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E-Company: A SD Model to evaluate marketing on line investment

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Abstract

Electronic Commerce, Marketing on line, Network economy, … seem to be today keywords of success. But how many managers effectively know about the cost and benefits of starting to sell their products and services through the Web ? How much they should invest at the beginning and how long does it takes to have a break-even point of their investment ?
In order to give a support in better understanding the process of web marketing and so to have more elements to decide to "dive" or not in this virtual world a System Dynamics model has been developed. The model has the aim to support strategic decisions, for company involvement in E-commerce, pointed out to guarantee sustainable growth and medium-long term success.
The project of E-Company, which includes also a detailed training course on the argument, analysed the whole process of investment in building and maintaining a web site, taking in to account the main variables of the E-commerce.
Through a case study a SD microworld model has been developed. The model gives the opportunity to users to evaluate different what-if analysis through the simulation period time (2 years) at each model step time (4 weeks).
The paper will explain the overall architecture of the model and will present some results of use of the model with different conditions.

Introduction

The decision to start up a web marketing project has to fit well into the general company strategy in order to contribute in achieving the goals of its mission. Indeed web marketing "initiatives" which appear disconnected to the general company strategy both run the risk of failure and, sometimes, weaken companies' market shares.
The e-commerce business, beside representing a new market opportunity, also stimulates improvement in the degree of efficiency of strategic corporate functions (such as the logistic one that's going to assume a growing importance in the new economy).
But in order to compete efficiently in the internet market, specific strategies and product systems have to be developed. Indeed, both for network features and for the internet user profile, the traditional commercial strategies don't work over the net. In the virtual market the user plays a very active role; searching for products in which he/she is interested and opposes the spammers, i.e those who disseminate advertisements on web sites and e-mail boxes. This doesn't allow companies to adopt the traditional commercial formula, often based on mass marketing activities, in order to operate efficiently in the virtual trading. In addition, since the Internet network allows (presently) only bytes, and not atoms, to be sent, the trading of tangible goods over the net appears too complicated and expensive.
In this contest companies attacking the virtual market have to project strategies aiming:

- to increase the weight of services in the product system;

- to increase the brand fame in order to induce potential customers to perceive the product as exclusive;
- to reduce the customer's perception of risk throughout the trading process.

In other words E-companies have to organise their product systems in order to induce customers to appreciate the difference between the perceived benefits and the relative costs, measurable in terms of money, time spent in network purchasing activities (such as browsing, e-mails and so on),and mental effort due to information overload, risks, etc.
Once the general idea of the product system is defined, it's necessary to demonstrate the project's long term economic and financial suitability, i.e. the future economic and financial return on investments. In this context decisions regarding the economic autonomy of the "initiative" or its dependence on the general marketing budget have to be made. In this sense the web marketing initiative can be considered both as a project equipped with independent goals and financial sources and as an investment of part of the general marketing budget.
The goal of this work is to provide the general management of an industrial company aiming to attack virtual markets with a tool able to support them to simulate a web based entrepreneurial idea. In particular it consists in developing a learning environment, based on a System Dynamics simulation model, evaluating the effects deriving from alternative e-commerce strategies and policies.
This work was developed thanks to the precious collaboration of LOGO 2000 S.p.A. that supplied all the knowledge necessary in order to analyse the main processes of virtual trading.

The case study

This study analyses the start-up of a new web based business idea. We examined a production company, ECOMOTOR, operating through the traditional chains of distribution, in order to overcome economic difficulties, decided to attack the virtual trading market.
In particular ECOMOTOR is a company producing electrical scooters, designed for use within factories, airports, nature parks, etc., operating in the domestic market. Having occurred an economic crisis due to the saturation of the internal market, ECOMOTOR took the opportunity to develop a web based business "branch" in order to compete all over the world.
To this purpose the ECOMOTOR's strategic planning pinpointed the following intermediate goals:

- to build a very sound brand image in order to induce potential customers to perceive the company's product system as exclusive;
- to increase the weight of services offered by the company;
- to create the image of the "company-customer" relationship as a success factor, by opposing the phenomenon of depersonalisation peculiar to virtual commerce.

Obviously the achievement of these strategic goals mainly depends on the system of policies and actions developed for this purpose. The aim of E-Company simulator consists of supporting the ECOMOTOR general management in approaching the "best" marketing mix in order to enable the company to be economically competitive in this new market. In other words the simulator has the aim to help managers to evaluate the effects produced by the alternative web marketing strategies on all company's sub-systems.

Model description

The E-Company simulator analyses the management of a web-based entrepreneurial idea through the following areas:

- Visitors management;

- Web site management;
- Information management,
- Production management;
- Economic and financial management

Visitors management

The model distinguishes between two types of visits:

- new visits;
- regular visits.

The first one is carried out by visitors that get to know the web site by means of both the company's marketing actions and of the word of mouth factor and browse it for the first time.
The second one, on the other hand, is carried out by accounting-holding visitors who have already browsed the company's web site.

