A Method to Evaluate Business Process Conceptual Models. A Study Case

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Abstract

The business process conceptual models present a global vision of the organization. It allows to better understand the enterprise's dynamic and its internal relations and with its environment. The business modeling is the main technique for aligning the development with the enterprise goals. In this context, the models have a fundamental role in the business process specification. For this reason, it is important their quality for helping to improve the performance and organization evolution. This characteristic is relevant in order to avoid that they be a risk factor. Taking into account the characteristics before mentioned, a method to evaluate business process conceptual models is proposed. The goal is to provide to the organization an approach to help them to study the business process quality. This study is carried out taking as point of view both their understandably and their adaptability to the changes.

Key Words: *Business Process – Evaluation of Business Process Conceptual Models – Conceptual Models.*

1. Introduction

The complex nature of business processes had generated several proposals and studies concerned with aspects like: Usefulness [1], Quality Evaluation [2] or Measurement [3]. In this context, the studies related with: the using of several tools and languages to model business processes (BP) are frequents [4,5,6,7]. The main motivation to do some researches in this area is twofold. On the one hand, the wide variety of notation and languages to model, define and execute BP. On the other hand, for providing an approach to compare BPs conceptual models to improve their quality. The using of Business Process Models (BPM) allows the organization to have a global vision. This vision makes possible to better understand the enterprise dynamic and both the internal relations and with its environment (clients, providers and service providers). For this reason, BPM is the more adequate technique to aligning the developments with the organization goals. If the model is built with the consensus of all interested groups, then the success possibilities will be increased. The conceptual model development is an important part for carrying out the BP implantation. However, it is a main task in the first phases of BP life cycle. They are used as tools or mediums for allowing the participants to easily understand the processes represented. Furthermore, they are employed as starting point when the BPs are adapted to the new enterprises need. For this motive, it is primordial that both the understandability and adaptability of these models be high quality. Two kind of quality must be distinguished when the topic of conceptual modeling is studied. The first, Product Quality, is concerned with the conceptual model characteristics. The second, Process Quality, refers to how the models are developed [8].

As Moody say in [9], it is fundamental that all evaluation proposals follow standards. These standards must be widely accepted and it must be proved that they can be applied in real cases. Particularly, Moody proposes that the models must be consistent with the standards ISO 9000 [10] and ISO/IEC 9126 [11]. It is due to that conceptual model is a particular kind of product (ISO 9000), and the norm ISO/IEC 9126 considers the conceptual models as information system models. The conceptual model complexity can be influenced by their components (tasks, sub-process, participants, events, etc.). Therefore, it is not advisable to define a general measure for its complexity [12].

Rolón in [13] proposes a set of quality metrics for Business Process Conceptual Models developed in BPMN. These metrics are based on the measures proposed by García Rubio en [14] for software process quality. From this point of view, the methods for measuring the conceptual model quality improve the administration, diffusion and maintenance of the processes. Within this context, the quality requirement evaluation process of BP conceptual models is very important. Therefore, it is relevant elaborating a quantitative method for evaluating and comparing the desired characteristics of the model. This method must be based on the principles and practices of Software Engineering. This is because they allow obtaining impartial and justifiable results.

In this article, a method for evaluating BP with the characteristics aforementioned is proposed. The goal is to help enterprises make decisions when they want to evaluate the quality of their BPMs. The results of this task are useful for: i) Analyzing new process models and ii) Evaluating the impact of changes in the models. With the goal to define the proposal described in this article several methods of analysis and evaluation of systems were analyzed. As result of the study before mentioned the LSP method (Logic Scoring of Preferences) was selected.

This method can be applied to different real life situations. Furthermore, it was developed to support logical operators observed in the human reasoning

[15]. The particularity previously mentioned is fundamental for the BPM evaluation. It is due to both the reasoning reflected in the model and the developer's judgments are important. LSP is a method highly used, for experimental trials, by the research group ([16,17,18,19]). This peculiarity and the observations done in the precedent paragraph allow deciding to use LSP for developing the evaluation model proposed in this article.

