



A case analysis of a product lifecycle information management framework for SMEs



Pedro Soto-Acosta^{a,*}, Emilio Placer-Maruri^b, Daniel Perez-Gonzalez^b

^a Department of Management & Finance, Universidad de Murcia, Campus de Espinardo, 30100, Espinardo, Murcia, Spain

^b Department of Business Administration, University of Cantabria, Avda. de Los Castros S/N, 39005 Santander, Cantabria, Spain

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ABSTRACT

Information management during the product lifecycle has received a great deal of attention over the last few years, mainly because firms work in a complex business environment characterized by information overload, high levels of competitiveness and the acceleration of technological change. In this context, Product Lifecycle Management (PLM) software has been evolving rapidly and, today, powerful tools in the market enable high levels of information to be managed. However, commercial PLM software is mostly oriented towards large-sized firms, which poses a big challenge for small and mid-sized enterprises (SMEs). To address this issue, SMEs can develop their own Product Lifecycle Information Management (PLIM) Frameworks for managing data and information throughout the product lifecycle processes. This article presents a successful example of a PLIM Framework: the case of Pladomin's PLIM Framework.

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1. Introduction

Changes in the current global economic scenario are inevitable. As a consequence, managing all the information during lifecycle of the product represents a major challenge for small and mid-sized enterprises (SMEs), which must nowadays compete in a global market (Soto-Acosta, Popa, & Palacios-Marqués, 2015). The process of managing the whole lifecycle of a product from the inception, through design and manufacturing, until it is disposed of, is referred to as Product Lifecycle Management (PLM). PLM is a new approach for managing information along the product lifecycle that enables firms to reduce products' time-to-market as well as to respond to a growing demand of quality and customization of products. From the point of view of knowledge management, companies may benefit from PLM through fast and easy exchange of documents and expertise, simultaneous dissemination, real-time control, improved communication and accessibility of product-related information. At the same time, PLM is a collaborative platform that can improve information access and sharing inside the company and between the company and its stakeholders (Palacios-Marqués, Soto-Acosta, & Merigó, 2015; Palacios-Marqués, Merigó, & Soto-Acosta, 2015).

Although there is a wide offer of PLM software available on the market, the lack of interconnectivity with other enterprise information systems is still a common issue that firms must deal with. Another important challenge has to do with the limited financial resources of SMEs, which limits their access to this costly software (Vezzetti, Violante, & Marcolin, 2014). In addition, adopting commercial PLM software may introduce significant changes in companies' routines and processes. In this sense, a self-developed PLIM Framework might be a good alternative. Nevertheless, planning and managing the process of change is fundamental for the success of the PLM system. The main objective of this case study is to present an example of a successful implementation of a self-developed PLIM Framework in a SME from the manufacturing industry.

2. Company background

Pladomin is a Spanish SME with over 80 employees and an annual turnover of approximately 10.6 million Euros. Initially, the company specialized in manufacturing household products, but in 1980 some of its activities were reoriented to attend to the demands of industrial customers in the telecommunications sector. In 1990, after obtaining the ISO 9002 norm, Pladomin started to collaborate with some of the most important domestic appliance manufacturers, such as Fagor, Bosch, Siemens or Teka, among others. Over the last decade Pladomin has obtained the ISO 9001-200 and the ISO TS16949:200 certifications and made an important push to enter

* Corresponding author. Fax: +34 868887537.

E-mail addresses: psoto@um.es (P. Soto-Acosta), placer@unican.es (E. Placer-Maruri), daniel.perez@unican.es (D. Perez-Gonzalez).

the automotive sector. As a result, Pladomin became one of the main providers of plastic components for well-known automotive brands like Ford, Mercedes, Volkswagen or Volvo.

Pladomin's installations are located in Santander (North of Spain), where it manufactures components in all kind of thermoplastics, using diverse automated injection machines and the most advanced manufacturing techniques (gas assisted injection, bio-material injection, multi-component injection, etc.). Nowadays, the company manufactures more than 640 tons of plastic components per year for a large portfolio of national and international clients, receiving orders from customers located in countries like France, USA, UK, Italy, Germany and China.

