

## THE ADISS METHOD FOR DEVELOPING A FAMILY OF EQUIPMENTS

Mircea Lobontiu, Adrian Petrovan

North University of Baia Mare  
email: mircea.lobontiu@ubm.ro

### ABSTRACT

*Launching a line of equipment into production and on the market requires a global view of the issues, from the concept to the maintenance system, including the equipment end-of-life "ceremonies". The ADISS equipment developing method for a family of products proved to be a fundamental framework of market competitiveness. The development of this method, which can be generalized and can be applied to the production of equipment lines, was based on the following structure of mutually interdependent activities: concept, marketing, trade, production, delivery, assembly, and maintenance. The method is based on a successful case, consequently it can be applied to other industrial equipment lines. The development of equipment families was based on a method intended to become framework for PLM implementation.*

**KEYWORDS:** Family of equipments production system, Adiss Method, PLM.

### 1. INTRODUCTION

In the context of the technological development of the 21st century, the innovation, transfer and diffusion of technology are permanently contemporary with the future [5]. In fact, we have to admit that technological innovation has always produced and is still generating considerable economic growth. We could say that today companies grow rather on the basis of new product development than on price reduction [4, 9].

Reducing the selling price and the production costs has a limit that cannot be broken. Orientation to new products with increased usage value also settles the issue of worthiness [2]. Schumpeter, in the 20th century, claimed that competition for new products is more important than price strategies. It is obvious by now that the invention, applied and transformed into a resource for the business, has become an engine of development. On the other hand, it is necessary to identify clusters for the approach of regional strategies [10].

Starting from the idea [7] that innovative activities, or more precisely the implementation of innovations, is based on 5 fundamental stages: scientific, technological, organisational, financial and commercial, providing a scientific value is required as study cases for the implementation of innovations, product development and especially the management (in integrum) of the whole as a business.

The assimilation system and the launching on the market of the Adiss products through the company's own means is organised as a hierarchical system. Through this, starting from basic concepts of the product, the design for the commercial system, the design of the product itself, the design for the supply, the design for the production system and also the accompanying documentation system for each product are done. For this system to be feasible, it requires some instruments and methods that should be the basis for implementing the product design system and its derivatives.

The instrument by means of which this system can be controlled is the product life management system (PLM). PLM can, in fact, function as a main resource of secondary information, but also as the producer's note, catalogues, client feed-back, marketing plans, archived design instruments and other items of information necessary during the product lifetime [8].

At a first analysis, the issue seems to be closed, but the modern approaches to the market launching of a new system of products is based, on the one hand, on externalising specialised activity modules; on the other hand, complementary activity modules are also necessary: transportation, servicing, human resources, etc. This is the context of approaching the issue.

**2. CONSIDERATIONS ABOUT THE ADISS METHOD**

The Adiss method of assimilation of a line of products through an organised systemic approach generating an integrated strategy has the following objectives [8]:

- Creating an inner corporate culture of approaching a line of products in an integrated, client-oriented, designer-oriented and constructor-oriented manner.
- Creating a new culture in the relationships between departments.
- Integrating knowledge and assuming responsibility of human resources on domains of competence.
- Creating a technological professional deontology in relation with the contracting - design contracting - manufacturing - supplying - depositing - PIF - guarantee maintenance and post-guarantee clients.

Thus, a system of equipment is designed having as a central element the pyramid of necessary

activities and compulsory for the function of the line of products (Figure 1).

This structure contains 5 stages that, based on certain methods and with the help of instruments, prepares the system for the entire product life cycle. Even in the creation and design stage of a new product, the identification of all possibilities of reducing production costs is being searched, at the same time with increasing product quality in comparison with the existent ones. This structure approaches these issues starting from the analysis of the functional concept of the product. The functions any product needs to achieve are related to satisfying the users’ requirements under optimum conditions. This can be accomplished by using technical-economic methods of analysing the conception, design and execution of a new product. These consist in a series of systematic procedures oriented towards achieving the necessary functions of the products with minimum costs without decreasing the quality, feasibility and performances of the products.