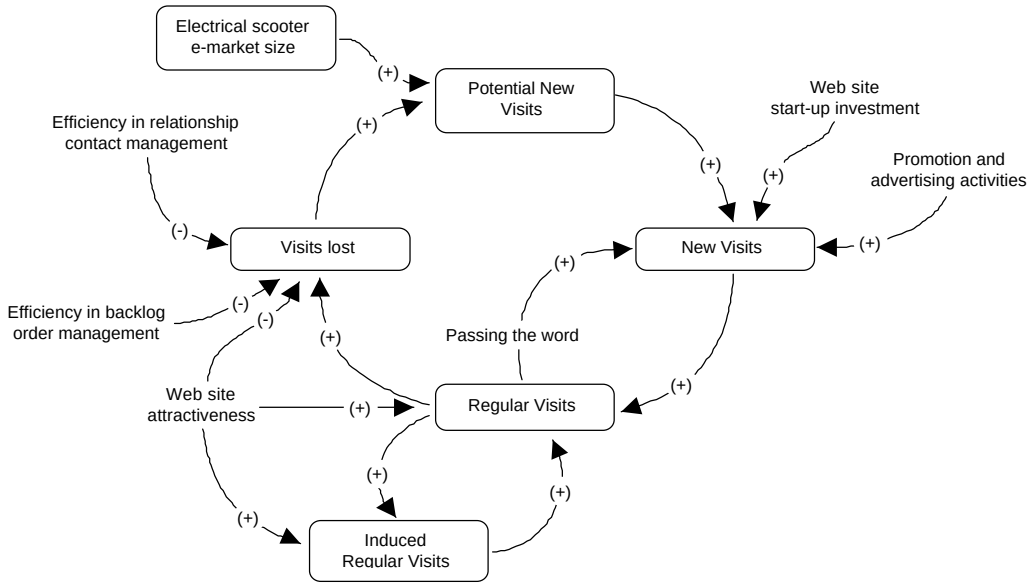

Figure 1 - Users area influence diagram

Figure 1 depicts the main relations determining the dynamics of the "Visitors" area.
In particular the number of weekly new visits depends on:

- the amount of start-up investment ;
- the amount of investment in advertising and promotion activities;

The start-up investment includes:

- the costs of web-site planning and implementation of contents, graphics features and interactivity;
- the cost of web site publishing over the web server of Internet provider;
- the start-up costs of the services necessary to support trading on line such as credit card account, delivery services and so on.

The advertising and promotion investments, instead, includes all the initial marketing activity costs such as:

- search engine registrations;
- banner campaigns;
- all other activities able to promote the birth of the site.

The higher the investment amount and efficiency the greater will be the size of new visits.
The transformation of new visits into regular visits mainly depends on the level of web site attractiveness. The web site attractiveness is measured by a ratio, ranging between zero and one, determined by the relations between the different investments made in order to maintain or increase the web site attractiveness and the requested investments necessary to realise a very high quality web site.
The dynamic of new visits is also influenced by regular visits through the "word of mouth" effect, as with every internet phenomenon. Indeed the management of regular visits enables the activation of a positive feedback loop determining an exponential growth or reduction of visits and, therefore, the probability to collect sale orders. This underlines the strategic importance of the web site management because it is able to activate the phenomenon of company's development or crisis.
In figure 2 it can be observed how strong could be the impact of the attractiveness management on the regular visits dynamics. Indeed web site attractiveness influences the regular visits in three directions:

- by regulating the size of the transformation of new visits into regular visits;
- by regulating the average number of weekly revisits per regular visitors;
- by regulating the size of visits lost.

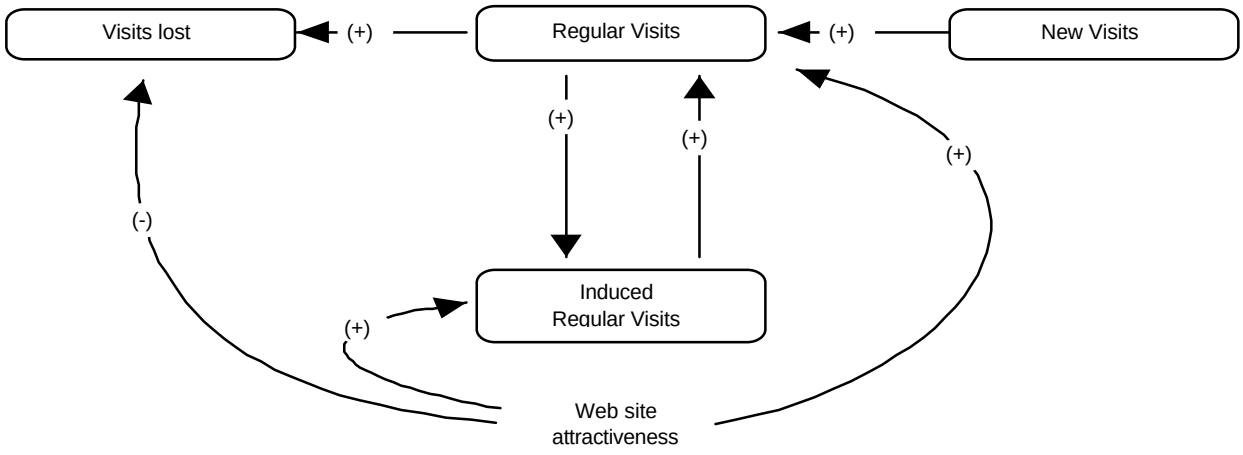

Figure 2 Regular visits dynamics

In the first direction it appears clear that visitors are induced to revisit the company's web pages if their graphic and logical content are appealing and their navigability is satisfactory. Hence the higher the web site attractiveness the greater will be the transformation of new visits into regular ones.
The company's web site attractiveness also influences the frequency of site revisit. Indeed the higher the web site appeal the greater the average weekly number of revisits per regular visitors.
The third type of impact concerns the loss of regular visits. In particular reduction of web site appeal produces a decrease in regular visits because visitors evaluate this phenomenon as the worsening of the corporate's image.