The article is organized as follows. Section 2 explains the method proposed. Section 3 describes the method application to a specific study case. Finally, section 4 expounds the conclusions and future works.

2. The Method: MEBPCM

MEBPCM appears as a response to the organization requirements of having a medium to: (i) Represent efficiently the BPs and, (ii) Communicate and interact with other process either themselves or the other organizations. The method goal is to help the designers, analyzers and developers, involved in the definitions and the modeling of BP of the organization, to obtain BP with high quality. Along the method phases, the more relevant and frequent characteristics of BP are determined, grouped and analyzed. These characteristics are reflected on a structure that allows us to study the extent to which models satisfy them. Taking into consideration the affirmations described in the precedent paragraphs, the elementary criteria are defined. These criteria are used to measure the satisfaction degree of the individual characteristics considering the evaluated models. In order to obtain the global evaluation, the elementary criteria are combined. This process is carried out until obtain an unique indicator which represents the global satisfaction of the elementary characteristics. Finally, this indicator is employed to: Achieve the result analysis and delineate the corresponding conclusions.

2.1 The Method Phases

The method proposed has four phases clearly differentiated. These phases describe from the quality establishment of the requirements until the result analysis. A description of each phase is accomplished below.

1. Determine and Specify the Wished Quality Requirements: This phase is concerned with the requirements determination process by using a strategy. This strategy is part of a base structure which contains characteristics and properties. The structure must be extended in order to satisfy and include all the aspects of interest. In other words, the activities aimed at determining the artifacts and characteristics that the BPM should be able to represent are included. It is to represent the requirements of the users interested.

In this phase a tree structure is obtained. This structure reflects the characteristics and sub-characteristics that all BP should be represented. By way of explanation, the requirements that BPMs must have and the main attributes to evaluate are determined.

With the purpose of building an exhaustive list of requirements, it is necessary to carry out a hierarchical decomposition process. Initially, the more important requirements group is defined. Then, through successive decompositions, each group is decomposed in subgroups. By repeating this process a Categorization Structure of the System Requirement is obtained. In this structure, the leafs represent the Elementary Requirements. According to the exposed before, a study of the basic characteristics that all BPM must have was accomplished.

It is important to remark that to build this structure, the characteristics found in the literature [20, 21] and the analysis of several BPMs proposed in [22, 23] were considered.

From this study a structure was built. This structure, depending on particular needs of the process under modeling, can be used as base to elaborate a complete structure for characterizing a particular problem (see Figure 1).

1. Tasks/Activities
    1.1. Simples/Atomics
    1.2. Composed/Subprocess
2. Synchronization Points of the Execution flow
    2.1. Decisions Points
    2.2. Join Points
    2.3. Division Points in Parallel and/or Concurrent Execution
3. Events
    3.1. Starting Events
    3.2. Intermediate Events
    3.3. Final Events
4. Participants/Actors
    4.1. Internal
        4.1.1. Participants/Actors Number
        4.1.2. Communication between Participants/Actors
    4.2. External
        4.2.1. Participants/Actors Number
5. Resources
    5.1. Produced in the Process / Generated (Internals)
    5.2. Externals

Fig. 1. Categorization Structure of the elementary requirements

The structure proposed in the method is not static. It is open to both the technological changes and the changing management enterprises policies.

Furthermore, depending on the particular characteristics of the domain under study, the proposed structure can be modified and adapted. This process is carried out to include the preferences for evaluating the characteristics before mentioned. It allows to get a better evaluation of the models analyzed.

2. *Define the Evaluation Elementary Criteria*: In this phase the criteria for evaluating the attributes established in the requirements structure are defined. Each elemental requirement is transformed into a Elemental Preference by applying the corresponding Elemental Criterion. A Elemental Criterion is a function aimed at transforming the values of elemental requirements, obtained from the reality observation, in values inside the interval [0,1]. These values are named Elementary Preference, and they represent the satisfaction level of the requirements, where: 0 indicates that the requirement is not satisfied, 1 indicates that the requirement is totally satisfied and the intermediate values express partial satisfactions.

