

THE HOLONIC ARCHITECTURE OF BUSINESS ORGANIZATIONS WITH APPLICATION TO FOOD INDUSTRY

C.I. Hrețcanu^{1*}

¹"Stefan cel Mare" University of Suceava, Romania

Abstract

This paper aims at making a succinct analysis of general system theory (GST) and the implications of the concept of system upon Business Company connected to the environment in which it functions. We shall approach a business company/organization/ firm as an open complex system and we shall bring into discussion its compounds as sub-systems. Having in view the characteristics of a holonic system, the structure of such a system is graphically presented. Then, a study on the firm as a holonic structure, composed of hierarchically and/or network arranged n holons is made and some characteristics/analogs of current functioning of firms as against the functioning of other holarchies from nature or society are identified. A case study on Racova Vaslui holding firms is dealt with at the end of this paper and these firms form a holonic system encompassing a series of companies working in the field of food industry.

Key words: system, holonic system, holarchy, holonic firm

INTRODUCTION

There are multiple approaching angles/perspectives regarding the concept of system, and, consequently, different thinkers, depending on the goal aimed at or focus of some research, have proposed associated definitions and classifications which differ significantly from case to case. According to the Explanatory Romanian Dictionary, a system is defined as *an assembly of interdependent elements (principles, rules, forms etc) forming an organized whole* [14], this assembly aiming at reaching a certain goal proposed by the user. According to Bertalanffy's conception – the father of general system theory, by system we understand a complex of n elements of different nature, but in interaction so that they function under the form of a whole to achieve a certain finality [9]. In other words, the notion of system involves a certain generality since from the point of view of this definition almost any structure organized within the Universe, nature, society or

business may be approached as a certain type of system.

MATERIAL AND METHOD

More specialty and outstanding books and papers from the field have been consulted to define and explain the terms used in this study. Among which we mention *The Ghost in the Machine* where the concepts of holon and holarchy are defined, the two notions being in a direct connection one as against the other [5], *Beyond Business Process Reengineering - Towards the Holonic Enterprise* where the concept of *holonic enterprise* is dealt with [6].

The concept of system and the firm considered as a system

In my opinion a system is an abstract concept referring to an objective reality (observable or not) by which the functioning of n compound „parts” is optimized to achieve a certain express objective. In other words, we consider a system an entity theoretically based on the interaction of its n compound „parts”, this new entity being subordinated to fulfill a definite goal.

The figure below (fig. no. 1) shows that any entity of “firm” type may be equivalent to an open socio-economic system and

*Corresponding author:

ciprian_hretcanu@yahoo.com

The manuscript was received: 20.03.2015

Accepted for publication: 31.03.2015

therefore, it itself is a complex system and at the same time a compound part of other extremely complex social/economic systems. One may deduce from fig. no. 1 that the firm, approached as an open complex system, consists of n sub-systems (its compound parts) and the idea that it is permanently in an interdependence relationship with different

entities from the localization environment of the firm. Such socio-economic systems have a fluctuating dynamic behavior, often cyclic on intervals of n years, so that the assessment of their state becomes at a certain moment a complex issue; much more, the behavior predictability of such future systems becomes extremely difficult [12].

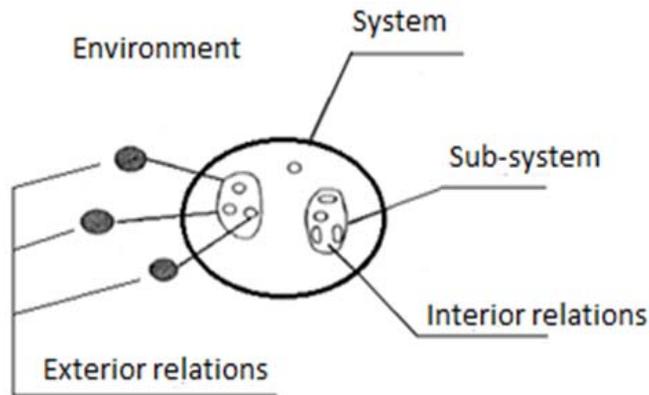


Fig. 1. Business organization approached as an (open)complex system (adapted by Radu I. et al., 2005)

In addition, complex systems in economy and society interact with each other and/or they influence mutually; the outputs of a system are at a certain moment partially dependent on what happens in the localization environment of that system (the firm, in this conception, cannot revitalize and self-adjust without the inputs permanently induced by the firm top manager).[13]

Holonic conception of systems

As results from the aspects regarding the definition and classification of systems, we can easily notice that there are some analogies and differences between the concept of system and the concept of holon. To what extent might the more analytical study of these analogies and differences be relevant for the organization theory?

