

CILE: Co-operative Interactive Learning Environment

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Abstract

For a company that is looking to engage new managers from outside or to promote from inside white colour personnel and to train them rapidly and efficiently is getting a crucial problem in the high level job mobility situation today present in Europe. In order to make productive, as soon as possible, new managers, specific training courses (held both in classroom and/or at distance) are filled out.

A successful training path aims to achieve the following goals:

- to teach quickly general base management arguments together with a systemic view of the overall company business area stimulating strategic plan definition oriented to pursue a financial and economic long-term equilibrium;*
- to motivate the best actions in order to keep general business management objectives within both stable and changeable organisation environment;*
- to promote expertise exchange process encouraging a co-operative management philosophy.*

In order to favour successful training process, a Co-operative Interactive Learning Environment (CILE), based on System Dynamics methodology and Flight Simulator concepts, has been developed.

CILE is a multi-users learning environment focused on:

- teaching simultaneously, to different managers, the main concepts of overall company management, putting in evidence the different business area (production, marketing, accounting,) variables relationships;*
- allowing to assign to learner a manager role (production, marketing, accounting) and so, giving to each role the possibility to evaluate, in co-operation with others, decision impacts in different area of action,*
- dynamic and continue mapping of knowledge and changing management vs personnel motivation and needs.*

The aim of this work consist both in describing CILE general architecture and in explaining its potentialities within manager training courses.

1. Introduction

The continuous evolution affecting the European economic situation is going to increase the training needs and to change the teaching/learning approaches. In fact, in order to operate efficiently in the "new economy" environment, characterised by the virtualisation of the main economic processes, managers need to learn in a new and dynamic way. New tools, as friendly as possible, able both to support rapid and effective acquisition of knowledge process and to stimulate, at the same time, individual motivation and awareness within changeable organisation environment are required.

The traditional training methods *teacher oriented*, where the learning process takes place through a passive transfer of knowledge from teacher to student, are joined with simulation method, *learner oriented*. In a simulation session, where space and time are shrunken, the learner can verify the flow of events, he/she can see the impact of his/her decisions in long-term period, thus he/she can understand the link between causes and effects. In practice, through a simulation, the learner gets over the theoretical-applicative gap caused by the clean separation between the training courses performed into the classroom, and the next learning by doing process. In this way, he/she can avoid the dissipation of training materials and assimilate them more rapidly.

A primary objective of System Dynamics is to design simulation models that can help to improve decision making and policy development. Indeed, the System Dynamics simulation models, providing a safe environment for testing strategies and policies, help managers to improve their mental models and to better understand the dynamic of complex systems i.e. the company. The common goal of these models, also called, in a learning context, Interactive Learning Environment -ILE-, Management Flight Simulator -MFS- or Microworld, is to stimulate managers in order to gain a systemic view of the overall company business area during the decisional process.

CILE -*Co-operative Interactive Learning Environment*- is an interactive learning environment which intends, to teach general base management arguments together with a systemic view, stimulate the manager to gain a co-operative approach to management and to promote a creative ideas and expertise exchange aimed to reach common goals. The CILE co-operative structure is realised by means of a simple interface that drives learners/managers to interact during the simulation; the heart of simulator is a System Dynamics model reproducing the typical manufacturing production company dynamics.

2. CILE Architecture

1. *The architectural design of CILE*

In order to obtain a successful interactive learning environment [1] it is necessary to develop a robust model structure with high level dynamic complexity including a significant amount of feedbacks and an interface sophistication, synonymous of easiness and appealing.

The model

The *conceptual model* which the CILE is based on, is the "competitive system model" of M. Porter (Fig 1).