The appropriate election of these criteria is fundamental when to determine the precision level and the usability of the evaluation model is wished [24]. The requirement structure decomposition process finalize when the elementary requirement can be evaluated. It is important to notice that each elementary requirement must be evaluate by the corresponding elementary criterion. So the possibility of introducing the elementary criterion is analyzed in each step of the structure decomposition. An elementary criterion can be organized in several ways. For this reason, it is important the election of the more appropriate type for each elementary criterion. It is due to this election allows the evaluator to reach the wished level of completeness and correctness of the total complex criterion. There are several types of elementary criteria having presents the precision, scope and usability. They are classified in:

(i) *Absolute Criteria:* They are used to determine the absolute preference of an attribute no related with indicators of other systems.

(ii) *Relative Criteria:* They are employed when two or more systems are compared. In this case, it is necessary to establish relative indicators for doing the comparison between different systems.

Figure 2 shows a proposal for the definition of two elementary criteria for two variables of preferences. These variables belong to the requirement structure presented in Figure 1. For the definition of these criteria a set of metrics, defined in the literature, aimed at evaluating the BPM defined in [13] was used.

Elemental Requirement: Simple/Atomic Tasks **Elemental Criteria:** $C_{1.1}(m_p) = \begin{cases} 0 & \text{if} \quad TNT(m) = 0 \\ 1/TNT(m) & \text{if} \quad TNT(m) \neq 0 \end{cases}$	**Elemental Requirement:** Intermediate Events **Elemental Criteria:** $C_{3.2}(m_p) = \begin{cases} 1 & \text{if} \quad NEint(m) = 0 \\ 1/NEInt(m) & \text{if} \quad NEint(m) \neq 0 \end{cases}$
Where:	
-TNT(*m*): Total tasks number of the model *m*	-NEInt (*m*): total number of Intermediate Events that occurs during de modeling process in m
Elemental Criteria $C_{1.1}$ (*m*): Model complexity related to the simple tasks. The greater the number of tasks, the more complex the model will be, and therefore the harder to understand and adapt to new changes, so the larger the value of TNT(*m*), the closer to 0 the relation 1/TNT(*m*) will result. If the model does not have elemental tasks the criterion returns 0 since the tasks absence will not provide any information about the process.	**Elemental Criteria $C_{3.2}$ (*m*):** Model complexity related to the intermediate events number. The greater the number of events, the harder to understand the model will be. If the model does not have intermediate events the criterion returns 1 because the absence of these events reduces the model complexity since the causes and consequences that could be generated in the modeling process execution flow must not be analyzed.

Fig. 2. Examples of Elementary Criteria defined for the structure proposed in Fig. 1.

3. Define the Aggregation Structure for the Global Evaluation: From the requirements and the elementary criteria defined in the first method phases, a strategy to aggregate these elementary criteria must be established. In this way a global criterion is obtained. This criterion is the global preference and it indicates the requirement satisfaction level of the model under study. This process is based in a system of sophisticated continuous preference logic operators. These operators have a high expressive power to model most complex logic relations. These relations exactly reflect all the user requirements. Hence, from the combination of elementary criteria into a preference aggregation structure the global preference is obtained. This structure is a model that represents a complex criterion. The global preference E indicates the global rate of fulfillment of the established requirements. The aggregation structure construction process represents the more complex phase of the evaluation. In this process it is necessary to have in mind the final user requirements.

The Global Preference E is the result of the combination of Elementary Preferences. This combination is done having into account: the relative importance of each one of them and the logic relation between them. This logic relation includes the weights and operators available in the logic of Continuous Preferences [25]. These operators encompass a range between Pure Conjunction (C) and the pure disjunction (D). The range between C and D can be covered by a sequence of preferences continuous logic operators placed equidistantly: C, C++,C+, C+-, CA, C-+, C-, C--, A, D--, D-, D-+, DA, D+-, D+, D++, D. Each operator has associated a specific value of a parameter r [25]. This parameter is used to adjust the desired logical properties of the functions. As a result of the aggregation function combinations, according to the evaluator preferences, a tree structure is obtained. This structure is used to compute the global indicator. Once built the structure, each system can be evaluated. In this point, the model must be provided with the inputs required. Those inputs correspond to the preference variable values. With these values the global indicator E_0 of each system is computed. It is important to remark that in the elaboration of criteria function is important the final user participation. This approach gives the final expressive power for a precise modeling of the user's needs, who defines what is going to be evaluated.

