

A NEW MANAGEMENT CONCEPT OF MANUFACTURING SYSTEMS- CONCEPT OF COMPETITIVE MANAGEMENT

- Project objectives -

The aim of the project

The aim of the project is the of a realization study of ensemble manufacturing system - the market in the sight founding lows governs it, the which relations describe it, the which sizes characterizes it, achieved a systems of drive the ensemble. Approching is to general level gift with application in the manufacture produced mechanic serial little in the middling si, envisaging, lastingly, dynamics of the factors of interaction: capital, the market, etc.

Key idea

The Exclusion Principle from biology.

Is taken over from biology Exclusion Principle (Competitive Exclusion Principle) and is applied to the ensemble the format from the manufacturing systems and the market. Fited this in a principle two ecologic system which species compete for same funds coexist if the ecologic factors the constant constant by-pathes. One among two one competitors shall gain again and a second shall be excluded or shall be due to adapted toward an another ecologic niche. Consisted izomorfism between the situation from biology and the situation ensemble system of manufacturare the market. The manufacturing system is analogue being and the like market of ecologic system. Analogously consisted as he is compulsory as the it enterprise is driven for the obtaining of the success on sale and, fited this principle, in case of the failure, entreprise must adapt the conditions were competitive.

On-line learning.

In currently, dates of the monitoring of the manufacturing system by-path transformate in knowledges just in the of a case the project investigatory scientific, then emissive through the system of dissemination. The circuit is overlong and the knowledges is due to arrive directly to the manufacturing system. In the project, is shall followed the of a realization the permanent circuit, on-line, of transform the informations concerning the operation of technological system of the in knowledges generated shares, and its shares is implementate in inside the system.

Comportamental modelling.

In currently the used models in the management of the systems of manufacturare analytic digital his by-pathes neuronale. These building is in all the cases based on investigating experimentally offline of a products, compose of a experimental databases the and this utilization selected from models family, the model most fit.

Amn't raportate in literature cases of systems comportamental modeling, monitoring the current operation of the manufacturing system in cause, to extract on-line knowledges, carry to is used, immediately for the management real-time in respective manufacturing system. In order to drove competitive it was necessary modeling relation among the components of the system. The new concept of drive manufacturing system must to build

on-line the models of the elements of the system and to model the interaction among elements (technological systems, produced manufactured, the market).

The general objective of the project:

The of a new development the concept of drive the manufacturing system, the concept of competitive management the adhibition of the concept for the elaboration of the algorithm of competitive these management systems and the development of the models of comportamental models, on-line learning and of estimate competitiveness and these implementation methods to the of a projection the system of competitive management.

This tackle does as objective project is the following:

Ob. 1. The development the of a new concept of manufacturing system drive-the concept of competitive management based on comportamental modeling and on-line learning

Drive competitive is a concept entered of the research team members investigatory and relieve the way which in is done adjustment of the process from the manufacturing system so that entreprise to obtain a maximum profit, the profit be difference among the sale price of produced and the cost manufactural of same product. In figure 1 is represented the spatial profited the what maximum is can obtained the in conditions date. Is demonstrated as the maximum profit depends on competitiveness entreprise.

It appears the question: to produce many expensive or little and the cheap in order to obtained a how much elder profit is demonstrated as as produced falls flat on sale, competitiveness is good. For maximum profit results that when competitiveness is high becomes more important the productivity (curve p) than the cost (curve c) and the intensity of the process is got closer to the point which Rp represents the intensity of the process for productivity maxim. If the productivity C' it is else little its results profit P'_{max} , the cost becomes else important and the intensity of the process is got closer to the point which Rc represents the intensity of the process for minimum expenditures. In the case minimum expenditures (cmin) the profit is the zero. These are output previous team members and shall constitute the origination of present research. Competitiveness once established shall cause for each elements of the manufacturing system the optimum level of intensity of the process, that is the optimum level of the costs and the optimum level of productivity.

Through competitive management is in progress the accommodation, as per principle of the exclusion from biology, of the manufacturing system in the sight of the increase of the profit. Modeled the interaction among the elements ensemble manufacturing system is shall achieved comportamental modeling. The term of comportamental modeling is entered of us and for this agreement notions shall consider two elements H1 and which H2 interacts between they. As per the figure 2, the element H1 establishes a connection between the entrance X and come out Y(put and output). Element H2 has the entrance Y and come out X. Through interaction modeling (comportamental) them mean as establish the valuable couples (X, Y) I carry satisfy the functions H1 and H2. The multitude of which solutions satisfy both functions H1 and H2 represents the comportamental modeling wherethrough describe the behavior of the elements H1 and H2.