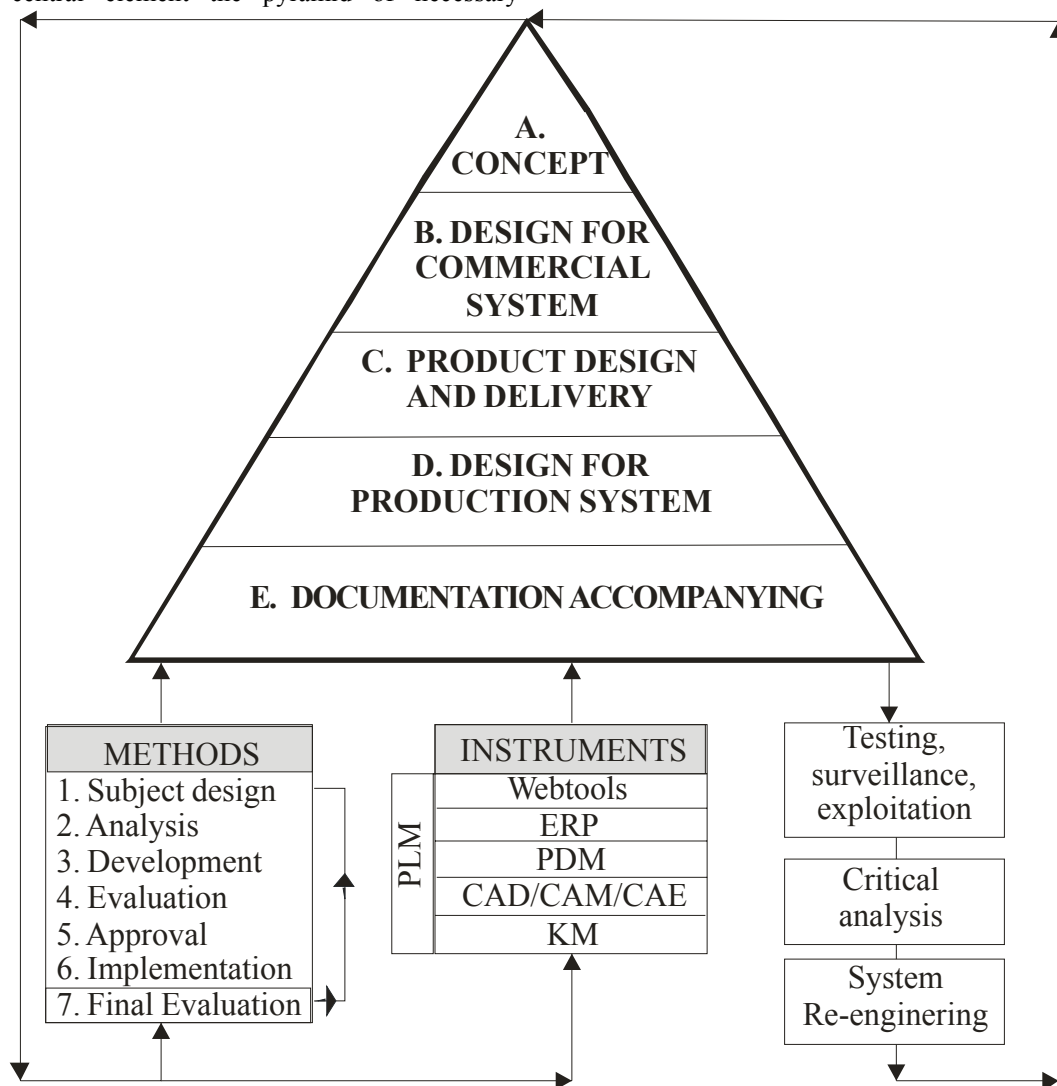


Fig. 1. The pyramid of activities within the ADISS method

The complete documentation of the products implies a complete investigation of the beneficiaries' requirements and a technological analysis which, besides technical drawings, technology, technologic production flow and costs, has to contain a history of the adopted solutions, the encountered difficulties, the alterations operated in the initial project, the functioning conditions, other characteristics (feasibility, lifetime, weight, etc.). In the end, a production analysis is made, which will emphasize the equipment used for realising the products, then those for checking and control, the existence of flaws and their causes, the origins of the raw materials and prefabs that make up the products.

