Chapter 2.14
Integrating Production Planning and Control Business Processes

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ABSTRACT

Organizations have production planning and control (PPC) processes supported by systems that execute, mainly, repetitive calculations. Based on these calculation results, decisions are taken by production managers. These decision processes make the connection between different levels of aggregation of information and could benefit from the increment of the level of automation. An increased level of application of business process modelling languages is proposed in order to contribute to increment the level of process automation and the detail of business analysis. Thus being, concepts of integration of production management processes, specifically of production planning and control processes are presented. These concepts, the application of business process modelling language (BPML) and some solutions of PPC integration compose the core content of this work. Additionally, criteria for evaluation of these processes of integration are identified and discussed. Finally, the presentation of an industrial case will be supported by BPML model.

INTRODUCTION

The incessant search of improvement of productivity and competitiveness business indices is a fundamental issue addressed by production management processes. It is broadly accepted that one way of improving these indices is to increase the integration between management processes. This integration could be based on business process modelling con-

tents that are being expanded to different industrial areas and functions within companies. In a recent study of Palmer (2007) involving 74 companies, an analysis of the current involvement in industry initiatives regarding business processes is made, including: modelling, analysis, management and automation of business processes. According to this study, functional areas where there is a greater resistance to the introduction of these techniques, with a larger frequency of answers "no plans" are: research and development with 68% of replies; risk management with 58% of replies; production with 54% of replies. It should be noted that these areas are very distant from the area following which presents a relative frequency of 45% of replies "no plans".

The production of products and services is led by management processes that must be adapted to the existing organizational conditions. These processes must adjust to the implemented company production system. Among the most common activities of management, the following production planning and control activities can be identified: determination of the demand in some planning horizon, determination of the resources necessary to satisfy the demand, determination of the activities to execute, execution of production activities, control of processes and finally, analysis of the results and eventually a change in the procedures. All these processes are based on information and their integration enables the increase of the system performance. It is intended to contribute to the following objectives through the application of business process modelling languages:

- Recognition and analysis of production planning and control main processes.
- Characterization and evaluation of production planning and control integration processes.

Some published works report the utilization of business process modelling (BPM) techniques for enterprise modelling. Rahimifard & Weston

(2007) used the established CIMOSA (Computer Integrated Manufacturing Open System Architecture - Vernadat, 1996) modelling framework linked to simulation models to analyse a case company. This work refers improvement results in lead time reduction. Monfared, West, Harrison, & Weston (2002) also used the CIMOSA modelling framework to analyse and represent, mainly, a design process and project management involving several entities. These authors realized that BPM is helpful to capture knowledge that is essential for enterprise processes understanding. Furthermore there was a recognized impact on cost assessment and managing changes. Quiescenti, Bruccoleri, La Commare, Noto La Diega, & Perrone (2006) applied the Process Description Capture Method IDEF3 (Integration Definition for Function Modelling) to represent both processes of design and implementation of an enterprise resource planning (ERP) system. Xu, Besant, & Ristic (2003) used XML (Extensible Markup Language) to build a business process model for a collaborative exception handling process in production planning and control. Cuenca, Ortiz, & Vernadat (2006) present a methodology to create CIMOSA partial models from data flow diagrams and unified modelling language (UML). Although there is a high level representation of the PPC model, the main work is related with a service process definition. These works reinforce the main idea of utility and performance increment based on the application of BPM languages to enterprise processes. Furthermore, it also contributed to recognize the lack of works relating BPM, production planning and control and integration of production management processes, emphasizing the need to evaluate the applicability of combining these business areas.

The integration is related with the incorporation or adaptation of elements between them, and can be seen in this context as the interdependence relationship between different production management processes. Production of a physical article or service requires a relationship between people, departments, management processes, design

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