THE IMPACT OF IT ON PRODUCTION MANAGEMENT

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Abstract:

The integration of computer applications into industrial enterprises is imposed by the necessity of real-time decision making in order to meet the frequent changes within a business environment. In this paper, we have tried to identify the impact that IT has on production management as well as the need for planned changes enabling effective implementation of integrated information systems. At present, the integration of software applications has developed into CIMOSA type (Computer Integrated Manufacturing Open System Architecture), which allow computer modelling of business processes, taking into account their knowledge bases. The implementation of such computer models facilitate the use of expert systems and other forms of artificial intelligence, capable of reasoning through a problem in order to reach a conclusion.

Key-words: *knowledge based society*, *artificial intelligence, business processes, CIMOSA.*

Clasification JEL : *M40, M41*

Introduction

In the knowledge based society, the success of an enterprise depends on the way it adapts its management system and IT infrastructure to facilitate the implementation of its business strategies. In a new era, decision-making process is characterized by[1]:

- complex interactions among decision-makers in organizations;
- alternative and, at times, conflicting criteria used in decision-making;
- constraints on resources: human, financial, natural, time etc.;
- global reach of many decisions;
- high impact of many decisions;
- increasing risk and uncertainty;
- the importance of dynamics and realizing a timely response to evolving events.

An up-to-date IT support contributes to the capitalization of knowledge, to a better manufacture efficiency and flexibility, to an efficient performance monitoring and a better substantiation of all decisions. In practice, there are numerous approaches for business process modeling. The IT development has allowed the appearance of CIM (Computer Integration Manufacturing), and later on the appearance of IT modeling informational architectures for all the processes in an enterprise such as CIMOSA (Computer Integrated Manufacturing Open System Architecture).

1. Essence of production/operations management

The traditional view of manufacturing management is the concept of Production Management with the focus on economic efficiency in manufacturing. Later the new name Operations Management was identified, as service sector became more prominent. Rapid changes in technology have posed numerous opportunities and challenges, which have resulted in enhancement of manufacturing capabilities through new materials, facilities, techniques and procedures[2].

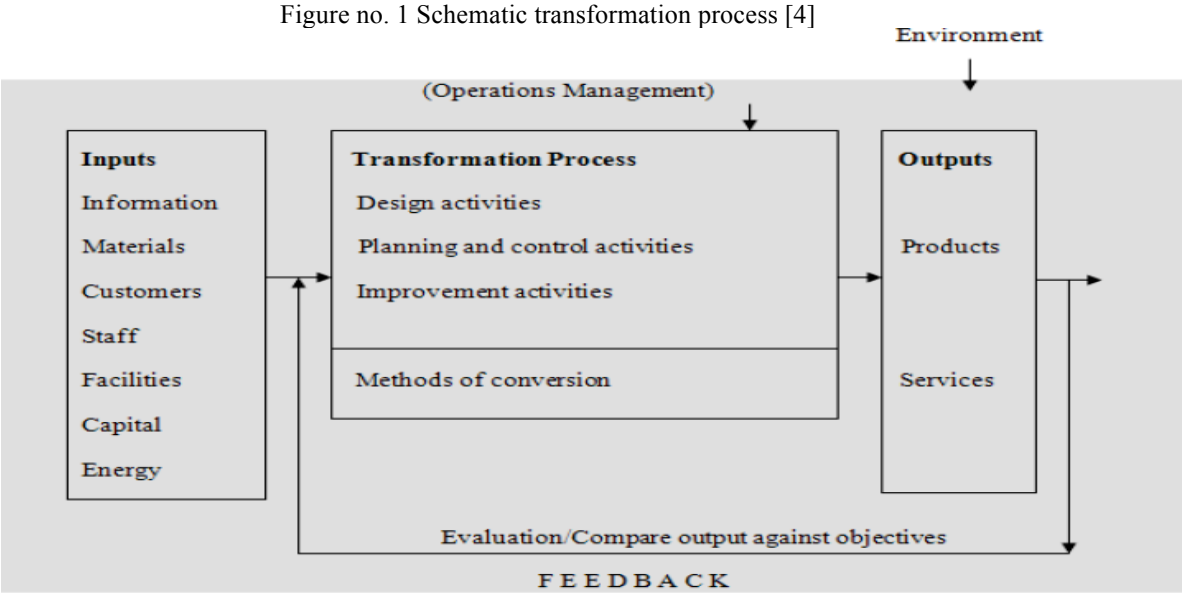
So, operations management is the activity of managing the resources which are devoted to the production and delivery of products and services.

The main field which operations management is concentrated on is managing the sources directly taking share in product manufacturing or providing a service by the organization, achieving the strategic

goals of the organizations. Sources are usually represented by people, materials, technologies and information. They are combined together by a number of processes in order to be used for acquiring an organization primary service or a product[3].