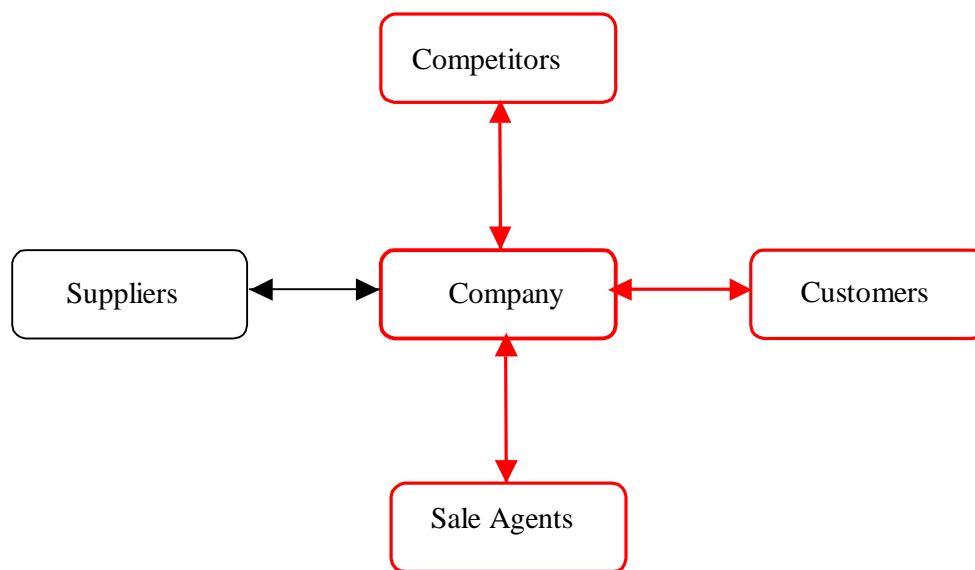


Fig. 1. Revised version of Porter's competitive model.

CILE model reproduces the main dynamics for the management of a typical manufacturing production company and the relationships between the *Company* and the other actors of the "competitive system model", such as *Customers*, *Competitors* and *Sale Agents*. For each actor, as described below, CILE dedicates a specific analysis area.

◆ **Company**

This section focuses on the *Company* actor, analysing it from its main process point of view: production, marketing (promotion, advertising and price), human resources and accounting.

The *production* area represents the main dynamics of the company production process. According to the company strategy, the learner/manager is able to decide the inventory policies (make to order, make to stock or assembly to order), the "lot" (a production unit for fixed number of product to be produced and supplied to customer) sizing and the material requirement planning.

The *marketing* area analyses the impact on company market share produced both by the promotion and advertising activities and by the price policies. The learner/manager disposes all the necessary information in order to determine the proper price policy, or to fix the product price on the basis of the production cost structure and comparing it with competitors one. In addition, in the case study examined by CILE, the sales performance is highly influenced by the efficiency of commercial middlemen activities.

The *human resource* area analyses the personnel management dynamics. In particular, the human resources manager has to schedule dynamically the work shifts and the overtimes in order both to meet the production needs and to maintain the production costs within the budget range.

The *accounting* section represent the corporate economic and financial process: credit management, financial sources and assets management, treasury management. The learner/manager should work out effective policies able both to keep the financial structure in equilibrium and to run efficiently corporate treasury. Besides, the model provides manager with a dynamic credit line, through which he/she copes with the financial shortfall deriving from the delay between credit recovering and debt payment.

◆ **Customers**

This section is mainly focused on the management of the relationships between the company and its customer portfolio. The customers is classified in two types: new customers and regular customers. The first are captured by means of aggressive marketing activities aiming to increase the market share. The second one, instead, are those that, being satisfied by the product system of the company, regularly get in supplies from it. The higher the sale agents efficiency the lower will be the regular customer's sensibility to competitors marketing activities.

◆ **Sale agents**

In the CILE conceptual model the interaction between the company and the market occurs through the activity of sale agents. In order to achieve the company's goals, the sale agents management assumes a strategic role: the agents efficiency determines an increasing of customer confidence and, consequently, of market share. The learner/manager should stimulate the sale agents both assigning and revoking agency contracts, and increasing the commissions on sales.

◆ **Competitors**

This area analyses the relationships between the company and some competitors that aim to reach the same customer target by offering the product system similar to one offered by the company. In particular, the model in this area offers to learner/manager all the levers and gauges able to explain the immediate and delayed effect deriving from marketing actions performed against direct competitors.

The interface

The *graphical interface* was designed in order to support the achievement of the main CILE goal: to stimulate the co-operation among the learners/managers. Besides, CILE is equipped with an help on-line, a system of pop-up messages and multimedia display that lead the learner/manager during the simulation.

For each learner the graphical interface structure is composed by four sections:

- *game schema*: containing information about general game rules, short case description and explanation of business area process;
- *levers*: containing the levers of the business area, through which the learner/manager carries out policies;
- *results*: containing the results (reports, graphs and tables) of the specific business area and the main results of the other business areas;
- *dynamic information*: containing the information about those variables, influenced by other learners/managers, that represent constraints or opportunities for the specific learner.