The visits lost measures the number of users not satisfied by company's product system. The number of visits lost, beside the web site attractiveness, depends on the following elements:

- efficiency in the management of customer relationships;
- efficiency in managing orders.

The efficiency in the management of customer relationships measures the appropriateness of the company's customer service organisation to the size of the controlled market. This efficiency is measured by a ratio, ranging between zero and one, representing the company's customer service ability to satisfy quickly and fully potential customer information requirements such as product features, efficiency of delivery, privacy of transaction data, etc. The higher the efficiency, the higher will be the customer satisfaction and the lower will be the number of visits lost.
The efficiency in managing orders, on the other hand, represents the relationship between the management of the web business unit and the other functions of the company such as production, marketing, human resources and finance. A low level of efficiency means that the web site sales potential is higher than the company's production capacity and the company is not able economically to cope with all the orders. Such a situation weakens the corporate image both in the off-line and in the on-line market, determining loss in global market shares.

Web site management

The area "web site management" analyses the following issues:

1) the model of customer contact management;
2) the web site attractiveness management;

Customer contact management

This area analyses the management of the contacts between the company and its present and potential customers.
In particular the model distinguishes between two types of contacts:

- information contacts;
- relationship contacts.

The first one are those contacts activated by potential customers' information requirements regarding product features, efficiency in delivery, terms of payment and so on. These contacts are created through e-mails sent to company's customer service.
The second type of contacts are those activated by company aiming to maintain contact with people that previously had connections with the company (such as consolidated customers and visitors).

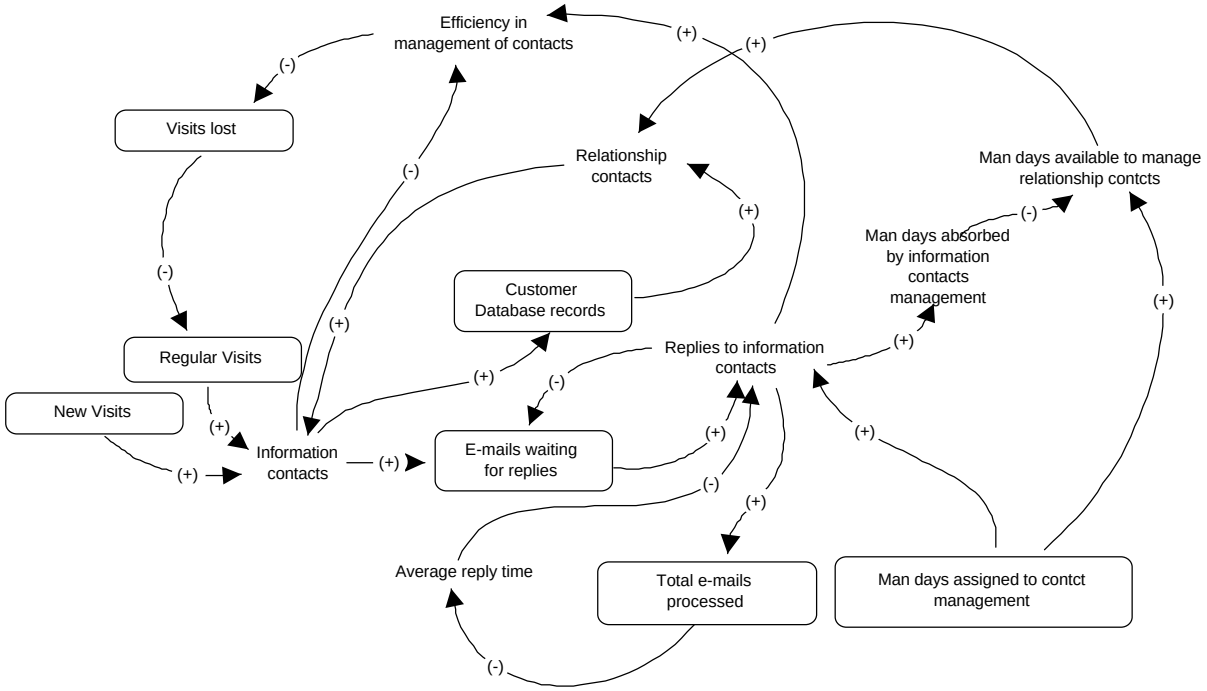

Figure 3 Customer contacts management influence diagram

Figure 3 depicts the dynamics of contact management. In particular the number of information contacts received per week is mainly influenced by the dynamics of web site visits. The higher the number of visits the greater will be the probability to receive e-mails requiring information.
The company's weekly capacity to reply to received e-mails depends on:

- the number of man days assigned to help desk service;
- the average time necessary to reply to each e-mail.

The experience curves concept well explains that the average reply time is a decreasing function of the total number of processed e-mails. Indeed as the number of processed e-mails increases the help desk's personnel gain experience in replying more quickly to them, reducing the average reply time. The reduction of replay time increases the company's efficiency in managing contacts or the ability to efficiently satisfy potential customers' information requirements.
For each new received e-mail at least one record of the customers' database is updated. The customer database is a very important resource because it allows the company to develop marketing activities aiming to maintain or improve relations with present and potential customers.
The main relationship marketing activities examined by this model are:

- creation of mailing list;
- creation of newsletter;
- sending of individual promotional e-mails.

