

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

To carry out the construction of a model for the simulation of the different functional areas of a company such as: Quality, finance, environment, marketing, production, human resources and technology, a process based on the deductive-inductive method must be carried out to analyze each of the functional areas separately and subsequently integrate each of the analyzes and conclusions into a general model.

In this general model, performance measures must be established for the variables to establish a sense of causality through which it is identified if there is a cause and effect relationship between the functional areas, this is done through a mathematical model that redefines the variables and its operation, and represents the causal relationships that affect the functional behavior of the company; Likewise, levels and rates of the different flows within the system must be established, in the case of levels, these can be: materials, personnel, means of work, capital, orders and information, and the rates are those that modify the levels by means of actions or decisions directed to achieve the goals.

Because the mathematical model is not enough, a continuous simulation model must be built, which defines the operating characteristics of the companies, where the basic time requirements, definition of levels and rates are established, as well as those parameters necessary to the mathematical model, to achieve this, uses a continuous simulation language under a diagrammatic environment, where the participants develop the model using icons that will allow them to build a direct graphic model on the computer screen. After developing the model, it continues with its validation, executing the model several times to check the meaning of causality and the hidden interactions between different causes and subcauses.

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

The general simulation model should have a main menu with the following options: 1. A description about the research project and the group that will carry out the project and a brief introduction to the functional areas of the company, 2. An entry data (where the information is grouped according to its related characteristics), 3. The execution of the model, 4. the presentation of the results, the following figure shows the design of the simulation model.

INPUT	PROCESS	OUTPUT
Definition of sections (functional or of interest)	Definition of related variables by sections	Management rating of functional areas
↓	↓	↓
Definition of variables	Defining mandatory variables	Qualification of areas of interest
↓	↓	↓
Parameter assignment	Causality analysis	Numerical and graphic display
	↓	↓
	Determination of multipliers	Scenario analysis.
	↓	
	Calculation of values	

Fuente: Mendez, G., Alvarez L., Kalenatic D. (s.f.)

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

Regarding the outputs of the model, these correspond to the information requirements and needs of users, clients, owners, workers and financial entities, which are grouped according to the risk that indicates the organization's ability to face the challenges internal and external, and also to the evaluation that the model makes to the company.

Next, let's see the different areas of the general simulation model:

## **Data Entry Area.**

In order to facilitate the data capture process and in order to have a comprehensive approach to the model, fourteen blocks of information are established for diagnosis, which will allow characterizing the system using parameters that influence their behavior, these blocks are:

1. Company profile
2. Business profile
3. Analysis of the environment
4. Market knowledge
5. Marketing strategies
6. Supplier management
7. Financial management
8. Pricing
9. Management of financial variables
10. Personnel management

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

11. Quality management
12. Environmental management
13. Production management
14. Technology management

When developing the model, in each of these blocks a brief description of each of the parameters is given and each user rates its incidence for the company with a value of 0 to 5 where 0 is no impact, incidence or presence and 5 represents the opposite.

## **Model process area**

In this area the model execution process is carried out, it is where the calculations and processes are carried out, it is also called the black box of the model (black box), and it is based on multiplier principles, where each of the parameters of the model, have a specific function within the sector and variable to which it belongs and according to its causal effects, it will cause an effect on the management level of your area.

When it comes to an increase in the value of the level, your qualification will be reinforcing and will only affect the entry rate, and in the case of a decrease in value. of the level, it would have a compensatory rating, which affects the exit rate by reducing the level in question.

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

The process area is made up of two sections: the first performs the calculation of the diagnostic variables and the second evaluates the management indicators of each of the company's functional areas, as well as the overall management of the organization, the management of risk and the qualification of the diagnosis.

The calculation of the diagnostic variables is performed according to the type of relationship (reinforcement or compensation) of these over each of the functional areas, taking into account the input parameters of the model, it also calculates the degree of incidence of the parameters within of the second section (management indicators of each area, global management and risk management). The diagnosis and qualification section is not included, since it would be doubly impacted, since this measurement results from the interaction of other qualifications.

