Process Analysis and Collective Behavior in Organizations: A Practitioner Experience

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Abstract. The analysis of organizational processes could support complexity and heterogeneity of companies if it is able to capture and organize the social behavior of enterprises. The phases - Orienteering, Modeling and Mapping – and the key characteristics of an analysis approach are described, focusing on results and returns. Results are the expected and committed outputs of the analysis process, such as the modeling of workflow processes. Returns are the impacts of the process analysis on individual and social behavior, such as awareness and motivation. Returns support the definition of the key assets of an organization, influence the modeling of workflow processes and are useful to capture the non-workflow components of organizational processes. This approach has been applied through a long-term activity in public and private enterprises. An experience is described presenting strong and weak points of the approach, differences and similarities, in particular between workflow and non-workflow processes.

Keywords: Business Process Analysis, Workflow and Non-workflow Processes, Social Behavior.

1 Introduction

The process approach is a key feature in the development, implementation and improvement of quality management systems [1].

The standard ISO (International Standard Organization) 9001:2008 "Quality Management Systems. Requirements" is based on process approach and the same approach could be applied in the development of other international standards, for instance BS (British Standard) 18001:2007 "Occupational Health and Safety Management Systems. Requirements" and ISO 14001:2004 "Environmental Management Systems. Requirements with guidance for use".

Recently, researches in Management and Organization Science suggest that organizational processes in the current business scenario may be the strategy of firms in unpredictable markets. Processes such as internationalization, product development, acquisitions and alliances enable firms to acquire, shed and recombine resources [8]. Most of these processes are in fact non-workflow processes.

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These studies propose a new beginning to the behavioral approach that explains psychological and social mechanisms by which mental processes affect organizations. Behavioral strategy merges cognitive and social psychology with strategic management theory and practice [6].As pointed out, also in Business Process Management (BPM), the perspective of a user on a business process corresponds to his/her way of looking at the process [4].

This paper describes the analysis method from two main points of view.

The first assumption is that Business Process Analysis (BPA) can be used to deal with heterogeneous and complex scenarios, where workflow and non-workflow processes are present.

The second one is that, beyond the results in the implementation of management systems, the analysis could help in understanding social behaviors of managers, employee and worker and in finalizing them to define a collective company identity.

In fact, process analysis is a two-way interaction between processes and behaviors: practitioners need to take into account social behavior in developing the analysis while analysis and modeling can influence and modify social behavior.

The analysis processes are presented in section 2, underlining results that is the concrete outputs of the analysis process and returns that are the impacts on individual bias, influence of group, ideologies, political realities, consensus building, etc. Returns could be useful to define a shared frame of collective behavior in the organizations. This frame supports the management of social behaviors such as involvement, participation, acceptance and transversal versus hierarchical relationships.

The method has been tested and validated through long-term activity in different economic contexts: large and small and public and private companies.

Section 3 reports one of these experiences, developed in a large energy company with the objective of an integrated Health and Safety, and Environment Management System.

The conclusion (Section 4) proposes a synthesis and an outlook on future research to promote the synergy between practitioner and researchers of different scientific areas, such as BPM, Adaptive Case Management (ACM) and Strategic Management.

2 The Method

The BPA is part of a project developed to respond to company commitments and requirements. The result of the project is a “new management system”.

Management and the project team usually share the project objectives in terms of operating results, such as the implementation of software applications, definition of common procedures, improvement of organization performances, compliance to regulatory requirements and measuring process effectiveness.

For instance, Sales Managers could require to clearly and quickly grasp activity flows to understand employee habits or detect bottlenecks in customer order management; Quality System Managers want to improve operating procedures and integrate them with Health, Safety and Environment requirements.

While the final result of a process analysis could be beneficial, the project team should ensure that the main set of numerous factors and components of the organization that influence process and how they interact are taken into consideration. The analysis method ought to capture these key factors.

During analysis, the practitioner usually stresses topics related to the effectiveness of operating tools and tangible and measurable results. However, improvement can also come from interaction with behavioral characteristics of the organization.

These points are not easily measurable (intangible) but, in fact, they could deeply influence process performances acting as a catalyst of process management.

The presented method is divided into these main phases: Orienteering, Modeling and Mapping, which are described below.

It is emphasized that each of these phases produces short-term results, i.e. direct outputs of process analysis and short or long-term returns, i.e. identification and changes in manager and employee behaviors and awareness.

The method proposes a gradual formalization of the analysis results. This approach could be useful to find out the diversity of company assets.