Having the perspective of managing the entire life cycle of a family of products through the PLM system, any producer will propose, for higher efficiency, externalising specific activities so as to coordinate and make the assembly more worthy and, on the other hand, it will try to identify the fundamental technological elements and the technologically supported ones for adding complementary value to the system of assimilated products. PLM, through its instruments (web tools, ERP, PDM, CAD / CAM / CAE, KM), will allow the organisation and management of these activities that are external to the company. Undoubtedly, every activity external to the company may be taken into consideration as a product or a system of products so that the pyramid of necessary activities can be generalised and developed for each of these activities.

The basic activities that can be externalised are the following:

- a) Outsourcing for equipment components;
- b) Technological research and development;
- c) Transportation of equipment systems;
- d) Servicing national network;
- e) On-line monitoring of functioning equipment in the national network.

To these activities that can become business objects convergent to the global objective, which is the assimilation of a technologic product (family) and its diffusion on the market, we must add packets of complementary activities that bring more value to the assembly. As there is a national network of monitoring the system of products, we can say that there is an infrastructure of communicating directly and effectively with the beneficiaries of equipment and components specific to a domain (the supplying company's domain). On such a foundation, we can promote "to the target" e-commerce, e-marketing as a specialised service for equipment and components convergent or complementary to the domain. We should neither avoid the activities of continuous training of the human resources on specialised e-learning platforms, as well as managing, within the network, the potential values of the human resources existent on a national level (available specialists in the field, who can be appealed to, the demand of human

resources, etc.). If the PLM allows managing the whole to the product's end of lifetime, even these activities from the end of a product's lifetime can become complementary activities. In this context, we can mention another 5 convergent activities that can become complementary business through which value is added to the assembly:

- a) e-marketing on the line of monitoring;
- b) e-commerce on the line of monitoring;
- c) e-learning on the line of monitoring;
- d) e-jobs on the line of monitoring;
- e) disassembly for recycling.

In Figure 2, we present the assembly designed in such a way that it can be managed through PLM – each and every component, as well as the entire system.

### 3. PLM SOLUTION FOR EQUIPMENT SYSTEM

The PLM system, through all the instruments it will support, will have to answer to the needs of the 5 hierarchic levels of an equipment system in assimilation. The PLM system will facilitate the development activity of the product, and will have a positive and pro-active impact upon the life cycle of the product [3]. These classes of needs cannot be treated independently, they have to be treated inter-connectedly, as there are reciprocal conditionings. Thus, if the first class of needs focuses on solving existent issues by creating and developing a product (service), the second one will focus on problems much further on in the future, addressing to the potential of later improvement of the product (services). The needs of the two classes can be grouped into the following categories:

- a) Information management;
- b) Management of the activity flow;
- c) Management of product and process alteration;
- d) Improvement of the company's performances;
- e) Increasing system efficiency based on IT usage;
- f) Automation of product development activities;
- g) Creating the infrastructure for effective product development;
- h) Firmity in the company issues;
- i) Improving functional performances.

In short, any information useful and necessary all through a product's lifetime can be managed with the help of a system of managing product data, making possible the correct accessing of the data by all the system users. Taking into consideration all the functions of a PLM system, its implementation does not have to be understood as "all or nothing"; this system will offer significant productivity advantages even if used only by a small group of users [11]. Despite all these facts, when this system will represent the enterprise "working environment" we will see a greater impact upon the family of equipments production line.

Starting from this organisation of the equipment family, structures of data specific for every family component will be created within the PLM system. Each structure corresponding to an object will contain all the information corresponding to the conceptual

pyramid of product development. The fundamental idea is creating basic structures around which derived structures will appear as parameters or with specific equipment complementary to the basic one.