The higher the number of new visits the greater will be the amount of information about potential customers and so the more successful could be the relationship marketing activities.

Web site attractiveness management

As previously stated, the attractiveness is measured by a ratio expressing the general evaluation of the web site in terms of technical features, graphic aspects and content.

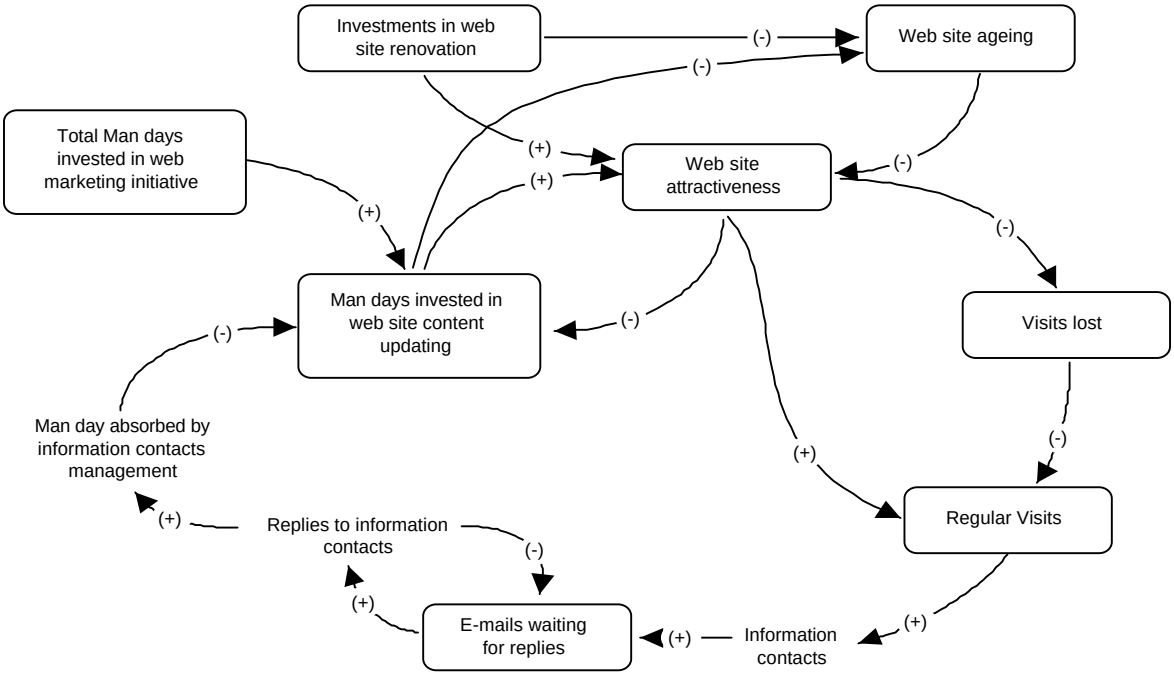

Figure 4 Web site attractiveness influence diagram

The degree of web site attractiveness mainly depends on:

- the amount and quality of web site investments in terms of technical and graphic aspects such as: navigability rate, transaction safety, graphic appeal, etc.;
- the number of man days dedicated to the web site's contents updating;
- the natural ageing process of the web site.

The strategic importance of the web site attractiveness management appears clear in figure 4, because it determines the dynamics of visits, contacts and orders.
Hence it is possible to state that the success of a web marketing idea mainly depends on:

- the web site attractiveness;
- the efficiency in management of relationship contacts and backlog of orders.

Indeed as the *attractiveness* aims to create the sales potential, the *efficiency* attempts to transform it into real market shares.

Information management

This area analyses the management of the new economy's principal resource: *information*. It analyses the problem of building and maintaining the customer database in order to utilise the available information:

- to develop relationship marketing activities aiming to maintain or improve the relations with present and potential customers;
- to adapt the product system to customer needs.

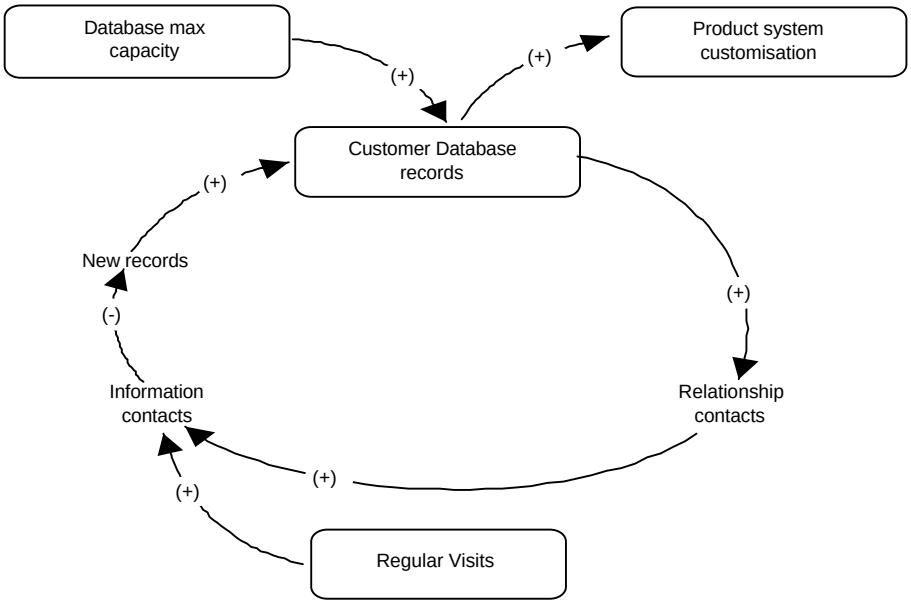

Figure 5 Information management influence diagram

The customer's database records contain precious information about customer needs and buying practices helpful to provide a product system tailored to customer requirements. The database collects information deriving from the contacts between the company and its present and potential customers.