The variables used in the functional areas diagnosis section are the following:

1. Quality area: satisfaction of customer needs, quality control, assurance, production factors, documentation, quality costs, failures, quality, quality level, quality entry rate, quality exit rate.
2. Finance area: Profitability, liquidity, budgets, financing, working capital, avoidable exits, inevitable exits, financial problems, level of finance, rate of entry of finance, rate of exit of finance.
3. Environment area: environment and markets, regulations, organizational culture, process, human resources, technological and capital resources, financial sector, product, released to the environment, rate of entry of the environment, rate of exit from the environment.
4. Market area: Marketing strategy, segmentation, positioning, differentiation, product, evaluation of results, competitors, internal problems, external problems, market level, market entry rate, market exit rate.

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

5. Production area: inventories, planning and programming, processes, capacities, labor, costs, materials, good delays, bad delays, difficulties, production level, production entry rate, production exit rate.
6. Personnel area: personnel selection, organizational culture, motivation, organizational climate, change, work problems, labor involvement, personnel level, entry rate of personnel, exit rate of personnel.
7. Technology area: planning, personnel, products, process, institutional support, knowledge, aversion, level of technology, rate of entry of technology, rate of exit of technology.

The variables for the management indicators section of each area, global management and risk management are as follows:

1. Management indicator: Internal management, manager, external factors, internal factors, management level, management entry rate, management exit rate.
2. Risk indicator: Internal risk, external risk, risk level, risk entry rate, risk exit rate.
3. Qualification: Qualification level, qualification entry rate, qualification exit rate.

The management indicator is in charge of carrying out an analysis of the actions taken in the organization to face the challenges imposed from and within the organization. The management's reaction capacity allows identifying the company's actions regarding its management, policies and the institutional framework that governs them.

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

On the other hand, the risk indicator analyzes the economic and financial elements, and also analyzes the internal and external policies of the company, a risk rated 5 means a negative value for the organization and for investors, for this the attenuators are used. which are used as a reaction of the company to mitigate the opposite effects of the risk, and these are affected by the way of acting of the same administration.

Regarding the qualification, this is a quantitative type value that is based on the parameters and variables of the simulation model, which takes into account the qualification levels obtained by each of the functional areas and affected by the general qualification of the company management as well as the risk indicator. The qualification allows decision making aimed at making a diagnosis of the organization in a timely manner.

## **Model output area.**

In this area, the numerical and graphical values of the different sections already mentioned are obtained. Within this area, it is possible to carry out analyzes of the type that would happen (what if ...) that allow parametric changes of factors to be carried out to allow evaluating the sensitivity of the answers.

## **Validation of the model.**

In the output section of the model, the analyst, supported by the application, can carry out diagnoses that help him to measure the impact of the recommendations before suggesting them to the entrepreneur.

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

The diagnosis is generally carried out in a traditional way, which requires an expert, although its performance is obtained with the help of computer systems and, in general, measurement data (input rate, level and output rate) are obtained for the most important variable variables of each section.

To verify the model, the following five scenarios are used:

1. Variables in maximum value: all parameters are assigned a value of five.
2. Variable in minimum value: values of zero are assigned to all parameters
3. Variables in optimal value: according to their rating (reinforcer or compensator), values of five or zero are assigned respectively to all the variables.
4. Variables under normal conditions: Values assigned by a typical user.
5. Variables with manipulation: Values are assigned to the parameters choosing the areas that are considered to most affect according to the opinion of the experts.

Through these scenarios it is observed how the diagnostic model responds to different ratings, it is advisable to make different runs of the model over time, to take full advantage of it and to reflect the effects of possible improvements in the organization.

# GENERAL MODEL OF SIMULATION ON FUNCTIONAL AREAS

Referencia

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