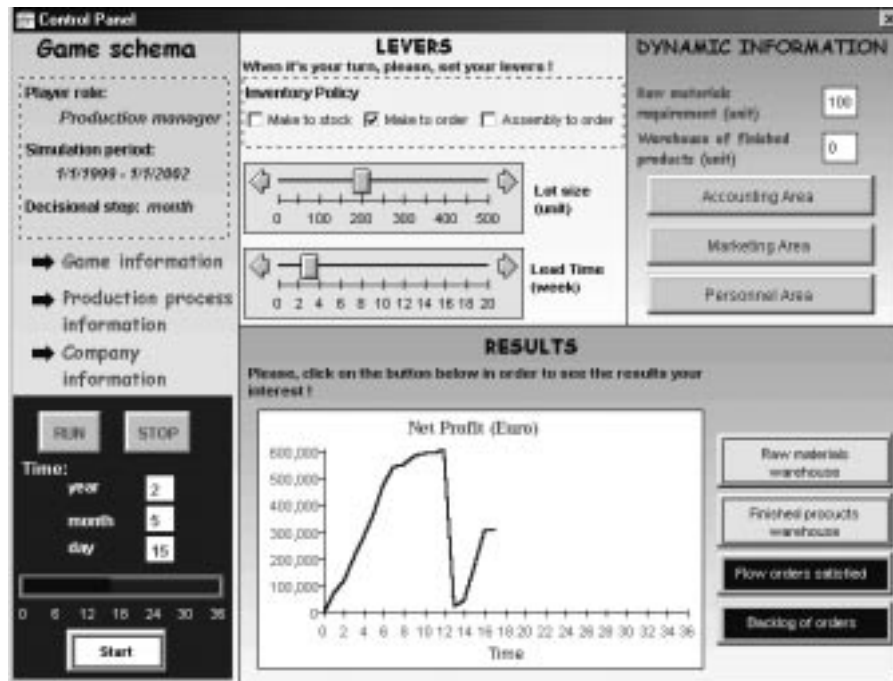


Fig. 2. The Graphical Interface Of CILE

2. Logical flow of CILE session

In a typical session, five teams, composed typically by one to three participants, represent the main roles of the company organisation (top, production, marketing, accounting and personnel manager) [2].

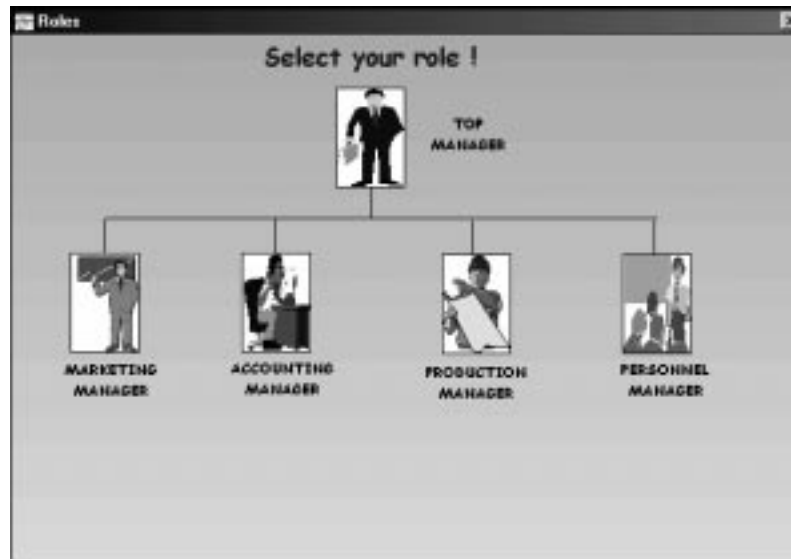


Fig. 2. The Graphical Interface Of CILE

The common objective of each team is to collaborate in achieving an appropriate profitability of the invested capital in order to support a sustainable growth over the long term. The simulation, even if structured in order to stimulate a co-operative management philosophy, favours a light competitiveness that make the game more interesting. In fact, at the final debriefing of simulation session, the performance of all teams will be discussed and compared in order to understand the achieved corporate results.

Each CILE session is composed by four stages: briefing, planning, simulation and debriefing.