2.1 Orienteering

In project development, the start-up of a process analysis is linked to a specific management commitment in which not all requirements are clearly stated. Therefore, the first step of the project is perfecting objectives and constraints. For this reason, the term "Orienteering" is used instead of orientation because it produces the result of getting people together to explore "new countries".

The key factor of Orienteering is to understand the heterogeneity, strategies and structures of the organization, including workflow and non-workflow processes, which is supported by tools useful for collecting information, habits, individual and social behaviour, vision, energies and resources.

In order to obtain it, the method is based on "meeting people and sketching on a blackboard". Sketches must easily name company activities and the related assets (e.g. a policy, document and/or database). This activity requires that the project team involved in identifying and describing the processes have competence, experience and sensitivity. Since people often describe the same activity differently, a good description requires the person doing the analysis to involve the process owners. For useful results, the analyst should calibrate and perfect subjective interpretations; several interpretations and interests can often be present in the same area. A working group can help the practitioner in averaging the different evaluations and reducing the bias.

Supporting evaluations with information related to process metrics and results can reduce the subjective bias. Even the point of view of the practitioner doing the analysis could orient the project. If the analysis is driven by the goals of a management system, interviews with process owners may be conditioned by these requirements.

Out from their everyday routine, managers, employees and workers can discover unknown corners of their own company and several requirements of internal supplier-customer relationships.

The tangible **results** of Orienteering is a first taxonomy of assets, habits and praxis, useful to implement the "new system" while the actual **returns** of this phase are sharing expertise and points of view and identifying multiple perspectives in and outside the team.

2.2 Modeling

The translation of visions and feelings (sketches and meeting minutes) produced during Orienteering into effective management tools requires the definition of the company models, finalized to project objectives.

In the Modeling phase, several factors could lead analyst "eyes" and several coordinates could describe the conceptual space. The coordinates define the frame to transform fuzzy assets into more structured models and, therefore, into the "new system".

Some of the most effective factors are presented below based on experienced projects.

Stakeholders and Points of View

The concept of organization stakeholders is a characteristic of Management System Models described in ISO and BSI standards.

Let's consider a well-defined activity, say a manufacturing process producing a semi-finished or finished product. For the same manufacturing step, the description tools (input/output, risks, metrics) are different based on the stakeholder's (client/user) point of view. The quality and product information are key factors in a customer-focused analysis, while the shareholders are interested in prices, costs, profit and loss. In terms of the environmental approach, the same activities could be described focusing on pollution outputs and, finally if the worker safety is the target, the analysis could stress behaviour and consciousness related to potential accidents.

Tangible and Intangible Inputs/Output

The process inputs/outputs could be tangible or intangible and depend on the points of view. A product could be described by several characteristics that can be concrete and perceived by a customer (flavour of a product), or measured and recorded on different media (for instance, the report of a control plan). Some outputs can be easily described through measurable and evident characteristics (e.g., a mechanical part); others require a deep evaluation of customer relationships.

Boundaries and Granularity

Boundaries and granularity are complex components of the process analysis. The practitioner should define system boundaries, and what is inside and outside of the analysis scope. Even the boundaries are strictly related to points of view. In a quality management system, the description of the product workflow is mandatory while for an environmental management system the key points are the factory sites and the related risk analysis.

Once the boundaries have been defined, the granularity is influenced by many variables: organization characteristics, key events and risks and is also related to the commitment and to the objectives of the project.

Time

A subset of company activities is 'flows of works', performed in a serial or parallel way. However, a main part of activities and assets do not depend from time: behaviours, awareness, motivation and capacity to adapt to changes. The system usually encompasses several of them.

The **results** of this phase are the "model of the new system" that would respond to the project commitment. The assets are identified, and the structure of the taxonomy is defined and related to the coordinates, such as workflow drafts, data structure, documents, and control.

The **return** is the awareness in the project team of the interaction of these coordinates, for instance of the different stakeholders of the organization.

2.3 Mapping

Mapping closes the project describing the results (flow, data, and procedures) and transfers them from the project team to the whole company.

The choice of a useful notation is the key factor for an effective Mapping of the modelled system.

The available standard notations are conceived to describe the main workflow processes and the related assets. However, these notations are not useful to describe all coordinates that could characterize the model, such as the assets related to main management commitments.

Furthermore, the choice of the notation depends from the objective of the project. For instance, in software design and implementation the granularity and the symbol types are unambiguous links with codes while sharing management approaches could be meaningful the contemporary description of several outputs, accepting some degree of ambiguity.