4. Production of Final Report: Analysis and Documentation of the Results Obtained: This is the method final phase. In this phase an analysis and comparison of the evaluation results must be carried out. This task is accomplished considering the elementary, partial and global preferences calculated in the method application. Furthermore, both the evaluation process and the collected results must be documented. In this way, the documentation can be useful, for future evaluations also as reference and historical evolution of the BPM analyzed. This documentation can also be employed as reference and comparison point when new models and BP need to be evaluated. This phase is concerned with activities like: analysis and comparison of elementary, partial and global quality preferences and the fundamentation of the results achieved. This phase finalizes with the conclusions and recommendations obtained. It is the most relevant phase of the method. So, it is useful that the information compiled, during the method application, be reflected in structures and representations easy to understand. From this perspective, a form is proposed which must be fill out each time a evaluation is accomplished. This form allows, between other things, to have present: which are the criterion functions used, if they were defined by the evaluation group or if other functions, stored in an specific repository, were employed. Furthermore, the data of both models and evaluators are recorded. If exists previous evaluations the references to them are included in the form. These references are useful to analyze and to evaluate the models evolution. Finally, it is included a field where a result analysis report can be presented. The form structure is not presented in this article for reasons of space. Nevertheless, Figure 5, of section 4, shows the form application used to the study case described in this work.

3. Study Case: A Local Enterprise

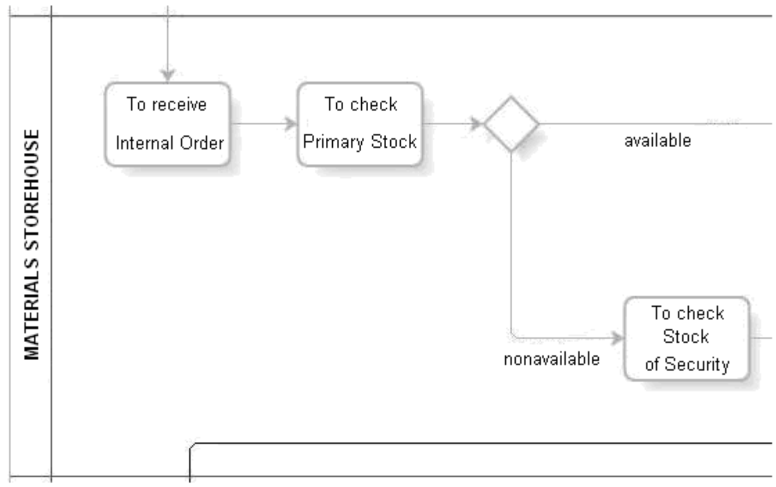
To show the theoretical and practical usefulness of all methods is a primordial aspect. In this sense, the proposed method was applied to the evaluation of BPMs of a local enterprise. This company pretends to get a competitive position in the labor market. In this way a first practical assessment centered with the method applicability was obtained. In the study done with the Enterprise management was possible to detect that the problem was the *line stop*. It is due to both the lack of the raw material stock and the deficient communication and coordination between different sectors. Once established the enterprise problems, the method application was scheduled. The main goal was to find an optimal problem solution. In this context, it was possible to work with some BPMs of the organization. These models were specified in BPMN.

The main problem according to the management is concerned with the Purchases and Payments process of the organization. Having into account the observation done in previous paragraph, the model of this process was analyzed in order to determine if it modeled the enterprise needs. The management priority was to find the solution to the Interrupt of Order Cycle. With the purpose of proportionating the best product at the minimum cost and at the less time, a new BPM written in BPMN was developed. In this model some possible modification are proposed with the goal of giving a solution to the problems.

