BPR IN MAINTENANCE: A CASE STUDY IN THE AUTOMOTIVE INDUSTRY

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ABSTRACT

With ever increasing importance, plant maintenance is no more considered as a second line or non-productive activity. Maintenance received due attention from various business improvement initiatives such as Total Quality Management (TQM) and Business Process Reengineering (BPR).This paper presents a case study of BPR of the scheduled maintenance process of an Italian firm, leader in supply of Global Service of maintenance in the automotive industry. It provides a methodology that may be used by others engaged in similar efforts.

INTRODUCTION

Beginning from the first of '90s, the progressive development of the Total Productive Maintenance (TPM) has essentially had the following consequences: the complete appropriation from the production of the maintenance culture; the birth of firms that furnish global service of maintenance; the development of the maintenance engineering [1]. The introduction in the '70s of the Toyota Production System (TPS) has represented one of the most meaningful changes from the technical-operational aspect to that organizational. The fundamental principles of the Lean Production are [2] [3]: the Process Management; the job enlargement; the team working; the use of the principal Japanese productive techniques; the continuous improvement, according to the Japanese philosophy of the Kaizen. Today, the diffusion of the outsourcing of no-core business activities is due to the necessity to optimize the business dimensions to the variability of the markets. In this context, the outsourcing of the maintenance activities is considered with ever-increasing importance [4] [5] [6]. Business process reengineering (BPR) involves the "radical" redesign of key business processes that cut across organizational boundaries where there is need for fundamental rethinking.

THE MODEL

The case study in existing literature on Business Process Reengineering are numerous and consolidated. From their analysis and comparison it emerges a series of common phases that, in their complex, allows individualizing a methodology taking as reference in the greatest part of the interventions of BPR today. The succession of phases changes following the specificities of the single interventions of Reengineering [7] [8] [9]. Our methodology can be summarized with 7 application phases and three logical moments of a project (Start-up, Reengineering, and Change Management).

Phase 0: Diffuse process culture. This is an essential precondition to implementing BPR with success.

Phase 1: Analyse Criticalities and Priorities. The performances of the core processes are measured, evaluating the criticality, defining the target objective and establishing a priority for the improvements.

Phase 2: Projects Planning and Launch. A crucial point in the definition of the organization of the project and critical for the future results is the choice of Reengineering Team.

Phase 3: Define Process (As Is). The Reengineering team analyzes the process, measures its performance, and seeks its dysfunctions identifying the causes of these in a cause-effect approach.

Phase 4: Redesign Process (To Be). The process is redesigned. Simulation software can be used to describe the process and evaluate the performances of the redesigned process.
Phase 5: Implement improvements. The new redesigned process is implemented.
Phase 6: Monitor and consolidate improvements. The management, therefore, in this last phase aims to monitor and consolidate the new process, and define the bases for its continuous improvement.

THE CASE STUDY

The Case Study refers to an Italian Group leader in supplying of automation systems for the automotive industry. Its division is particularly able to supply Global Service of maintenance. Inside the Group, a BPR has been developed among 2000 and 2003, in order to reach critical improvements, in terms, with extreme synthesis, of efficiency and effectiveness. In the follow, the phases of the project are shown.
Phase 0: Diffuse process culture. The crucial element of Reengineering has been the carrying out of workshop in order to maintain high the involvement of the people engaged in the project and to reduce their resistance to the change.
Phase 1: Analyse Criticalities and Priorities. In this phase, the main aim has been to create a model to describe the business process portfolio of the firm: Marketing, Prospect Development, Order and Acquisition, Supply Maintenance Activities, Maintenance Engineering and Supply Management. In the definition of the processes on which to affect the BPR, the impacts of processes on the Key Performance Index (KPI) have been analyzed using the matrixes Processes/KPI impacts.
Phase 2: Projects Planning and Launch. The availability of the plants results a heavy constrain. The process has three typologies of customers: external customer (consumer of the service of Scheduled Maintenance); inside customer (some business functions that ask for some process performance); general management (process requires determined performance target to Scheduled Maintenance). The performance indicators used to measure them are shown in the table 1.
Phase 3: Define Process (As Is). A cause-effect analysis has underlined the causes of every single criticality: labour cycles not yet completely structured; the alignment with the customer on the list of the activities needs to be improved; the management of the feedback information from the interventions needs to be improved; the requirement of the resources, equipments and materials is not always guaranteed; some differences from what planned are possible.
After having identified the criticalities of the process on which intervene, some Key Performance Indicators have been defined (table 2).
Phase 4: Redesign Process (To Be). Some changes of the new process are underlined in the follow.
In the new process, the provisional planning on the availability of the plants is furnished from the customer to the engineering and then on the effective availability of the plants. Ineffectiveness regarding the requirement of the materials, equipments and external performances should be rarer because an effective communication is anticipated. Communications, interactions and sharing of the activities performed with the consumer are more numerous. The overlap of the roles has been foreseen avoiding the reduction of the gap between decisional and operative roles.
Phase 5 and 6: Implement, monitor and consolidate improvements. Implementation of the new process in the Pilots Sites has been ended and the targets on KPI have been obtained. At the present, the last phase of BPR project is starting in order to implement the new process in the entire site.

CONCLUSIONS

Industrial and academic worlds are paying more and more attention to maintenance as its contribution to the achievement of business objectives rapidly increases. Maintenance is now an integral part of businesses with many opportunities for improvement. BPR can offer valuable ideas/ ideas/knowledge

for maintenance improvement. In this paper we have introduced a methodology for BPR and have presented a case study of BPR of the scheduled maintenance process.

TABLE 1. **Performance Index**

	EXPETATION	PERFORMANCE INDICATORS
EXTERNAL CUSTOMER	service quality	*MTBF*
	planning reliability	*(Effective Scheduled Maintenance– Planned SM) /n° interventions*
	machine repeatability	Δ *machine capability*
	cycle time reduction	Δ *cycle time*
	down time reduction	Δ *down time*
	flexibility	*% offline interventions*
	deadlines exactness	*n° effective / n° planned interventions*
	machine safety	*n° breakdown / n° interventions*
INSIDE CUSTOMER	saturations resources	*% inactivity*
	planning reliability	*n° deleted / n° planned interventions*
	plant efficiency	*technical availability*
	maintenance hours reductions	*scheduled maintenance hours/ total maintenance hours*
	safety	*safety indicators*
	satisfaction	*customer satisfaction indicators*
GENERAL MANAGEMENT	process economization	*process cost /n° interventions*
	profitability	Δ *interventions unit cost*

TABLE 2. KPI, target value and responsible person

KPI	TARGET	RESPONSIBLE PERSON
n° interventions / n° planned interventions	100%	Leader
Δ process cost	-10%	Site Manager
site EBIT	+20%	Site Manager
scheduled maintenance / total maintenance hours	+50%	Area Manager

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