Obviously the greater the amount of information about the customer recorded into the database in terms of customers' e-mail addresses, needs, etc. the more effective will be both the relationship marketing activities and the level of customisation of company's products.

Production management

This area analyses the biggest problem afflicting the development of e-commerce: the interaction between web and supply chain.

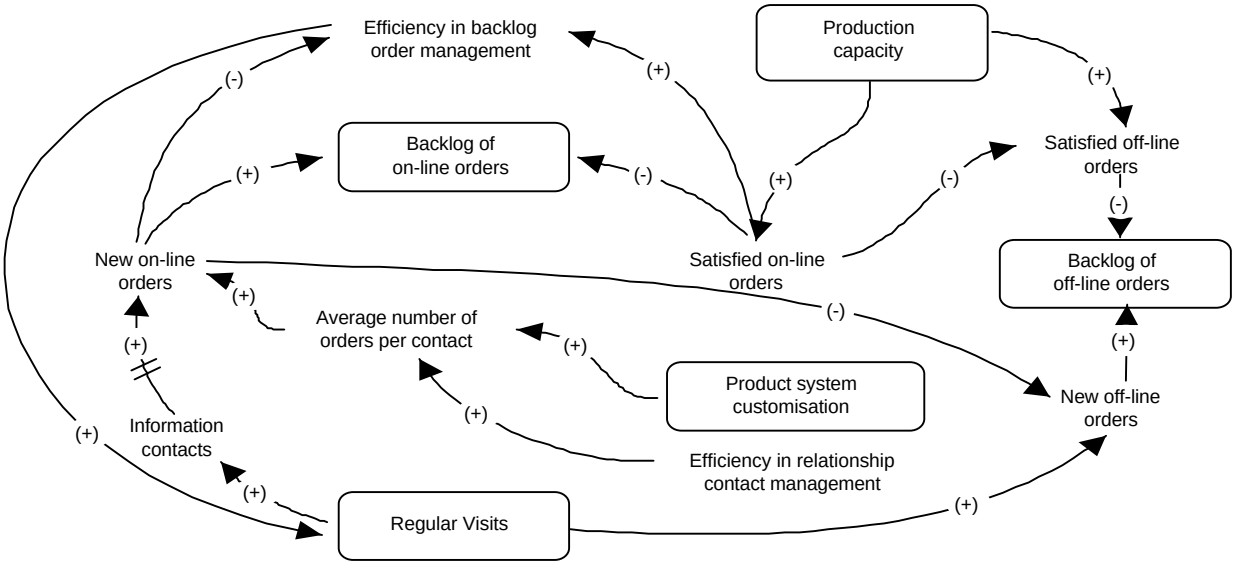

Figure 6 Production management influence diagram

Figure 6 shows the main relationships existing between on-line and off-line commerce analysed by this model.

In particular the received e-mails nourishes the flow of new on-line orders according to the average number of received orders per contact. This percentage depends on:

- the degree of corporate's product system customisation;
- the degree of help desk service efficiency.

The satisfaction of on-line orders depends on the corporate's production capacity, or the capacity to produce and timely deliver the products. But the corporate's production capacity is a common resource, hence a growing use of it by on-line sales decreases the company's capacity to timely satisfy all off-line orders.

Other relationships between traditional and electronic commerce are represented by the following two effects:

1) pulling effect;
2) cannibalism effect.

In figure 6 the pulling effect is represented by the link between "Regular Visits" and "New off-line orders". This connection means that the company's presence on the web also increase its fame in traditional market pushing up off-line sales.

The cannibalism effect, on the other hand, represents the erosion of the off-line sales caused by the increase of on-line ones. This effect occurs when web marketing strategies aim to reach the same customer target reached through traditional marketing policies; indeed in this case customers could be interested to directly buy from producer, avoiding the middle man. This effect is well showed in figure 6 through the link between "New on-line orders" and "New off-line orders".

Keeping all this in mind it is clear that the economic evaluation of a web-based entrepreneurial idea has to be founded not only on the base of the revenue increase deriving from the web but also considering all the effects that such an idea will produce on the traditional market share.

Economic and financial management

This area describes both the economic and financial consequences produced by the decisions affecting the other areas (such as users management, web site management, information management and so on) and the opportunities and constraints that an autonomous economic and financial management offers to the "system of decisions". Figure 7 depicts these relations.