Schematic transformation process is presented in Figure no. 1.

Figure no. 1 Schematic transformation process [4]



A key aspect of operations management is process management. A process consists of one or more actions that transform inputs into outputs. In essence, the central role of all management is process management. Businesses are composed of many interrelated processes. Generally speaking, there are three categories of business processes[5]:

- *Upper-management processes.* These govern the operation of the entire organization. Examples include organizational governance and organizational strategy.
- *Operational processes.* These are the core processes that make up the value stream. Examples include purchasing, production and/or service, marketing, and sales.
- *Supporting processes.* These support the core processes. Examples include accounting, human resources, and IT (information technology).

Yet, the integration of the specific production management modules with the informatics modules specific for the other enterprise processes contributes to the creation of integrated IT systems allowing for an increased managerial efficiency and efficacy.

2. IT modeling of enterprise entities and activities

The IT modeling of the enterprise processes facilitates an increasing use of the enterprise ontologies for linking business strategy and software architectures.

The CIMOSA architecture has proven to be one of the most complete approaches for business process modeling. The necessary integration between different aspects of the enterprise function, information, organisation and resources, in every business processes approach, has contributed to the selection of CIMOSA for the modeling of business processes [6].

CIMOSA supports the engineering of an enterprise. Continuous Business Engineering can be described as defined correspondence between business strategy and model of IT- infrastructure [7]:

- On business strategy level, a model exits expressing the business strategy of the organisation in question. Forward-development and evolution of this model is performed and controlled by a management process,
- On IT-infrastructure level, a model exists representing the existing IT-infrastructure or the software architecture of the organization in question. Forward development and evolution of this model is performed and controlled by an engineering process.
- Between business strategy and model of IT-infrastructure correspondences exist. These correspondences enable control, assessment and supervision of the IT-infrastructure with respect to the business needs expressed in a business strategy.

Graphs with Results and Activities Interrelated/GRAI Integrated Methodology (GRAI/GIM) was initially developed to model the decisional structure of a manufacturing enterprise for strategic, tactical and operational

planning. GRAI was extended to support the design of computer integrated manufacturing (CIM) systems leading to GRAI integrated methodology (GIM) as an integrated methodology for business process modeling. With special emphasis on the decisional aspects, the concept (analysis), structure (user oriented design), and realization (technical oriented design) phases of the life-cycle concept are supported [8].

Integrated Enterprise Modeling (IEM) supports the creation of enterprise models for business re-engineering and therefore allows for the modeling of process dynamics for an evaluation of operational alternatives. IEM supports the main phases of the enterprise life cycle (requirements, design implementation, and model up-date) [9].

Purdue Enterprise Reference Architecture (PERA) is intended to support and guide the development of the master plan for an enterprise business entity. The methodology covers the complete project of introduction, implementation and operation of an enterprise business entity, which may be either part of a larger entity or be a complete enterprise itself. The life cycle starts with a definition of the Business Entity to be modeled, identifying its mission, vision, management philosophy, mandates, project sponsors, leaders and members and ends with obsolescence of the plant at the end of the operational [10].

The modeling language of CIMOSA is very expressive. All the other methodologies use specialized languages for particular modeling purposes, e.g., language for project description (PERA), language for decision systems and CIM systems design (GRAI/GIM) [11].

The realization of integrated management systems facilitates the use, in enterprises, of different forms of artificial intelligence.

The artificial intelligence systems that businesses use most can be classified into the following major categories [3]:

- Expert systems, which reason through problems and offer advice in the form of a conclusion or recommendation.
- Neural networks, which can be "trained" to recognize patterns.
- Genetic algorithms, which can generate increasing ly better solutions to problems by generating many, many solutions, choosing the best ones, and using those to generate even better solutions.
- Intelligent agents, which are adaptive systems that work independently, carrying out specific, repetitive or predictable tasks.

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4. Conclusions

On the level of production management, the IT implementation has permitted:

- a computer three-dimensional designing for products and landmarks;
- a substantiation and elaboration of the production programs based on real time information;
- an efficient management of the translating planned orders;
- an automatized realization of the technological operations;
- an organizational learning;
- an efficient management for stocks and orders;
- the use TPM(Total Productive Maintenance) and JIT (Just in time);
- an automatic signaling of the manufacture systems breakdowns;
- an efficient management for database an data warehouses;
- the use of balance scorecards for monitoring performances based on indicators.

The lack of correlation between the IT infrastructure and the business strategies may generate major competitive disadvantages for the enterprise, affecting its performances in the long run. For this reason, between the information beneficiaries in the enterprise and the architectures of the IT infrastructure, there has to be a permanent collaboration for the harmonization of the strategic, derived and individual goals in order to prevent the irrational consumption of material, financial, human and informational resources [4].

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