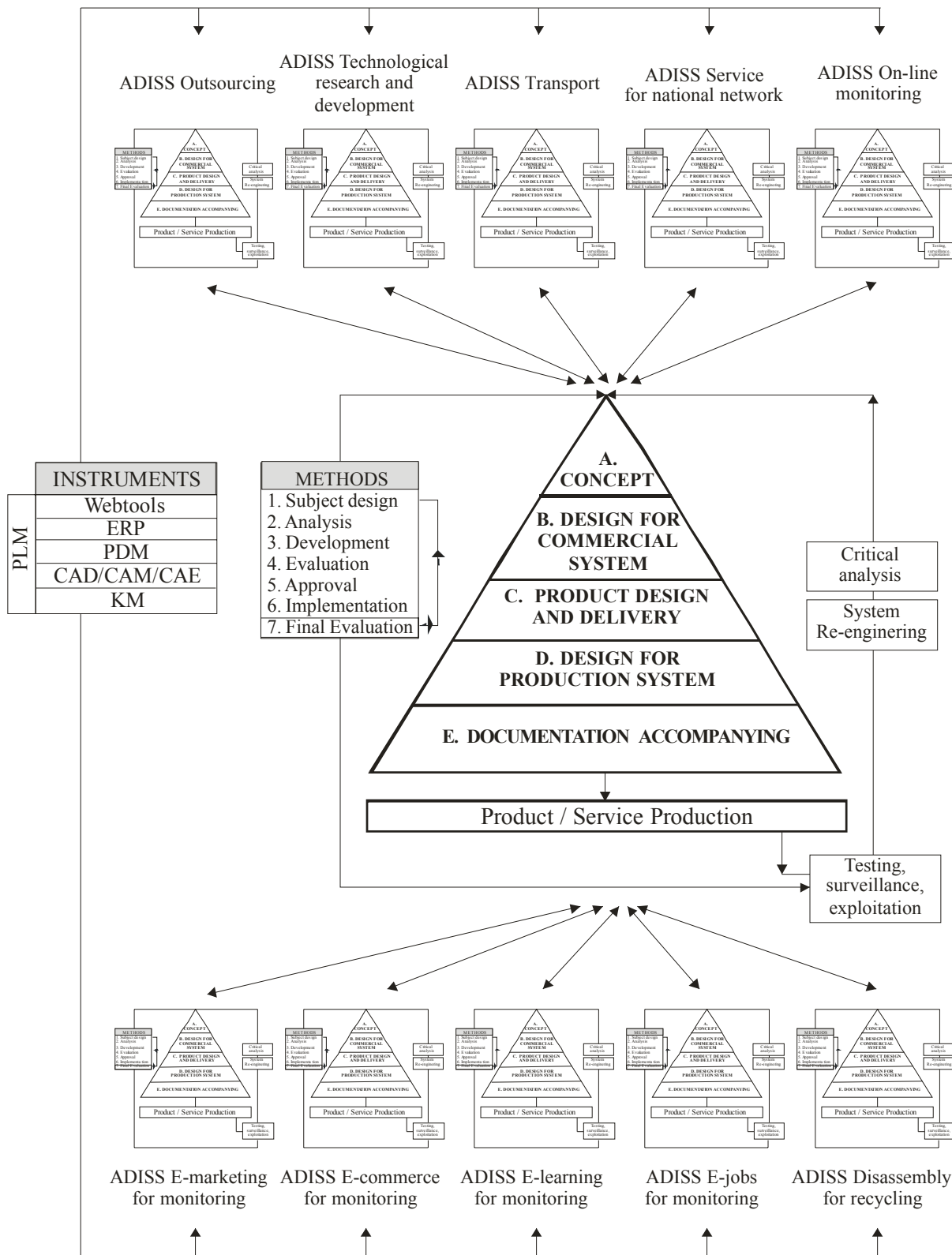


Fig. 2. The Adiss Method including every external activities.

The PLM solution for supporting and following the design, production and maintenance of a product family through the Adiss method will have to be implemented so that it can coexist with an ERP (Enterprise Resource Planning) system. The two systems can be automatically synchronised, eliminating the errors that can obviously appear in the case of manual synchronisation.