Briefing

Since the learners mental model can differ from CILE developer's one, the first stage of a CILE session has to begin with the explanation, through casual loop diagrams, of qualitative model structure (feedback loops, time delays, and non-linear relationships). Indeed, an awareness of the model structure helps to understand the reasons behind its behaviour favouring, of course, the comprehension of the system under study [3]-[4].

Planning stage

Before the simulation begins, the learners/managers are encouraged to design the corporate strategies. They are supplied with the case description and a set of financial reports covering the last 2 years of company performance.

Play the simulation

Once the planning process has been completed the learners/managers implement the predefined strategies using the simulator. The length of simulation is three years, whilst the decision interval is one month. This means that the simulation is automatically paused each month and the different teams are invited to plan the actions to perform for next period. In this

phase they can "try" their decisions before making them effective, taking into account the effects of their "tried" decisions together with other teams assumptions, along several simulation steps.

Debriefing

At the end of simulation a debriefing session is necessary in order to avoid for learners/managers the manifestation of "videogame mentality", that is enthusiastic game without critical reflection of experience.

3. The simulation model

The CILE simulation model analyses the dynamics of the following business areas: production, accounting, marketing, personnel.

◆ Production Area

According to a long-term view, the production manager, on the basis of sales forecast, internal (production capacity) and external (technological and economic factors) constrains, should define a general plan of production (how much to produce), fixing the conditions of production process execution in order to pursue the corporate goals.

During the definition of the production policy, the manager has to plan the best combination of production factors (human resources and equipment) in order to achieve the corporate goals.

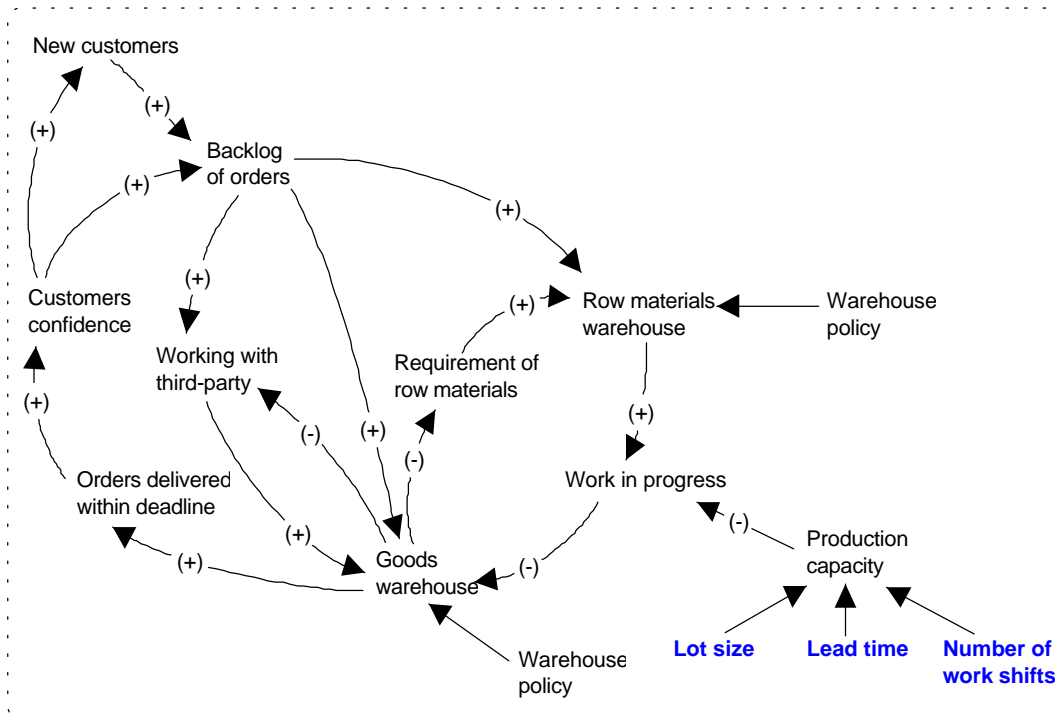


Fig.3. Influence diagram of production area

The main objectives of production manager are:

- to respect the contractual delivery without excessively loading the corporate costs,
- to "balance" best equipment management.

To this purpose, the production manager disposes the following levers:

- planning material supply, according to the chosen inventory policy (make to order, make to stock, assembly to order),
- sizing production average "lot",
- defining the "lead time" per production average "lot".