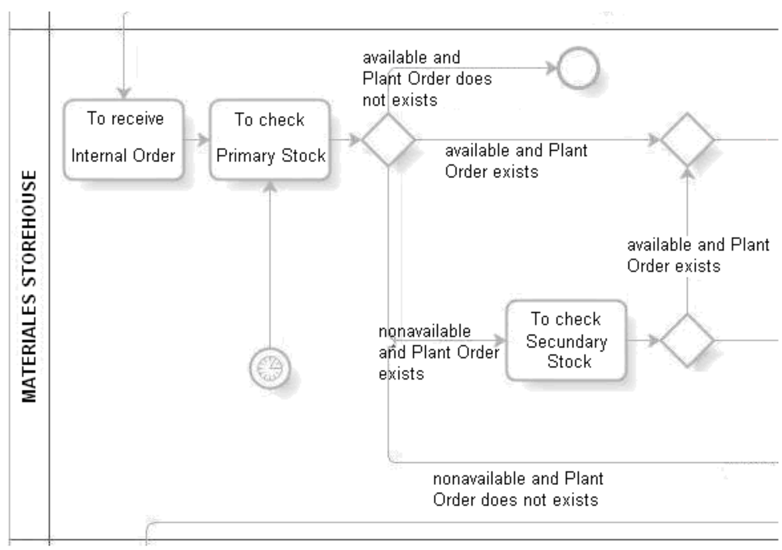
With the purpose of elaborating the model, relevant information provided by the enterprise was used. From this information was detected that: When the line of production has not raw material, an order to the company store was done. Just only in this instant the control of the raw material stock was carried out. If there was raw material, the required amount was sent. However, when the order cannot be satisfied, in that instant, the raw material was purchased. It generates an important waste of time due to that the production line is stopped when there is not raw material. Figure 3 shows a piece of the initial model of the organizational unit: Material Store (Figure 3.a) and its differences with the new model (Figure 3.b). In the original model, the stock control was carried out when a requirement is received from the plant. In the new model, this control is periodically accomplished as it is possible to observe in the Figure 3.

3.1. Application of the Method to the Evaluation of the Proposed Models

Once the models were obtained and the problem was established, the method was applied. The main goal was to determine if the models meet the quality criteria that all BP conceptual model must to have.



(a)



(b)

Fig. 3. Piece of Process Model of Purchase and Payments: (a) Initial Model – (b) Proposed Model

3.1.1. Determine and Specify the Desired Quality Requirement

In the first method phase the requirements to evaluate were defined and analyzed. In this sense, the basic requirement categorization structure proposed in the method was applied. It is because the goal was to evaluate if the models meets the quality requirements for BPM. In this first phase of the study case analyzed no adaptation was carry out in the basic requirements structure. It is due to that no typical element of the study case was considered (See Figure 1). As the models were analyzed, it was possible to observe that the resources and their distribution between the BP participants were not represented. Owing to the problem presented by the management was not necessary to include an analysis of the resources used; it is possible to delete the item 5. Resources. However, it was held because the resources representation it is important to comprehend the process. Therefore, keeping this information improves the model quality.

3.1.2. Definition of the Evaluation Elementary Criteria

Once determined the requirements the elementary criteria associated with the preference variables, obtained in the aggregation structure, were established. In this way, the elementary preferences of the elementary requirement were obtained. For the global evaluation of the models, the elementary criteria proposed in the method were employed (Figure 2 shows two examples of these criteria). These criteria are based in a set of metrics for BPM extracted from the literature (For example from [13]) and other metrics defined for measuring particular characteristics.