The notation to capture non-workflow assets has to deal with quite different entities: data (structure and analysis), individual behaviors (motivations, habits, responses and emotions) and social behaviors (team management). The available notations use naïve symbols: colour, graph, box and text. The challenge is to define an effective set of tools that freely map the system.

A key part of the project **results** are the maps.

Whatever the map, structured or naïve, the **return** of the mapping phase is to orient managers and employees by identifying the roles of everyone within the system. Having a map could improve the perception of their own position and help in managing company activities, giving managers a common and shared frame to view the "company environment".

3 Experience Report

3.1 The Scenario and the Project Objective

In the context of one of the main Italian Energy Company (Business Unit on Green Energy), the management commitment was the implementation of a Health and Safety and Environmental Management System. The main objectives of the management were:

- The improvement on Health and Safety performance through all divisional processes with reduction of incidents, injuries, ill health and risk for contractors and visitors as well as production capacity and quality, respecting time and costs, due to compliance of processes to required standards;
- The improvement in process efficiency by means of a deep analysis of activities and hence the reduction of safety costs (for instance loss of working days for incident).

Starting from these constraints, the project goals were the integration of a Health and Safety (H&S) Management System with investment processes in wind turbine ground farm and the broadening of H&S culture beyond conformity to legal requirements.

In particular, the project was finalized to include the requirements related to Safety in the investment processes, supported by the requirements of Standard BS 18001 "Occupational Health and Safety Management System Requirements".

3.2 The Project Phases

The first step of the **Orienteering** phase was choosing the project team, jointly performed by practitioners and company managers. The first team was composed by the manager of the Health and Safety area. In a concurrent approach, a key point is the choice of the managers: they should be involved in the commitment and have consolidated experience in the company activities.

During the first meetings, a brainstorming approach was used, supported by the requirements of BS 18001, to translate ideas into a first "map of the new country". During this phase, other functional areas, such as Investment and Finance, R&D and Purchasing, were progressively involved in the project.

Questions such as "Do Preliminary Investment reports include health and safety requirements?" or "Who manages safety in the feasibility study?" allows the financial managers to discover unknown fields, for instance regulatory requirements that could dramatically influence the investment costs.

Orienteering produced a better definition of points of view among people and was useful to adjust the project, in particular in defining the required competences. At the end of this phase, the project team was composed of members coming from R&D, Engineering, H&S, Operation, and Purchasing Areas. Practitioners were expert in

Process Analysis, H&S management system and technicalities (for instance equipment safety).

All the involved functions shared the awareness of merging Health and Safety requirements in their processes, in particular in investment management, purchases and engineering activities.

The result of this phase was a first set of meaningful assets such as a list of existing process models, operating procedures and experienced safety criticalities on the equipment and in the creation of the wind farm.

During the **Modeling** phase, with a better definition of coordinates, the rough set of asset was refined and exploited to build the model of the new system.

The identified stakeholders were the shareholders, the employees and workers. For the shareholder, the key characteristics of the model could be related to investment risk, and for workers this could be the safety risk. The line among these risks is not sharp, for instance the business continuity could be interrupted by a serious incident on the wind farm, and the cost of the investment could increase because of the need of dedicated safety structures.

The final results of the investment are tangible. For safety, there are many concrete points such as the shape of fall protection, emergency stairs and safety devices required for maintenance. However, many inputs/outputs were intangible, for instance feasibility and design reports as well as risk assessment documentation. Both tangible and intangible aspects should be taken into account.

The boundaries of the model were extremely large, encompassing several business units, wind farm site and also including supplier facilities. For this reason, the granularity (detail level) was not too stressed because the aim was not to produce software tools but to influence a broad set of company rules and procedures.

The modeling phase was developed by means of frequent team meetings and a broad consultation of data and documents, in particular the existing design and investment process maps that described the workflow activities from the shareholder point of view. During the meeting, the environmental requirements were also established, for instance considering the impact of noise that the equipment has on people and wild animals.

Analysing the health and safety (and environmental) impacts together with the operations gives an idea on the fact that plants generate money as well as personal safety risks as well as environmental pollution risks. These have to be controlled by increasing everyone's attention to these aspects.

The final result of the modeling phase was the updating of the scenario, for instance defining a link with process mapping and workflow management already exploited and the re-definition of processes with attention to H&S points, mainly in wind farm design and building.

The return of this phase was the shared awareness that the project team had on health, safety and environmental impacts on investment and an improved "thinking by processes" skill.