In our propose project, H1 represents the manufacturing system of and H2 the market. A comportamental modeling is achieved in inside of manufacturing system on the base of on-line learning.

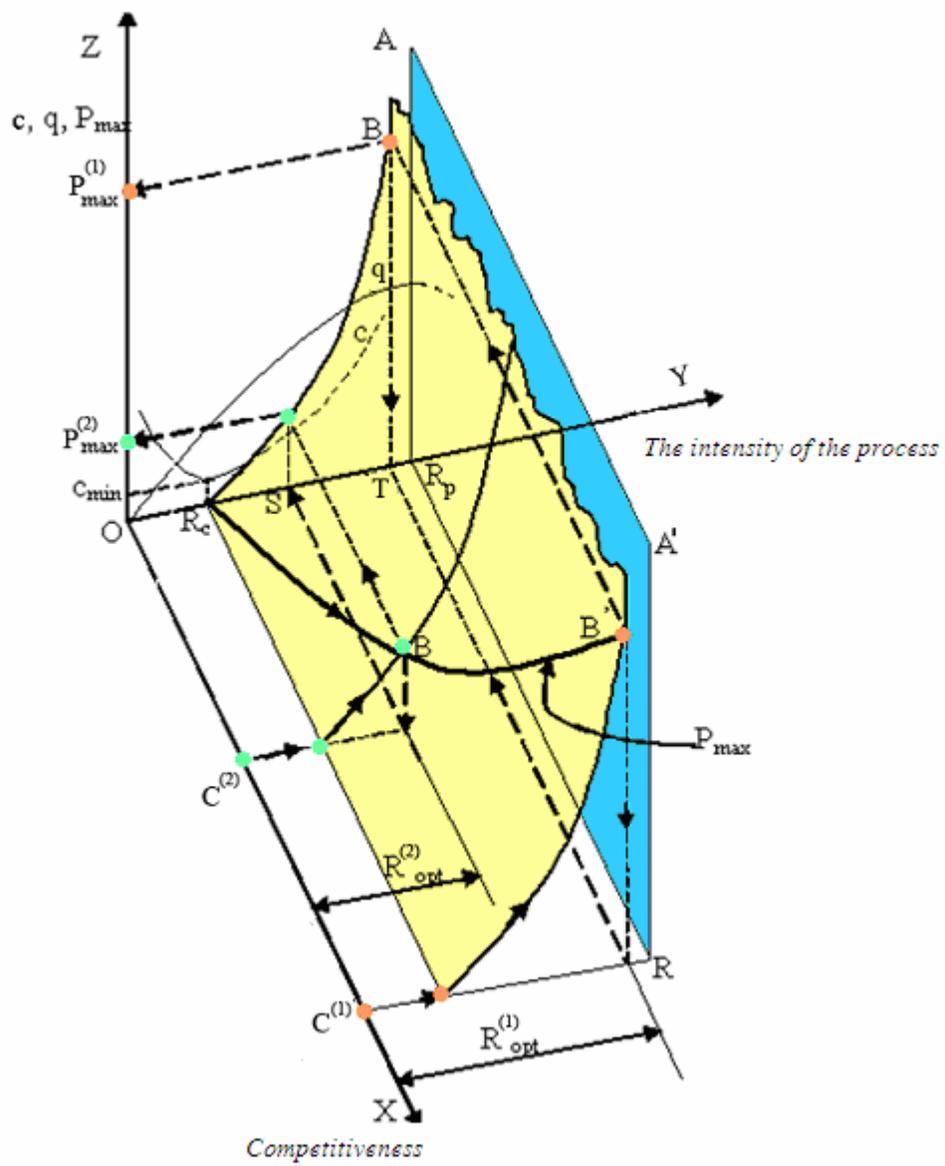


Fig. 1 Curve of maximum profit

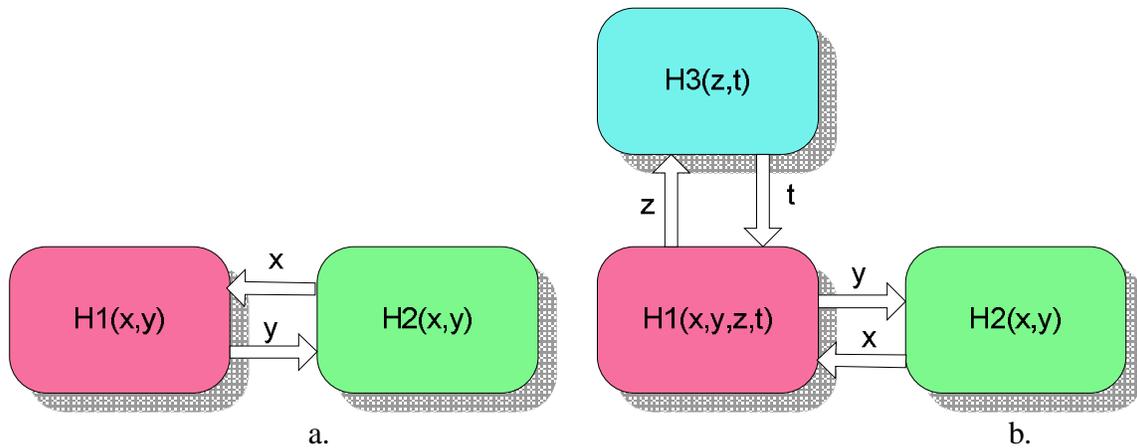


Fig. 2 Comportamental modelling

Ob. 2. The elaboration of the algorithm of competitive management with application to the manufacturing systems of the mechanics buildings

Scheme of the algorithm of competitive management is presented the in figure 3.

On the based of the relation modeling of the market – manufacturing system, punctual indicators of competitiveness and the modeling manufacturing system is achieved comportamental modeling of ensemble the manufacturing system - market and the implementation management. The manufacturing system receives instruction concerning the way of carrying on the manufacturing process in the aim of the increase competitiveness enterprise.

