Analysis of the Information Resources for the Furniture Industry in BIVEE

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Abstract. One of the most important objectives of the Business Innovation and Virtual Enterprise Environment (BIVEE) project is the management and fostering of innovation and production improvement in small and medium enterprises (SMEs). This short paper presents a brief description of the key factors and the methodology followed during the analysis of the current situation of the companies selected as end-users for the BIVEE project. While BIVEE focuses on two spaces (innovation and production spaces), this short paper presents details on the production space. In this space, the furniture cluster of AIDIMA (Technology Institute of Furniture, Wood and Packaging) plays mainly the role of end-user. Due to the nature of the selected companies, the conclusions are also valid for a large number of companies from the furniture industry in Spain. Our objective is to analyse and detect problems on the current processes of the companies inside a Virtual Enterprise Environment.

Keywords. BIVEE, Virtual Enterprise, Value Production Space, Production Improvement

1 Introduction

The improvement on the production activities of the SMEs is one of the most important objectives of the BIVEE project together with the management of the innovation in these companies. The BIVEE project aims to provide the needed components to ease the improvement in the production processes of the companies inside a Virtual Enterprise Environment. AIDIMA participates in the BIVEE project as one of the end users representing the companies of the furniture industry in Spain. The involvement covers both the innovation and production areas with a special dedication to the production space of the project, namely Value Production Space.

This objective is hard to achieve specially in the Furniture industry due to a number of important factors. As an example, one of these factors is the absence of information in the analysed companies. This is usually because many SMEs in the

furniture sector have no information systems enabling them to provide the essential information needed to ensure a deep analysis.

In order to provide useful methodology and tools to improve the current processes of these companies, a deep knowledge about the 'as-is' situation is a starting point for our study. According to the experience gained from past projects and specially BIVEE, a set of information items can be identified and analysed in order to obtain enough knowledge to evaluate the key factors of the improvement. These are some of the most relevant components to be known and analysed in this study. The goal is to come up with the following key information:

- Business processes carried out in the company
- Actors involved in these processes
- Incoming and outgoing documentation of these processes
- Key Performance Indicators related to the production activities

All the aspects mentioned above should be structured and organised according to the real working methods of the company in order to get a valuable "picture" about the "as-is" situation of the companies. To achieve such a goal, the methods can be summarised as interviewing, collecting information through questionnaires and analysis of the knowledge collected by the information systems.

As for the organization of the paper, the selection of representative companies will be described in the next section. Then, the available information resources for these companies will be detailed. In section 4, we will focus on the way these information resources are used. Finally, the paper will be concluded.

2 Selection of Representative Companies

An optimum selection of representative companies is taken into consideration. After the analysis of a medium group of candidates, two SMEs have been selected to for this analysis as representatives of a wide range of furniture manufacturers. During the selection process, the available information within AIDIMA about manufacturers has been taken into account and a number of interviews have been made with the candidate companies.

These two companies comply with some conditions to ensure the desired level of reflection of the furniture sector. This selection have been made also taking into account the main objectives of the BIVEE project:

- Selected companies fit into the definition of "Virtual Enterprise". These companies often define and configure business alliances with external enterprises to achieve specific production objectives. This collaborative production approach is implemented in many furniture manufacturers and it is providing important advantages to furniture SMEs.
- An overview to their information systems (automated or not) are stated before starting the analysis. The following section presents a brief description about

the systems encountered in these SMEs with a special focus on those related to the improvement objectives.

While one of these companies produces a special type of chair, the other company produces a complete kitchen with its furnitures. Both companies are in a virtual enterprise environment. The different parts of the production such as painting, varnishing, upholstring, supply are being operated by different SMEs within their virtual enterprises. Both companies use an Enterprise Resource Planning system to manage their resources.

3 Available Information Resources: AS-IS

One of the most important information pieces in the companies is their ERP software. Particularly in our selected enterprises, the GdP[1] (processes management) ERP is implemented and run succesfully. GdP is a business management system that enables a quick access to the production information providing a full traceability and connecting the different departments of the company to a centralized information repository. GdP provides relevant information about the products and their composition. The most relevant feature of Gdp is the ability to define specific operations to the different parts of the product. This allows the generation of an entire „Product Breakdown" containing the internal and external processes to be applied to any component of a product. Despite this, a parallel research inside the infrastructure of the company is performed in order to detect the main production processes and the actors involved from a higher level. Gdp, thus, plays an enabler role for the identification of business processes and related actors.

The ERP provides several indicators mainly related to production activities. Most of these indicators can be considered as „internal indicators" so their value is generated and consumed only during the execution of internal production activities. Considering the objectives of the BIVEE project, we need those which have relevance inside and outside the company environment. Therefore, we focus on the KPIs which are involved in processes executed inside the Virtual Enterprise environment. These are the indicators (i.e. related to costs or production cycle times) which are influenced by not only the current company but also the production partners within the defined Virtual Enterprise. Having such a starting point, we have focused on elaborating the KPIs and have a number of metrics to measure the success of a new process.