3. The project

Due to its continuous endeavor and dedication Pladomin has grown over the last 40 years from a small company to a medium-sized company, extending its customer portfolio from small national clients to international customers, including strong multinational groups from the automotive industry. However, in the current business environment there is a growing demand to develop more complex products and, at the same time, to shorten their time to market. In this scenario, excellence in quality, knowledge management and collaboration in product design have become a common demand from Pladomin's customers. As a result, PLM has emerged as a new paradigm for managing information along the product lifecycle that may improve the efficiency of internal processes and collaboration with clients and other stakeholders.

3.1. The preceding scenario: before using PLM

Project management at Pladomin was the responsibility of only one person, who was the project leader. Each project had its own structure and a folder with all the drawings (2-D and 3-D) and related information. Due to this, creating new versions of drawings with alternative solutions was sometimes a problematic task. Pladomin used to work with more than ten clients at the same time. In these circumstances, managing existing projects is difficult if clients assign the same drawing number or specification to totally different components. As a consequence, the risk of errors is such that it can even lead to a collapse in daily operations. Even though the risk is amplified in the case of large companies, this kind of problem is quite common in the product development process, and it occurred in Pladomin. Accordingly, top management at Pladomin concluded that access to and exchange of product-related information between the different stages of the product lifecycle and between the company and its stakeholders was a serious challenge which could be addressed through PLM.

3.2. Second step: analysis of PLM as commercial software vs. internal procedure

Pladomin had the possibility of choosing between two alternatives: (a) to purchase a commercial PLM; or (b) to develop a PLIM framework by themselves. Since the adoption of new routines and the cultural change may occur faster in SMEs, implementing PLM should be easier at Pladomin than at larger firms. However, planning and managing the process of change is a key pre-requisite for the success of the PLM. Before deciding whether to purchase a commercial PLM or to develop a PLIM Framework, a detailed analysis of the business model should be conducted (Hachani, Gzara, & Verjus, 2013). To support the decision making process, Pladomin analyzed their previous way of working from the point of view of

managing product-related data and information. The analysis was divided into three blocks:

1. *The use of information and formats.* Pladomin manages a lot of information from different sources and for different purposes. For example, it gathers information automatically from at least eight different software systems of its customers. Sometimes the data format is not compatible and, in this situation, the company must convert data by using an intermediate software or get back to the customer if it does not work. Thus, as a main feature, the new PLM must be able to work with different formats and improve the conversion processes.
2. *Information consistency.* Pladomin creates and stores information in different data storage formats and paper support. When clients share confidential information, storage becomes a critical issue. In this situation, it is difficult to find an equilibrium between satisfying customers' requests for confidentiality and, at the same time, guarantee the accessibility to information for both the firm and the customers. In fact, one of the main problems that Pladomin must overcome is that sometimes information is unavailable when needed. Based on these identified issues, implementing PLM at Pladomin should be directed towards simplifying the integration among data management systems, which means robust data importation and exportation between systems.
3. *Information redundancy.* It is very common to find duplicated information, since every new version of a project is independently managed. Information redundancy can create confusion. Accordingly, adopting PLM may enable all the duplicated information to be removed.

Having seen the need to implement PLM, Pladomin analyzed the characteristics of the commercial PLM software being offered by Siemens, Oracle, SAP, Autodesk and ZUKEN, among others. After comparing the different options, the company identified some of the most commonly mentioned advantages of commercial PLM software: enhanced quality of the product; less time to launch the necessary documentation; environmental responsibility (less paper); centralized databases; better internal processes; reduced time-to-market.

In addition, most commercial PLM softwares are advertised as easy to use, install and maintain, but little is known about the connectivity, information sharing with clients or connectivity with Computer Assisted Design (CAD) software. In this case, Pladomin has some relevant constraints: they use CATIA and/or SOLIDWORKS software for 3-D drawings and AUTOCAD for 2-D drawings and, as a consequence, information systems integration is a must. However, they noticed that the integration of PLM with the company's CAD system was an important issue that could not be addressed by using commercial PLM software. Another inconvenience of adopting commercial PLM software was that the minimum implementation cost of the commercial PLM software is around €120,000, with annual costs of around €30,000 approximately. In addition to the cost of the software, the company estimated that it would be necessary to incur around €40,000 in costs for the lack of data integration of commercial PLM software. Developing an internal procedure for PLIM framework may address the data integration problem efficiently without committing too many financial resources.

3.3. Current status

Taking into account all the limitations of commercial PLM software, Pladomin decided to define a PLIM framework using their own database. They preferred a self-developed PLIM framework over commercial PLM software for two main reasons: (1) adopting a totally different way of working with new procedures, pro-

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