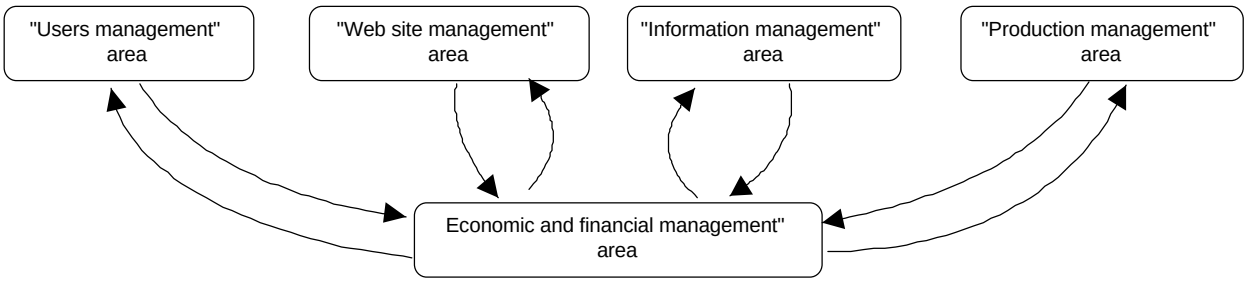

Figure 7 Description of relations between different model's areas

It is first necessary to state that the E-Company model analyses the web marketing "initiative" as an autonomous business unit with a specific budget, its resources, credit lines and goals. However in order to define correctly the business unit's economic results, the share of general fixed costs, contributing to generate the revenues of competence, has to be assigned to it.
This area analyses the following aspects:

- the financial consequences of costs and revenues;
- the management of financial resources;
- the achievement of the break even point.

The following figure 8 describe the main economic and financial dynamics characterising the web business unit of company.

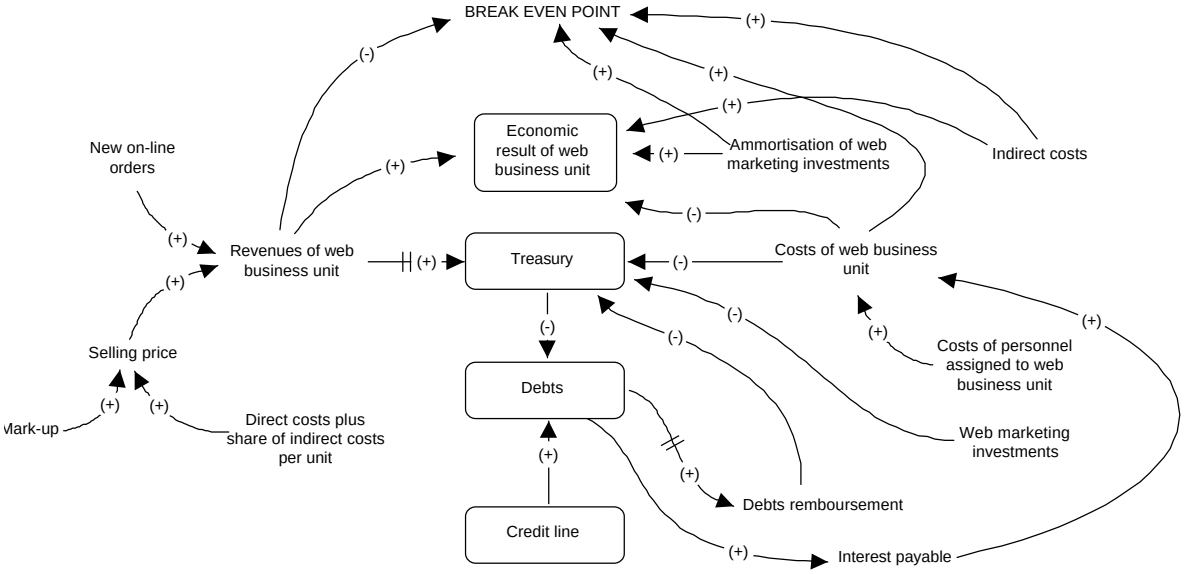

Figure 8 Economic and financial management influence diagram

The revenues of the web business depends on:

- the number of on-line orders received;

- the selling price determined by summing up to the unit full cost a fair mark-up.

The costs are distinguished by the model into three categories:

- direct monetary costs;
- direct non-monetary costs;
- indirect monetary costs.

The first category of costs is represented by the direct costs producing the economic impact before or simultaneously to the financial one. "Costs of personnel assigned to web business unit" and "Interest payable" belong to this category.

The second type of costs produces the financial impact before the economic one. For example the long term investments produce an immediate financial outflow and a postponed economic impact. "Web marketing investments" belong to this category.

The indirect monetary costs, finally, produce only an economic effect on the web business unit while the financial consequences are suffered by other business units. "Indirect costs" belong to this category.

This costs classification is very important in order to assign to company web business unit all relative directly and indirectly costs and so correctly evaluate its goals.

In order to cope with financial requirements, external financial sources are activated within the measure of accorded credit lines.

One of the main goals and output of the economic and financial area consists in determining the "Break Even Point " i.e. the point where costs even out revenues.

Description of the environment

E-Company simulator is part of a detailed training course on the argument. In particular E-Company includes three layers:

1) the front end;
2) the simulation model;
3) the spreadsheet recording the simulation session.

The front end is very simple and intuitive and an exhaustive help on line is available. It contains levers, outputs and simulation commands.