The algorithm of modelling the relation of the market - manufacturing system comprises the use of the database, extract of knowledges through the data- mining and the realization of the model through technique reinforcement learning. To obtain punctual indicators of competitiveness are shall constituted databases from average competitionl the and are shall extract knowledges in the sight evaluation competitiveness. The algorithm of model the manufacturing system achieved through monitoring this and the of a realization databases concerning the parameters functional and economic and obtain the model through techniques of unsupervised learning.

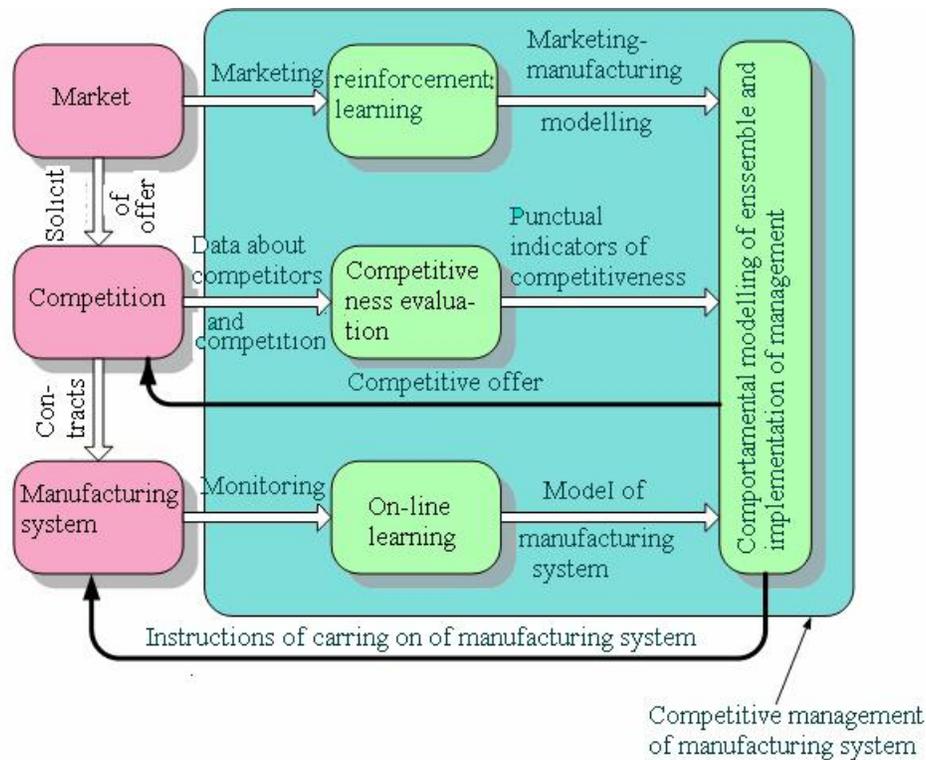


Fig. 3 Algorithm of competitive management

Ob. 3. Conception of a methodology of mathematical evaluation and the on-line identification of tehnico-economical competitiveness of manufacturing system