On the basis of adopted inventory policy and order portfolio, the manager plans the production process for the next months in terms of raw materials supply, production average "lot" and so on. If the level of good inventory and the production capacity are not able to satisfy economically the demand, production manager can ask for working with third-party.

◆ **Accounting Area**

The process analysed by the model concern the management of:

- financial dynamics of all corporate costs and revenues,
- commercial credits and debts,
- financial sources,
- treasury and financial assets.

Credits represent a freeze capital for their whole life period. In case of financial shortfall, accounting manager will be able to unfreeze credits before their natural expiration, having recourse to a "factoring" organisation. Factoring organisation will examine the credits proposed by its customers, will accept only those one which evaluates as sure credits and will advance to them the net value, earning an interest; the credits rejected by "factor" will come back into commercial credit portfolio waiting for their natural expiration.

The process of treasury management aims to assure that corporate treasury is equal to the desired level one, i.e. the level at which financial requirements can be economically satisfied day by day. If corporate treasury exceeds the desired level one, the treasury management process will take care to invest the surplus in financial assets, otherwise it will satisfy the financial requirements by means of the bank borrowing.

The process of financial assets management aims to manage (i.e. buying, selling, cashing of interest, exercising of pre-emptive rights, etc) the financial asset portfolio deriving from the investment of treasury surplus.

The goal of the financial sources management process consists in organising the different financial sources in order both to assure the necessary corporate liquidity and to pursue its economic goals. This process includes both the management of own stock capital and of debt capital. With reference to own capital, the financial policies normally consists in increasing or decreasing corporate stock capital in order both to face up financial requirements and to make strategical actions (such as to issue preferred shares, to drive own shares price, etc.). With reference to debt capital the financial policies aim to select the more appropriately external financial sources.