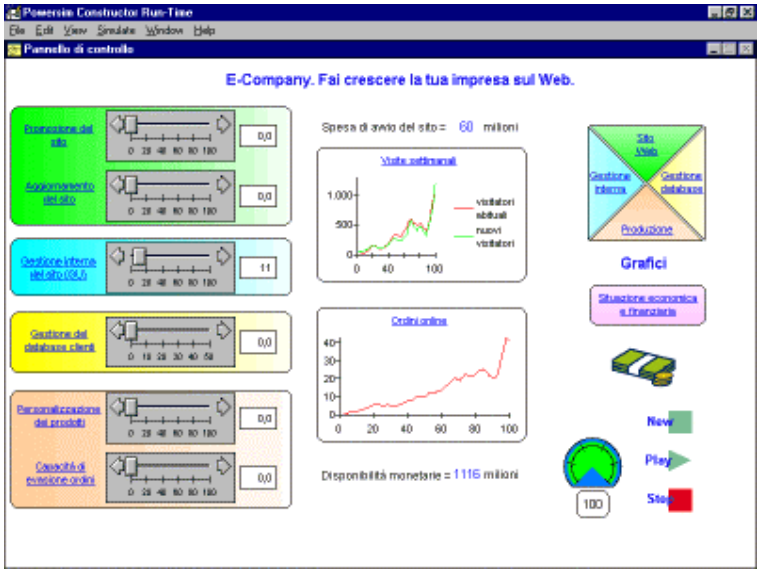

Figure 9 E-Company front end

The System Dynamics model simulates over a period time of 100 weeks (about 2 years) and the simulation is automatically paused every 4 weeks.

All simulation data (both user's decisions and relative simulation results) are recorded into a spreadsheet in order to allow users to elaborate them with the more common office automation tools.

A what-if analysis performed through E-Company

A critical resource of the e-commerce is represented by the human resources, hence the size of man days assigned to the web site management assumes a strategic role. Indeed the human resources management meets a trade off between the corporate image and its production costs: the higher the human resources assigned to the web site management the greater will be the corporate image but the greater also will be the production costs.

Here below two scenarios reproducing two different personnel management approaches are showed.

Scenario 1:

The company aims to increase its *virtual market* share through an aggressive strategy based on frequent activities of web site promotion and content updating. But its personnel management policy aims to increase the staff size only when marketing activities begin to produce their effects. In other words the company's personnel management approach is tuned up a short term view.

Figures below describe the main inputs and outputs characterising this scenario

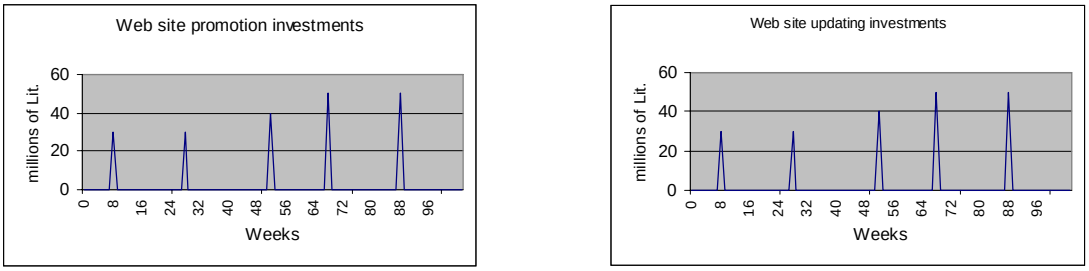

Figure 10 Scenario 1 marketing investments

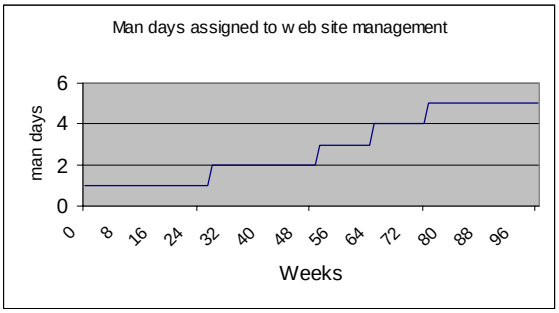

Figure 11 Scenario 1 human resources management

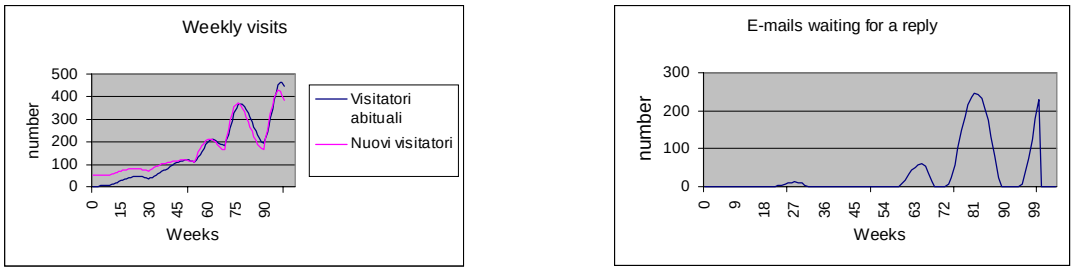

Figure 12 Scenario 1 dynamics of visits and e-mails

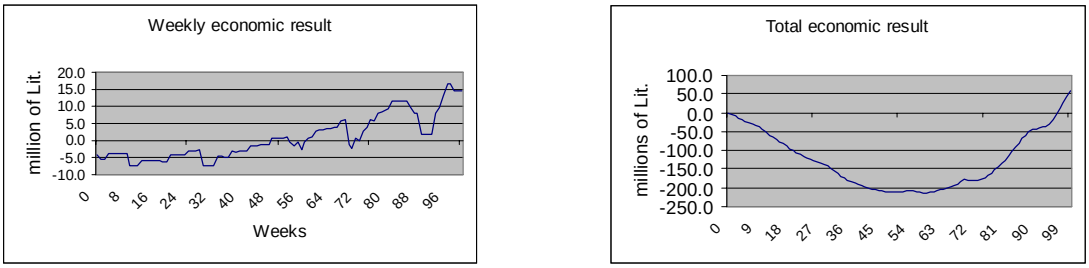

Figure 13 Scenario 1 main economic outputs

Scenario 2

In this scenario the company pursues the same strategy described in scenario 1 with the exception for the human resources management. In fact in this case the company's personnel management is far-seeing oriented i.e. it aims to anticipate the effects of marketing actions. increasing the staff size before them begin producing their effects.
Figures below describe the main inputs and outputs of this scenario.