Fig. 1 describes how the Safety (and Environmental) requirements could "contaminate" the existing workflow models, this deployment started with a new awareness in the project team. The **Mapping process** was exploited using the IDEF 0 (Icam

Definition for Function Modelling) notation with the aim of translating the prototype into the company standard process maps based on BPMN (Business Process Modelling Notation). The maps were tracked on the blackboard during project meetings while the team assessed company documents and activities.

For every activity, the mapping allows to define links with company operating documents (such as procedures, instructions and risk assessment) and registration (such as equipment certificate, tender and purchase orders).

This phase was also useful in defining a new relationship among managers and updating operating procedures and registration tools, with particular attention to legal requirements. For instance, the closeout report, usually issued at the end of plant construction, was recognized as a key input during the evaluation of new purchasing contracts and supplier offers were checked in terms of safety and environmental requirements using a specific questionnaire.

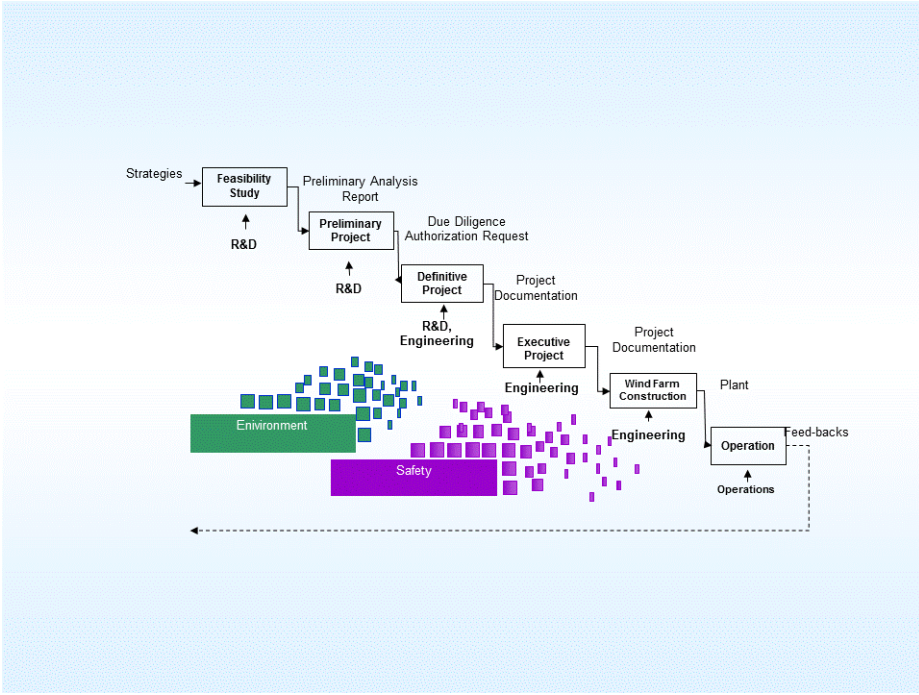

Fig. 1. Environment and Safety Deployment in Investment Processes

The mapping process better defined when and how to take into account safety and environment requirements and what are the rules (forms, procedures) and which are the actual operations (for instance logistic management with attention on personal and environmental safety). The existing process flow (from the shareholder point of view) was integrated with safety and environment requirements. For instance, when

evaluating supplier offers, questions regarding compliance with safety requirements and the recyclability of material could be asked.

The results of mapping were the updating of internal workflows, documented procedures and internal software management tools.

In term of returns, the project enriched the Company Identity of shared values on Environment and Health and Safety while their translation into operating tools (e.g. internal procedures) supported the transfer of the new awareness in everyday practice.

The company management appreciated the project results as they find the response to commitment and a driver for change in company perspective.

3.3 Project Discussion

In this section some weak points of the project are proposed for discussion.

- There was the risk that returns and results were restricted only to the part of the company mainly involved in the commitment. In fact, new awareness and skills, confined within the team, ought to be transferred to the company to deploy the change in everyday practices. The maps could be an effective way to communicate and transfer results and returns.
- Because of the lack of a notation for non-workflow assets (for instance the perception of a safety risk), only the workflow part of the new system was clearly described and the new points of view constrained in the workflow notation. Hence the use of the maps was not completely effective.

4 Conclusions

The paper presented a process analysis method exploited to design new management systems. Experience suggests that, beside the concrete results documented in maps and procedures, the process analysis could be useful to capture and modify social and collective behaviour of the companies.

The paper proposes a new development area to address process analysis methods in understanding and describing behaviour and social identity of the organizations and in developing useful notations to describe most of the management system assets.

For these reasons a bridge among different competences that acts on the same environment (e.g. Management System Development, Strategic Management and Computer Science) could be useful.

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