Chapter 1
Information in Systems Theory

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ABSTRACT

This chapter deals with the issue of information in systems theory. Systems theory requires the use of undistorted information in approaching both the system, as such, and its components, including the relation established between them. Systems theory places the study of automatically adjusted systems at its very centre. The management of systems must provide those actions of eliminating the negative consequences caused by distorting the information used in the system. The following chapter discusses the theoretical approach of the “system” concept, use of the analysis and synthesis method in systems theory, modelling and simulating the systems, automatic adjustment systems, automatic adjustment system-management system interdependence, systems management, and more. The conclusion emphasizes the role of information in the management of systems and the possible distortions of information that can occur when it is not properly used in the system.

THEORETICAL APPROACH OF THE “SYSTEM” CONCEPT

The knowledge acquired about the environment, human (as rational being) and society have allowed the development of some theses and generalisations determining the transitions of systematic thinking from the scope of theory into that of practical activity. This has allowed that the notion of system – initially used only in the technical field – would become a basic tool for the economic research and analysis and contribute to solving the abstract – and sometimes sensitive – issues which the theory of systems is currently facing. Thus, by actually approaching the problem, any phenomenon, activity, process – even the beings – can be considered as systems of a certain type – more complex or less complex – characterised by two categories of environment and namely: environment outside the system, meaning the area where the system occurs and the environment inside the system, expressed by relations between its components and usually considered variable sizes. Hypothetically, under this aspect, when both the connections of the system with the outside and those between the components are zero – meaning null – the system is isolated.

If we referred to the systems created by humans or to the natural ones, the previously mentioned connections are not null, because such systems

DOI: 10.4018/978-1-4666-6481-4.ch001
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receive and give information to the environment, which arises the requirement that in the analysis of social systems, especially to start from the atomic—dissipative structures and from the utility of systems. In such situations, the extension of the parameters taken into account, combined with the high degree of difficulty regarding the quantifications, makes mathematicians’ mission difficult in creating a system of equations appropriate to the studied system. This difficulty amplifies if we consider that, in order to surprise any evolution, abstract behaviours must be taken into account (such as: information, activities, etc.), as well as actual behaviours (meaning: the number of jobs, number of employees, assets such as fixed assets) of the system. Such a concept ensures the measurement and determination of the particularities in the case of timeless systems, temporal systems and social systems.

Regardless of the form of organisation, size or purpose of action, any natural or artificial product can be represented by a conventional model. If we consider a physical good “F” which we associate a set of commeasurable characteristic to (volume, weight, speed, etc.) as some injective functions at the time t, taking into account the number of characteristics, the set “MF” may be created:

“MF” = \{f_1(t), f_2(t)...f_n(t)\}

Mathematically speaking, a set of the input – output pairs can be created, ordered in time as follows:

(x(t_0, t_1), y(t_0, t_1)) ∈ F

with the condition of positive sequence:

\(t_1 < t_2 < ... < t_n\)

Analytically, the set “F” may have the following form:

\(F = \{(x, y)\}\)

and the sets:

\(I(F) = \{x/(x/y)A\}\)
\(E(F) = \{y/(x/y)A\}\)

represent the set of input segments and respectively the set of the output sets of the system, meaning the quantitative commeasure of those input and output sizes (Figure 1). Based on the previous specifications, the system is designed as a structure that involves the takeover at a time \(t_0\) of some input sizes from the outside environment, their transformation into others — which are usually different from the input ones and their render at another time \(t_1\) as products and/or services (Figure 2).

Therefore, any output y of the system depends not only on the state of the input x, but also on the state of the system \(Z_F\), which in its turn depends on the input, meaning:

\(Y_F = f(Z_F, X)\)

Figure 1. The abstract model of the physical good “F”
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