As per the concept of competitive management, carry comprises the 8 is based on comportamental modeling and on-line learning, needs to is known the each in the moment the state of the manufacturing system, that is the relation among this capacity operated to optimum parameters of performance and average economic, at one time, in a situation the date.

Answered hereto required generates it the methodology of mathematical evaluation tehnico-economical competitiveness of manufacturing system in strict frame caused. In the concrete case of the manufacturing system performance is can estimated through installment of the profit of the in of the report with the expenditures, with duration of the process, with digit of business.

The elaboration of the relation, which named it of stand the system, is necessary the settlement and the of a quantification attributes of the manufacturing system, the quality, the flexibility, the predictability, beside attributes ale external this environment of the market segment, the evolution of the dynamics of the requirements of the customers, the price market, the systems these concurrent. Attributes constituie in variables ale the system wherewith is operated and through their connexion logic is caused the relation of state, what it characterizes qualitative his quantitative and competitiveness of the system S in of punctual way, that is for produced P, to the moment T, on sale X, in concrete conditions.

Comportamental modeling, conceptual term defined and entered of us in this frame, enable as the attributes are can interfere and which become thus made to order his variable check, to is used-up for the functional adjustment of the system of the in the

sight of the touch of optimum values ale competitiveness.

In the substance, the methodology of mathematical evaluation the and on-line identification competitiveness shall generate solutions for knowledge of the measure competitiveness, in modulo punctual explained hereinbefore and on the strength of on-line learning to put at command management data and solutions for the elaboration of which politics visas obtain, the preservation and increase of the level tehnico-economical competitiveness.

Ob. 4. Conception of a algorithm of model operation of technological fittings based on-line unsupervised learning

This objective has as the aim the quick elaboration the precise and of the model of technological system wherewith is can done compatible technico-economical competitiveness the manufacturing system with the conditions enforced of the market. On the based of monitoring operation of technological fittings from the frame of the manufacturing system established the consumptions and the costs of technological operations. The cost is an which function depends on the products and of the intensity of the process of manufacturing. After drowing of curve the productivity and expenditures (p and c from figure 1), as well as one profited maximum Pmax, depending on competitiveness is regulated the intensity of technological process, achievement thus the accommodation for the procurance of maximum profit. Through adjustment intensity of the process of manufacturing and through on-line unsupervised learning is adopted the model of the system of manufacturing of realization competitive. It is comportamental modelling because it is based on monitoring of the an interactions of the elements components of the manufacturing system the and on the permanent circuit of informations the exterior and inside of the manufacturing system.

Ob. 5. Conception of a methodologies of modelling, in real-time based on reinforcement learning, of the relation of the manufacturing system with average economic.

The process of learning, at large in, is a process an in abaft whom a system of manufacturare improves the capacity of act so that, in temporally of a subsequent solicitations, this undertakes shares with efficient increase. Conception of a methodologies of modelling the real-time based on reinforcement learning the relation of the manufacturing system with average economic, it means as the manufacturing system ‘learn’ what to do in certain situations, on the based of given data of average economic, so that the shares undertaken to lead to the increase possibility of touches the suggested aim. The system is due to ‘exploit’ what knows already obtained the profit, but must in same in the same time to ‘explore’ the possibility of finding other future actions. The manufacturing system must try a variety of actions and then to chooses them on those which even optim.

Is done an evaluation of the an evolution of average economic state, on a distance, and give a ensemble modeling based of the past events. Through reinforcement learning is understand the capacity of the manufacturing system to learn permanently in interaction with average economic, to inform and updated the informations about to auctions and anticipated took the statement, the level profited, and how to acted well. The relation modeling of the market – manufacturing system simulates, on the based of a average

states and of a shares of the manufacturing system, the behavior ensemble and can predict which shall be the next state the and the result obtained. The relation is used-up for planning, that is for the of a taking decisions concerning comportamental modeling of ensemble the manufacturing system -market through of a possible considering future situations before these states to be experienced. After each possible situation the manufacturing system modifies the comportamental models so that they to lean towards the values his next states most probable. Through the process of learn, the manufacturing system will be leaved to execute a series of actions according to the instruction of the comportamental model of ensemble and is shall selected that which act shall it bears it capable in with maxim competitiveness.