Furthermore, AIDIMA manages a furniture ontology based on the funStep[2] standard for the information exchange (ISO 10303-236) inside the funiture and wood sector. This ontology is being developed according to the knowledge of the domain experts and the regulation of the furniture sector (UNE, EN, ISO) and extended through interviews, books, articles and other relevant sources. The ontology is developed under OWL DL[3] which provides the needed expressive richness and allows

[1] http://www.aidima.es/gdp/
[2] funStep Furniture Catalogue Representation Standard – http://www.funstep.org/
[3] http://www.w3.org/TR/owl-guide/

efficient computational inferences. This ontology defines a common vocabulary to use in the furniture sector and the relationship between the different concepts included. Having identified the documentation related to production activities [1] such an ontology creates a semantic background. Software systems, i.e. BIVEE Platform can make use of this ontology to assign meanings to concepts and extract valuable knowledge from the incoming and outgoing documents about the furniture domain.

4 Use of Information Resources: TO-BE

In the industrial furniture sector, most of the manufacturers do not have any information systems to define and manage their internal and external processes. For that reason, the arrangement of technical meetings with the production responsibles is needed to define these processes formally and then analyse them in depth.

To facilitate this task, the default production processes were considered as a template considering the four production phases approach [2].

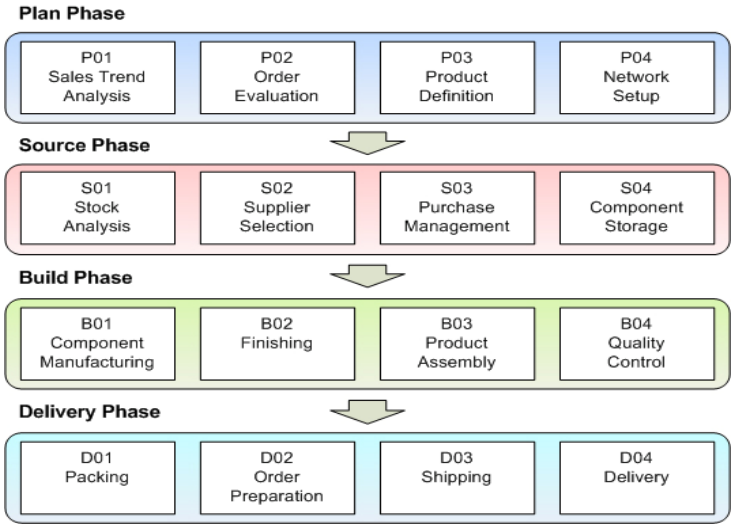

Fig. 1. Four Production Phases approach

Each one of these processes were defined by default using a possible simple working flow in order to take this as a primary template to be customized.

GdP software, as an ERP system, is also an important tool to support the process definition task. This tool contains specific low level operations applied to different elements during the production of a piece of furniture. The downside is that GdP does not include processes related to management activities so it is focused on production operations. For this reason, the definition of each specific process has been completed according to the information extracted from technical interviews with the Production / Logistics managers of the company.

After the definition of the workflows assigned to each one of the production processes, a formalization of these workflows, the related actors and documents about the flow was performed by using a process modelling tool: ADONIS[4].

Regarding the documentation analysis, GdP has been also an important source of information on that point. Some information slots stored in the ERP database are frequently converted into formal documents which are usually shared among the different actors involved in the production processes. For this analysis we have turned our attention specially in those documents that are exchanged between the manufacturer and their external production partners.

The funStep ontology has been considered a useful resource in the BIVEE project so it can be considered a knowledge repository for the furniture scope. However, the drawback is that, as mentioned above, the ontology developed to date is mainly focused on catalogue information and product configuration. At this moment, the ontology lacks information about the processes carried out by the company and there are not references to the „production technologies“ followed during the production activities. The objective of using this ontology resource is the semantic link between the elements considered in production processes or documents to the concepts included in this ontology, giving them an specific meaning and increasing the interoperability of the system [3].

5 Conclusions

It is important to indicate some important hindering factors detected during the study. The required special training for the application of a new system usually implies variations in current methods. The *fear of change* facing any new improvement is also a very important point so the application of new procedures in the daily business can make some people feel uncomfortable due to the possible isolation from activities that they master. In most cases, this *fear* is due to some mistrust in these new methods. In other cases, this is due to the lack of enough information to know the scope and benefits of the new improvements. This last factor usually makes the implementation and success of this new methods much more difficult.

On the other hand, the current information systems of the companies should be studied in order to make some adjustments to the proposed improvements according to them. These systems should be able to manage the information achieved through the improvement in order to evaluate the impact on the business processes.

The meetings and interviews with the different SMEs manufacturers involved in the project have enabled to get their perception and feeling about the innovation and changes in their production processes. Until a few years ago, most companies were reluctant to any important change om their production processes. Despite many companies have no mechanism to perform an optimal management of these changes, the organizations are currently considering these changes necessary in order to adapt to the new production models and confront any adverse situation.

[4] http://www.boc-group.com/tr/products/adonis/

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