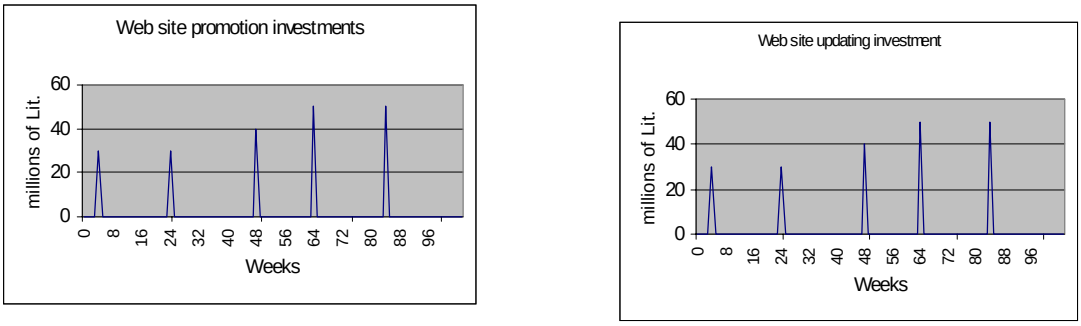

Figure 14 Scenario 2 marketing investments

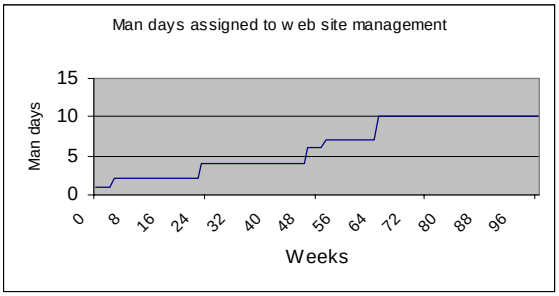

Figure 15 Scenario 2 human resources management

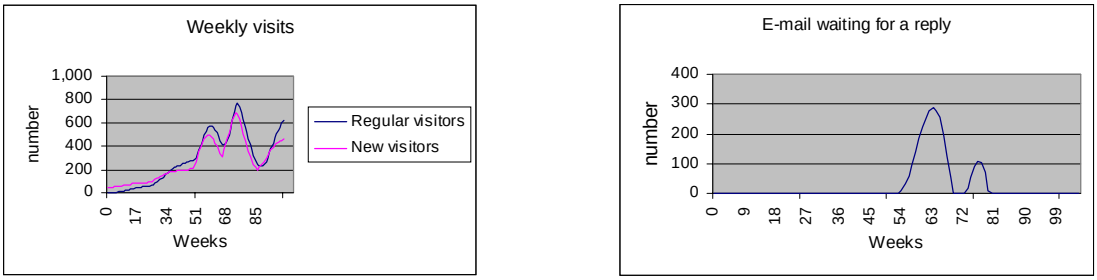

Figure 16 Scenario 2 dynamics of visit and e-mails

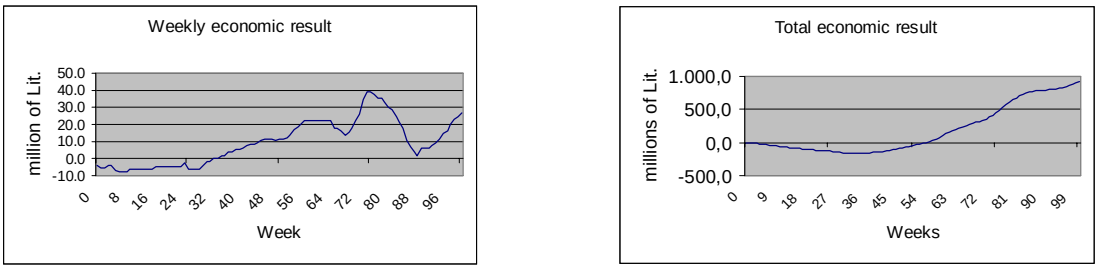

Figure 17 Scenario 2 main economic outputs

Comparison between the two scenarios

Comparing the two scenarios it can be observed that in the same commercial conditions the results produced in scenario 2 are better than those produced in scenario 1 (see figures 13 and 17). This depends on the different personnel management approach. In fact in scenario 1 the decision to increase the size of personnel staff is not an autonomous decision but it is induced by the increase of visits and contact deriving from marketing actions. (see figure 11 and 12). But the adjustment delay of the size staff to the new potential market determines the accumulation of e-mails waiting for replies and that both reduces the effectiveness of marketing actions and weakens the company's image (see figure 12 and 13).

The scenario 2, on the other hand, looks upon the staff size as a very important marketing lever. In fact in scenario 2 the staff sizing comes almost simultaneously to the web site promotion and updating investments (see figure 14 and 15). That allows company to efficiently copes with visitors and customers needs, preserving its image and increasing the profitability.

Hence even if scenario 1 reduces corporate costs over short term it is less able than scenario 2 to sustain company's growth over the long term.

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