Ob. 6 Studies of cases considering to the implementation the new concept of management manufacturing system

For the verification of the accuracy and applicability of the concept of competitive management of the manufacturing systems is the necessity of results obtained the practices on a concrete cases. This in the sense is shall simulated and modeled a real manufacturing system of a enterprises which pilot works the in real conditions on a real market with values ale parameters taked from the economic reality. This in frame through the utilization of the methodology are shall enter the values of the attributes generate through on-line learning, is shall caused state of the system and respective the solutions for the of a optimum realization of competitiveness. These are shall applied the model and are shall caused the solutions for the generation of the politics of management.

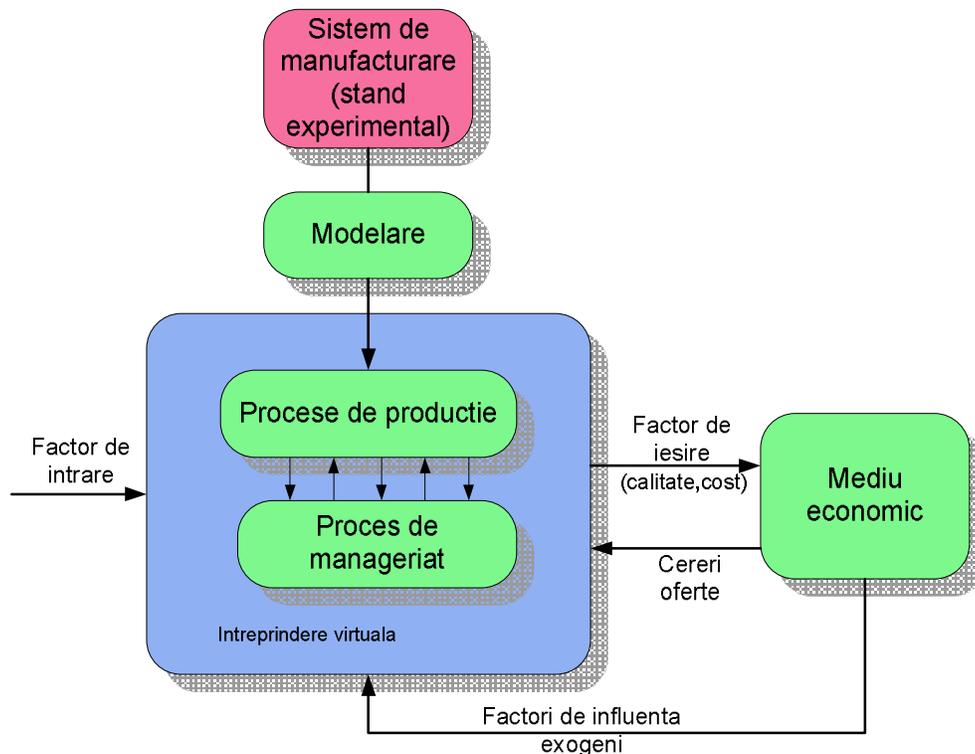


Fig.4. Experimental system using for concept validation

Elements of originality

1. The in a treatment new original manner of the competitiveness problem of the enterprise, through the utilization of modern methods of investigation, carry envisage all the which factors compete to the assurance, maintain and increase competitiveness of industrial enterprise.
2. The elaboration of the methodologies of mathematical evaluation of a technico-economical competitiveness of manufacturing system.
3. The elaboration of a new concept of drive the manufacturing systems based on comportamental modeling of ensemble manufacturing system – market and the implementation of management to the level of the manufacturing system which is general applicable and proper of current requirements ale of the market.
4. The utilization of the method reinforcement learning of the in the assurance adaptability of the enterprise to the requirements market

Importance of the project for the area the visa is determinated as a matter of fact as the in don't exist tackle it complete a notion of undertook and the multiple emphasis parameters of which depends, the diverse areas of appurtenant the parameters(techniques, economically), the relations between these and the way which in can be monitoring and these controlat relations.

Us tackle and new concepts concerning the evaluation and then drive toward undertook faults in the welcome acute must of current stage, losted and implemented scientific solutions with large practical applicability for the acquirement technico-economical competitiveness.