3.1.3. Definition of the Aggregation Structure

Once defined the elementary criteria, the aggregation structure was built. In order to achieve this task, both the mandatory process model properties and the typical enterprise properties were taken into account. For example, the importance of resource representation has lower weight than the other characteristics. It is because for the enterprise the resources' influence and their distribution is not interesting in this phase. For its construction a association between the preference variables and the logic aggregation functions must be done. This aggregation must be done by linking the variable more related; so the partial results, for the evaluation of the more general characteristic, are obtained. The aggregation function links the variables through *andor* operators. They include from Pure Disjunction (D) to Pure Conjunction (C). The intermediate values (D++ to C++) represent evaluations where the value absence is compensated by the presence of others. This compensation is higher while the operator is closer to the pure disjunction. The opposite case appears when the operator is closer to the pure conjunction. Hence, at the first aggregation level, the variables involved with the elementary preferences of each general category are related. The logical operators were selected bearing in mind the relevance degree of each elemental preference. It is to say, situations such as: if a requirement is mandatory or if it is desirable but its absence does not influence enough in the model valuation.

For example, the elementary preferences 1.1 and 1.2 are important when the understandability and clarity of the models must be evaluated. However, the absence of simple tasks can indicate that the model represents the high level vision of the process. In this case, each task in the model represent a sub-process, therefore this characteristic must not influence in the model assessment. The absence of complex tasks (sub-process) indicates that the model is representing to the process at the lowest level. This characteristic must not be dismissed. So these variables were unified by using the operator D-+.

Taking into account the weight assigned, it is possible to say that the simple tasks were considered the most important. It is due to they indicate the decomposition lower level. This means that the model provides all the information needed about the process. This information is important because it allows perceive that it is not necessary to inspect other process models.

In the same way the other elementary preferences were analyzed. They were grouped considering their relations. Then the logic operators were selected, this task was carried out by following the analysis described in the precedent paragraph. With respect to the aggregation levels, the same approach was used, i.e. the general requirements were grouped between them.

The other aggregation levels were grouped following the approach before mentioned. In this way and by observing the Figure 4, it is possible to see that the characteristics 1, 2 and 3 were aggregated by using the operator C-. It is because they determine both the task to do and the flow where they are executed.

The conjunctive operator was selected because these elements are important when the process, that the model represents, needs to be analyzed and evaluated. As consequence, the model will be better understood.

At the next aggregation level the characteristic 4 was aggregated. This characteristic indicates the persons that accomplish the tasks.

To know the task responsible people is critical. Thus, it is important that the BP model reflects this particularity clearly. For this motive, for its aggregation, a conjunctive function was also used. This aggregation was accomplished with the branch corresponding to the task flow valuation.

Finally, in the characteristic aggregation 5 (resources) a disjunctive function was used. It is because of the enterprise management was not centered with the resources. Furthermore, a highest weight, than the used by the resources characteristic, was assigned to the tasks and participants of the BP. Under these considerations, the aggregation structure shown in Figure 4 was obtained.

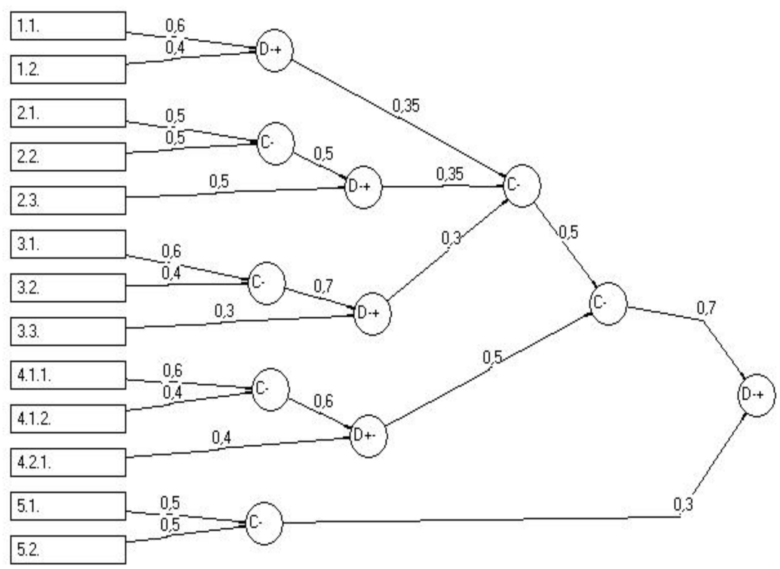


Fig. 4. Aggregation Structure

The structure building is strongly dependent of the reality analyzed. For example, if the focus is turn out to the resource distribution, the structure must be modified. In this modification a higher weight to this characteristic must be assigned. Probably, it must be considered a necessary characteristic i.e. a disjunctive function must be used.