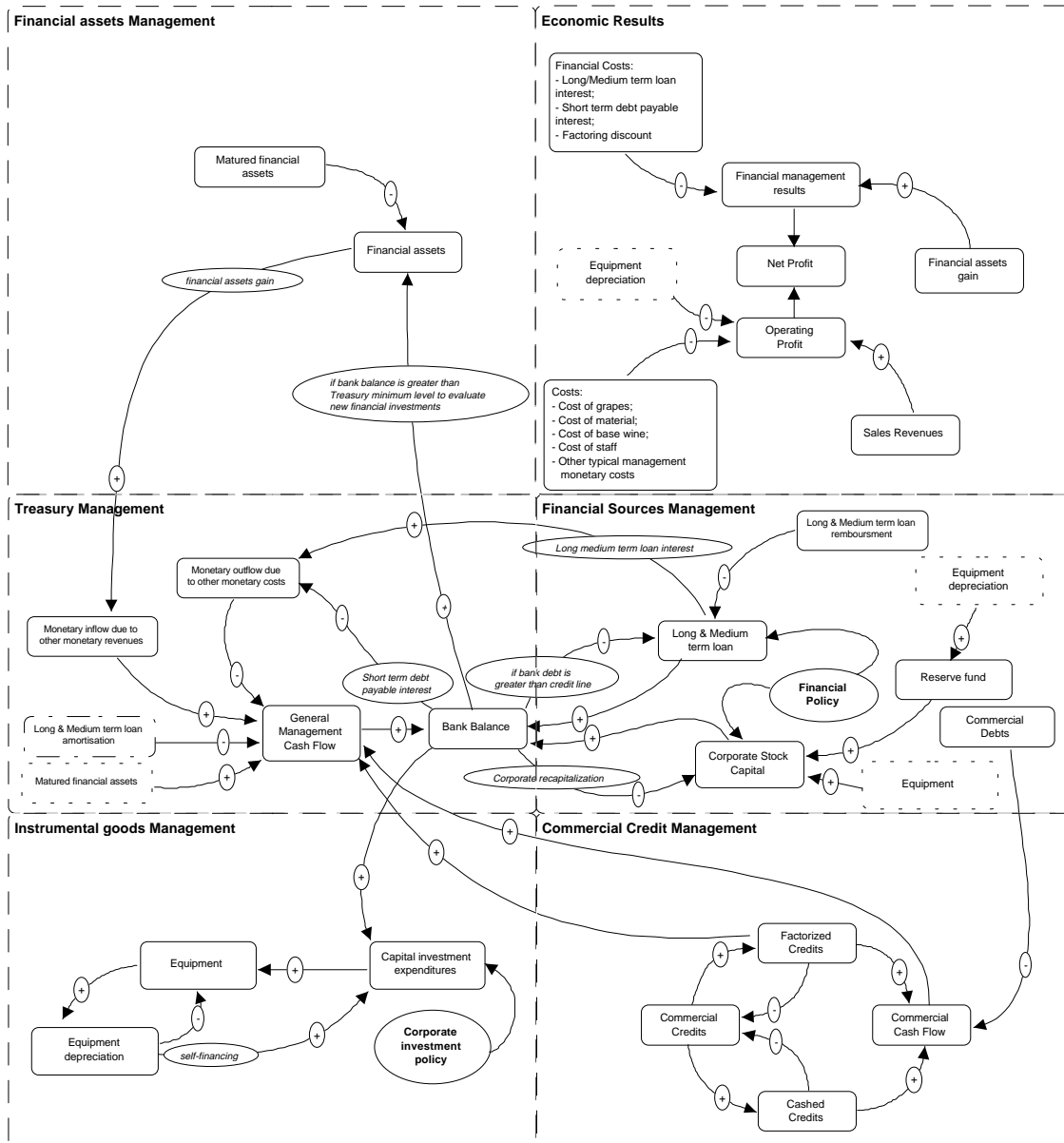


Fig.4. Influence diagram of accounting area

◆ **Marketing Area**

According to the McCarthy's [5] marketing-mix definition, the present model analyses the impact in the corporate market share deriving from the manoeuvres of three of the four "P"s of the marketing-mix:

- Promotion;
- Price;

– Product.

With reference to "Promotion" and "Price", the model analyses the effects deriving both from commercial actions started by the company and those started by direct competitors.

In particular while the company's commercial actions increases the market potential, the sale agents' efficiency allow company to increase concretely its market share.

Marketing actions performed by company stimulate commercial reactions of direct competitors aiming both to reduce the company's market potential induced by its marketing activities and its current market share.

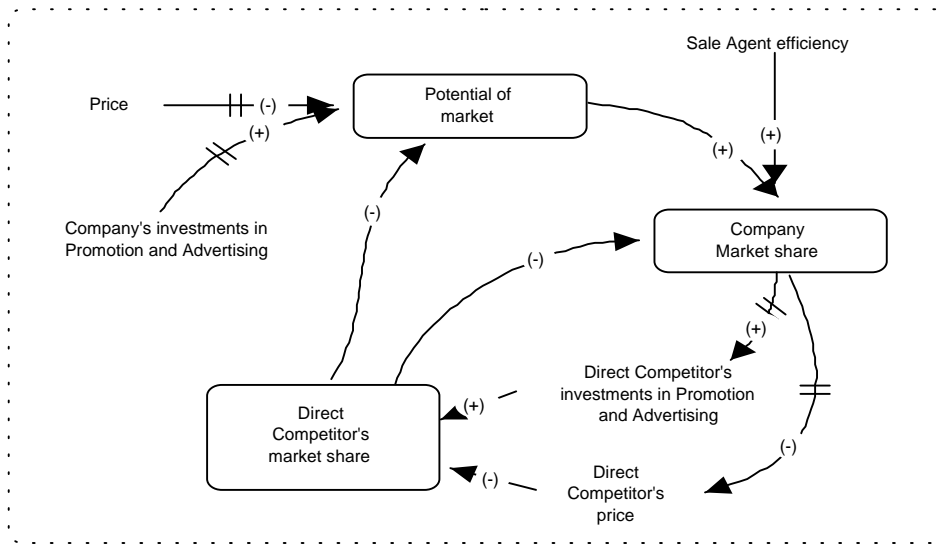


Fig.5. Influence diagram of marketing area

With reference to the third P, i.e. "Product", the model analyses the process of launching a new product. The new product launching requires adequate investments in:

- market and customer analysis in order to identify new customers' requirements and new market "niches";
- research activities in order to identify new product types or to stimulate new usage modality.

The launching of a new product induces competitors to react and perform commercial actions aiming to recover the lost market share.