In addition, the CAD / CAM / CAE systems will have to coexist around a basis of global data that will represent the nucleus of primary information every basic model of product family has. The other derived models can be obtained by inheriting the characteristics of the basic models. The existence of such a system, generically called PDM (Product Data Management) [1, 6], will ensure both the correct management of every product's data (cataloguing, versioning, securing), and also the possibility of all users cooperating in a challenging work environment.

Another basic instrument of the suggested PLM solution is the system of Knowledge Management

(KM), which will remember the company's knowledge about the product creation, production and supply processes, so that the users can look more efficiently for solutions of solving different problems. This system will have to be interconnected with the system of managing the product data in such a way that the users adopt the correct design solutions from the very beginning and contribute to the knowledge system of the company.

These instruments are necessary, but will be specific for each entity that takes over one of the basic activities or of the ones that add value to the system.

Most interoperations of these systems will be made possible by the web instruments through which the system proposes to ensure the whole informational flow (conception -> design -> production -> marketing -> supply -> maintenance).

This complex system, with the above-mentioned sub-systems is presented in figure 3.

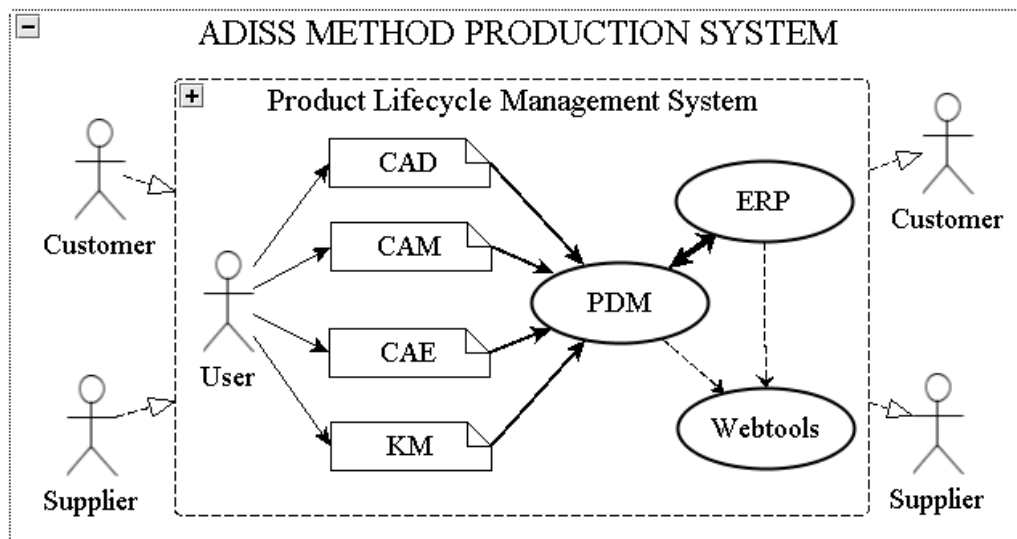


Fig 3. The PLM solution for Adiss method based production system

## CONTRIBUTIONS

- A new concept of global approach of an innovative product necessary on the market has been introduced, concept that can be extended to other products as well;
- Ensuring the diffusion of the equipment family with a higher speed of response to the market needs;
- The built pyramid has allowed the parallel planning of several activities;
- The Adiss method has been assimilated as an element of corporate culture, and it can be approached for other product families as well;

- Participation as collaborators at generating, implementing and achieving, which is in fact KM for the academic environment.

## CONCLUSIONS

The Adiss method allows:

- High-speed development of an innovative product family;
- Comprehensive hierarchic planning and planning activities that occur simultaneously;
- High-speed diffusion as a market response;
- For PLM implementation, an integrated structural basis of approaching product development is necessary;

- For the implementation of PLM, the pyramid of activities must be supported by “methods” and “instruments”, between which connections must be designed;
- The PLM solution suggested for supporting a family of products represents the work frame that will ensure the process of information organisation;
- PLM is implemented within a new corporate culture.
- Integrating the CAD / CAM / CAE design activities around the PDM system will make it easier for the enterprise to get accustomed to the new organizational and technological trends requested by a real collaborative environment.

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