3.1.4. Documentation, Analysis of the Results and Conclusions

The final phase is concerned with the analysis and comparison of the model evaluation results. This task is carried out considering the elementary preferences defined in the method. The documentation process must be accomplished carefully. It is because its results will be used as reference and historical record of the evolution of BPM. This data is important when the models need to be modified or actualized. This documentation can be useful as comparison and reference point when new models and processes be built. The model evaluation was automatically achieved using a tool that implements the method. From this tool the model global evaluation results were obtained. Table 1 shows the results by indicating both the evaluation of each characteristic and the global evaluation for each model. The values shown are obtained from the evaluation of each aggregation function in the structured depicted in Figure 4.

Table 1. MEBPCM applied to enterprise models (Table Ref-1)

Variables of Preferences	Weight	Model 1 (Proposed Model)	Model 2 (Initial Model)
1. Tasks/Activities			
1.1. Simples/Atomics	0,6	0,042	0,022
1.2. Composed/Sub-process	0,4	0,33	0,022
D-+	0,35	**0,24023376**	0,022
2. Synchronization Points of the Execution flow			
2.1. Join Points	0,5	0,2	0,11
2.2. Puntos de Unión	0,5	0,25	0,11
C-	0,5	**0,22397029**	0,111
2.3. Divisions Points in Parallel and/or Concurrent Execution	0,5	1	1
D-+	0,35	**0,78442014**	0,78075887
3. Events			
3.1. Starting Events	0,6	0,5	1
3.2. Intermediate Events	0,4	1	1
C-	0,7	0,66986598	**1**
3.3. Final Events	0,3	0,14	0,25
D-+	0,3	0,59067393	**0,88288258**
C-	0,5	**0,48817677**	0,30247469
4. Participants / Actors			
4.1. Internal			
4.1.1. Participants/Actors Number	0,6	0,2	0,2
4.1.2. Communication between Participants/Actors	0,4	0,2	0,2
C-	0,6	**0,2**	**0,2**
4.2. External			
4.2.1. Participants/Actors Number		1	1
D+-	0,5	**0,85393179**	**0,85393179**
C-	0,7	**0,65226859**	0,52634624
5. Resources			
5.1. Produced in the Process/Generated (Internal)	0,5	0	0
5.2. External	0,5	0	0
C-	0,3	**0**	**0**
D-+		**0,57404485**	0,46322383

Following with the method phases and on the base of data obtained the proposed form was completed. It is important to notice that this report is part of the documentation for completing in the evaluation process. Figure 5 shows the proposed form completed with the data gathered from the method application to the models under study. In this form can be found information about the evaluated models, the criterion functions used, and the result analysis.

Nº of Reference: 1		Date and Hour: 23/04/2011	
EVALUATOR/S		**Area or Department o Commission**	**External/ Internal**
Eval 1	UNSL	UNSL	External
Eval 2	Carlos Salgado	UNSL	External

Model/s of Evaluated Business Process/es

Nº of Model	Developer	Date	Language	Earlier Evaluation	
				Date	Nº of Reference
1	Carlos Salgado	16/03/2011	BPMN	-	-
2	Owner Enterprise		BPMN	-	-

