices revealed that the company doesn't do the definition of roles, the description of the job and the competency profile according to the process mapping. Its people management system doesn't consider the needs and the results of the process and doesn't use the formal mechanisms for the retention personnel specialized in process management.

Leadership

In this criteria the company had a negative evaluation (overall average of the observable variables = 42,4%), result considered Bad. Although the company recognized the need to improve the process performance and to promote the process management, it doesn't provide support for these initiatives and the process management is not one of its basic attributions. The leadership sees the process management as only a project, not as a definitive way of business management. It doesn't have a process office established to coordinate and to integrate all the process management projects of the company.

1.4 Conclusion

This paper presented a group of criteria and observable variables for the evaluation of the maturity of the process management business process management practices.

From the literature review about the attributes used by the maturity models, were proposed six criteria and forty three observable variables for evaluation. The group proposed was used for the evaluation of the business process management practices of a large oil and gas company.

The practices related to the Process Mapping and Indicators criteria were evaluated positively and can be considered as strong points of the process management of the company. However the practices related to the Process Improvement, Process Manager, People Management and Leadership criteria presented several opportunities of improvement.

The main limitation of this paper concerns to the fact that there may be other characteristics that were not included in this study.

As guidance for future researches related to the present theme, it is suggested the statistic validation of the group of criteria and subcriteria proposed in other organizations that are recognized by their excellent practices in business process management.

1.5 References

CIP E&P (2009). *Relatório de atividades/produtos do Núcleo de Avaliação de Desempenho. (Tech Rep. No. 1)*. Brasil, Rio de Janeiro, Universidade Federal Fluminense, Núcleo de Competitividade Estratégia e Organização.

Crosby, P. (1985). *Qualidade é investimento*. J. Olimpio: Rio de Janeiro.

PMI (2008). *Organizational Project Management: Maturity Model (OPM3)*. Knowledge Foundation.

Quintella, H. and Rocha, M. (2007). Automotive product development process: comparing and evaluating the maturity level. *Revista Produção* 17 (1), pp. 199-215.

Valadares, A. (2001) *Modelagem de Processos para implementação de Workflow: avaliação crítica*. Unpublished thesis (MD), Universidade Federal do Rio de Janeiro.