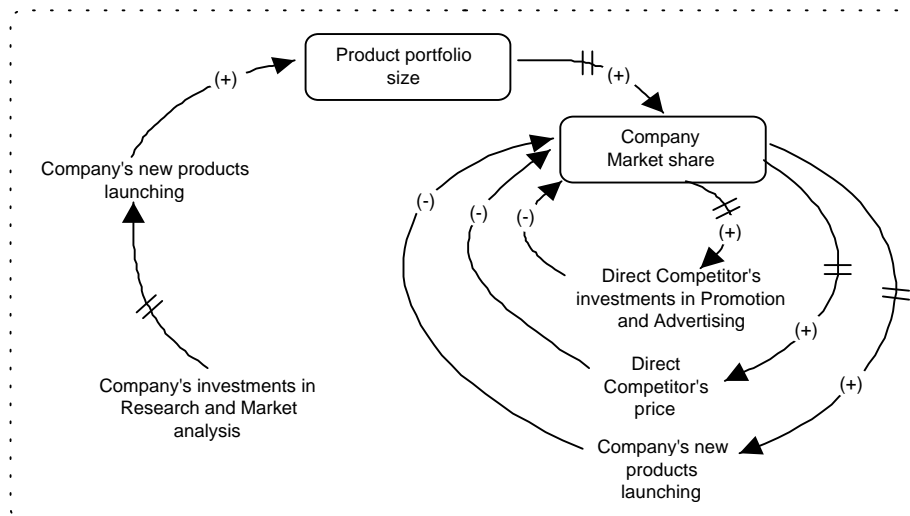


Fig.6. Influence diagram of marketing area

◆ **Personnel Area**

This model area analyses the management and control activities of human resources.

The main objective of personnel manager is to ensure a sufficient number of skilled staff in order to meet the production needs maintaining the production costs within the budget range.

Staff numbers and skills vary as a function of recruitment, leaving (turnover) and training process. The rate of recruitment is determined by the difference between staff necessary in according to production requirements and total staff available, or total staff minus staff on training courses and staff leaving. In particular, the model allows manager to respond to short-term manpower deficits both with time-limit and no time-limit recruitment. Besides, the manager, in order to maintain a proper skill level, has to plan the training courses keeping in mind the short-term production needs.

Hence, the tasks of human resources manager are:

- to schedule dynamically the work shifts and the overtimes, in collaboration with the production manager;
- to identify the recruitment requirements in order to maintain the proper staff numbers;
- to control staff skill level which may have consequences on the quality and volume of production process.

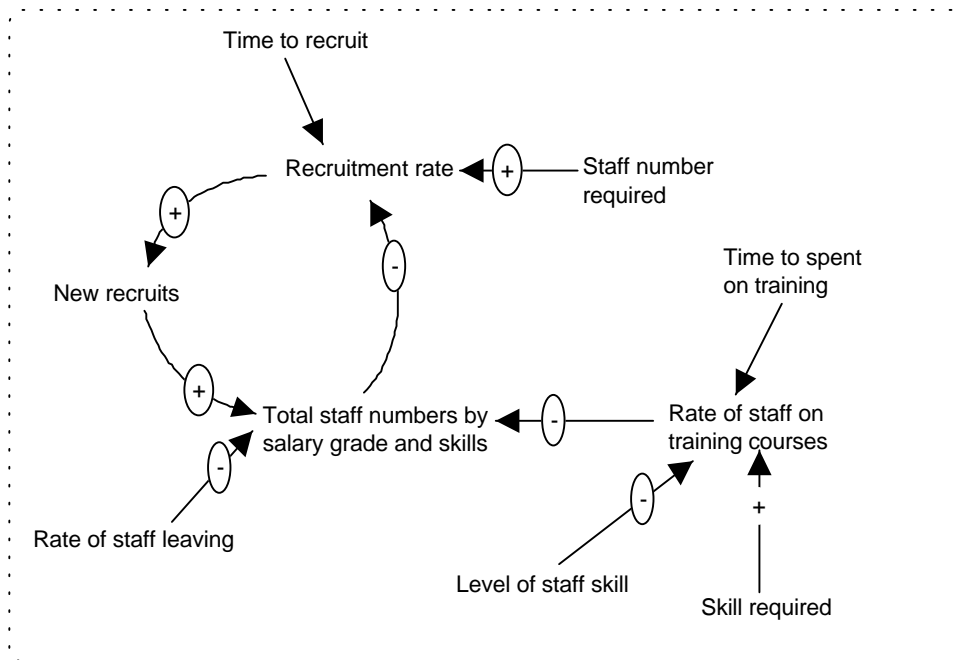


Fig.7. Influence diagram of personnel area

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