Applied Criterion Functions

Defined (D) / Repository (R)	Elemental Criterion	ID. Repository	ID. Criterion Function
D	Task/Activities Simples/Atomics	RFC-1	1
D	Task/Activities Composed/Sub-process	RFC-1	2
D	Synchronization Points: Decision Points	RFC-1	3
D	Synchronization Points: Union Points	RFC-1	4
D	Synchronization Points: Division Point in the Parallel and/or Concurrent Execution.	RFC-1	5
D	Start Events	RFC-1	6
D	Intermediate Events	RFC-1	7
D	Final Events	RFC-1	8
D	Participants/Actors: Internal: Number of Participants	RFC-1	9
D	Participants/Actors: Internal: Communication between Participants	RFC-1	10
D	Participants/Actors: External: Number of Participants	RFC-1	11
D	Resources: Produced in the Process (Internal)	RFC-1	12
D	Resources: Externals	RFC-1	13

Analysis of Results

From the observation of Table Ref-1 it is possible to see that both models are favored in some characteristics and in others no. So, the Model 1 was favored on the characteristic 1, 2 and 4, while the Model 2 was favored on the characteristic 3. The remaining characteristics obtained the same results. However, the Model 1 obtained a better global evaluation than the Model 2. It is due to that this model was favored in the characteristics more relevant and with higher weight.

This result indicates that the Model 1 satisfies to a greater extent the quality criteria of BP conceptual models in as regards both the understandability and adaptability.

Fig. 5. Evaluation Documentation Form

3.1.5. Improvements to the Enterprise

After the method application, it was detected that the new model is closer to the conceptual model quality standards. From this analysis, the enterprise management took the new models and compared them with the real process. In this action, it was detected that the process are not corresponding with the new models. It is due to they were developed on the base of the specifications and requirements, done by the management, without know the actual process model. This work allows to the management to conclude that the actual process is adapted to its model. However, the model and the process are not adjusted to the reality of business requirement. Therefore, a restructuring at the startup of the purchasing and pay process is needed. Currently, the enterprise is scheduling the restructuring previously mentioned. This task is carried out by defining the new requirements and implementing the changes to adapt the process to the new models.

4. Conclusions and Future Works

The process continuous improvement is a fundamental tool for all enterprise because it allows renewing or improving its BPs. It implies a constant actualization making possible the organizations to be more efficient and competitive.

The BPM is the base to: i) Comprehend the organization operation; ii) Document and publish its process; iii) Make efficient in the operation and iv) Integrate the solutions into a service oriented architecture. These characteristics are a relevant tool to hold the organization at competitive level. In this aspect, the BPM are fundamental when an analysis centered in both the correction and quality of the process is required. From this point of view, a quantitative method aimed at evaluating Business Process Conceptual Modeling was presented. This method was defined taking into account the enterprise needs, the domain expert opinions and the state of the art. The goal of this method is to provide the organizations a tool to hold objective information about the model's maintainability. This characteristic makes easier the BP evolution of the enterprises involved in the continuous improvement process. Furthermore, it provides support to the BP management by facilitating the early evaluation of certain model quality properties. Thereby, the organizations are favored in two ways:

(i) Ensuring the understanding, diffusion and evolution of BPs without affect their execution;
(ii) Reducing the effort needed for both the changing of models and the maintenance of them.

With the goal to validate the proposed method, it was applied to the evaluation of BPM of a particular local enterprise. This enterprise wants to analyze its BP and to determine the problematic and major conflict areas. From the method application to this study case, it was possible to detect that the enterprise follows the model's guidelines. However, they do not correctly describe the business need of the enterprise. This characteristic did generate that the management would try to adapt the business rules to its needs. The results allow observing that the method was valuable to the case studied. The benefits of the method application can be observed at:

(i) The documentation generation for monitoring the historical evolution of the models and BP that they represent. These benefits are concerned with the organization's owners.

(ii) The application of metrics in the definition of elementary criteria. In this context, it is useful as empirical validation tool. These benefits are useful for the research on modeling quality area.

Furthermore, the method application will generate a repository of functions of elementary criteria. This characteristic is of paramount importance when: the new models need to be evaluated, or for carrying out a new evaluation of models already analyzed.

The future works are oriented in two directions. The first one is interested with the tool development to automatically apply the analysis proposed to the studied models. The second one is centered with the method application to new study cases for their practical validation. In this sense, the research group is trying to apply the method to other areas, such as the sales and Payments, of the organization under study.

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