Estimated impact of the project

Scientifically, impact of the project is materialized the in:

- The development to conceptual level of of a new ideation concerning the complet treatment the interdisciplinary and of the notion of competitiveness manufacturing system utilizing the extrapolations and innovating approach of exclusion concept from biology, of the competition from nature, from economy;
- The development to conceptual level of of a new notion of mathematical evaluation the and identification on-line of competitiveness manufacturing system, that is this state on the strength of the econometric analysis of technological and utilizing the total amount parameters of what state characterizes the process;
- The development of the notion of competitive management of the manufacturing system through comportamental modelling and on-line learning. This in the context major impact of the project consist in approach original manner, analytic competitiveness, drove competitive, carry opens new scientific advanced horizons in imagine of a systems of able operated comportamental with technical appearances, economically, managerial the commercial and, therethrough covering an area of study unoperated until now, what it connect manufacturing system with average economic.

From industrial viewpoint, impact of the project is materialized the in the of a development generations of industrial able his enterprises turn to good account completely and durable the scientific progress from the area of the economy based on

cognition, promoting a new equilibrium between technology, economy and society. This new generation of enterprises shall arrive at the capacity of realization in economic conditions, produced personified to the level quality prompted of the market.

The interdisciplinary character.

The objectives, contained scientifically, and approach of the project have the interdisciplinary character, because satisfy the basic conditions for this attached character. These are:

1. Advert to scientific aspect of a appearances different areas, forming a coherent ensemble with an own architecture;
2. The ensemble the format is can develop stand-alone, having potentially became the in temporally a new area with objective, shares and own low.

The area of the project found out to the intersection of the triplet of discipline Engeneering -Management Econometry, with the disciplinary triplet Observation Technology – Information Technology- Cognitive Technology (fig.5).

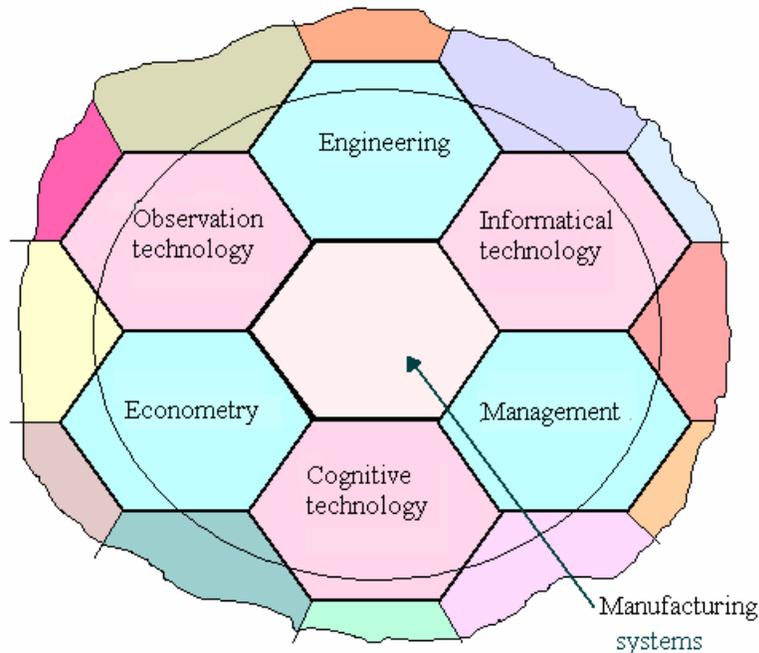


Fig.5 The interdisciplinarity

The technology of the information wherethrough is adverted to a new concept of analysis and model the systems based on a new tackle; The econometry wherethrough of the adhibition respective approach to the economy system of enterprise the all in his complexity; management wherethrough don't is can studied a process of production than in company with the process of management; engineering wherethrough don't is can tackled the central concept of the project of competitiveness entreprise than through prism of the coexistence of the appearances technico-economical management; Observation Technology wherethrough extracted knowledges from databases; Information Technology wherethrough the process of management just as is stipulated the in the conception of the project is based on an intellective system wherewith the used-up knowledges in management am taked over from the element driven.

This interdisciplinary approach can drive to the of a development area of new study having as objective the creation and drive, modern entreprise, competitive considering whole the system of relations of this with: the market (flexibility, adaptability, reconfigurable), the investor (profit), the operator (adaptability) and the customer (quality).