As a matter of fact, from a strictly historical perspective, the concept of system and different ways of classification into systems/sub-systems of some realities from nature, society, economy or business have initially made themselves conspicuous. From a synthetic and orientative point of view, we

can discuss about two distinct periods regarding GST (theoretical developments which „overlap” inevitably with the evolution of the theory regarding holons and holonic structures) [2]:

- the period between 1930-1980, when the classical conception of systems developed and was brought into prominence;
- beginning with the '80s and up to present we can discuss about direct/indirect influences induced by the concept of holon upon the GST evolution.

The bases of the holonic conception regarding the organization of society nature were laid by Koestler in the paper *“The Ghost in the Machine”* [3], where a *holon* is defined as being *“a whole deduced from parts”* [5].

By using the notion of holon, Koestler was among the first authors who wrote about *systems operating within other systems*; this connection between these two theoretical concepts intervenes almost involuntarily as the functioning of hierarchically arranged n holons equates to a type of open and complex system [4].

In the theory of management and business organization, beginning with the year 1980 and up to present, more theoretical concepts have been proposed which are directly or indirectly formulated in a systemic vision on the firm as follows:

- the concept of *excellence in business*, proposed by Thomas Peters and Robert H. Waterman [10];
- the concept of BPR (*Business Process Reengineering*), proposed by Michael Hammer and James Champy [12];
- the concept of *holonic enterprise*, proposed by Patrick McHugh, Giorgio Merli, William A. Wheeler III [6].

Having in view the conception of “*holonic enterprise*” proposed by the three authors, we make the precision that a holonic system is a reference system in the structure of which other two or more systems function with a certain autonomy, namely, by generalizing we may state that „*n*” autonomous systems function [6]. If we refer to the business organizations approached as holonic systems, more questions arise such as: *On the basis of which criteria can two or more firms get integrated to fulfill jointly precursory defined objectives? Is it possible to integrate or not compound “parts” from the structure of some organizations into a newly-created holonic system which functions as network of holons?*

In our opinion, clear and sufficiently argued answers to such questions require precursory explanations of those analogies and differences between “*holon*” and “*system*”. Anyway, it is easily deductible that especially in society and business, if *n* organizations form a holonic system; this system acquires an integrator role and will focus on the optimization of output and/or of the results obtained by all incorporated systems. To a certain extent, it may be stated that the theoretical modality of defining a holonic system is quite close to that of defining an open and complex system. However, in our opinion, especially in the situations when two, three or more organizations aim at forming a holonic system, we apprehend that there are certain

basic differences between the content of the two concepts [2]:

- the holonic system is in all the cases an open system;
 - the classical notion of system, of seemingly “*excessive generality*” ([1], [3]) rests valuable but by introducing some limits in the operating process with holonic systems;
 - in a holonic system, “*detachment*” and “*attachment*” to autonomous holonic systems may take place both at abstract level and real level, *aspect which is not valid for the classical system*;
 - there are comparison points as well as real differences (role, functions, properties, optimization etc) between compound sub-systems of a general system and autonomous systems of a holonic system;
 - the optimization within the holonic conception focuses both on compound systems and reference system (integrating), *aspect which is not compulsory in the case of classical system*;
 - in principle, at the basis of operation with holonic systems there is the distribution of some autonomous systems *within the human systems* or, more precisely, there is a particular type of holon named *the system of human activity*, which the optimization of all the other holonic systems appertains to. [6]
- Taking into consideration the characteristics of the holonic system, its graphic structure is shown in fig. no. 2 where S_1, S_2, \dots, S_n are autonomous systems.
- As can be seen from fig. no. 2, any firm considered as a holonic system integrates other *n* - autonomous systems (terminologically it would be more adequate to discuss about „*holonic networks*” as an equivalent to what we usually name a firm) and in the context of its common functioning, it is permanently positively/ negatively influenced by different other entities and/or factors (we noted in fig. no. 2 entity A, entity B, etc., with which the system has current external relationships). Essentially, firm top management is mainly charged with the optimization of functioning of each autonomous system as well as with that of the integrating system throughout their evolution on *n* years.

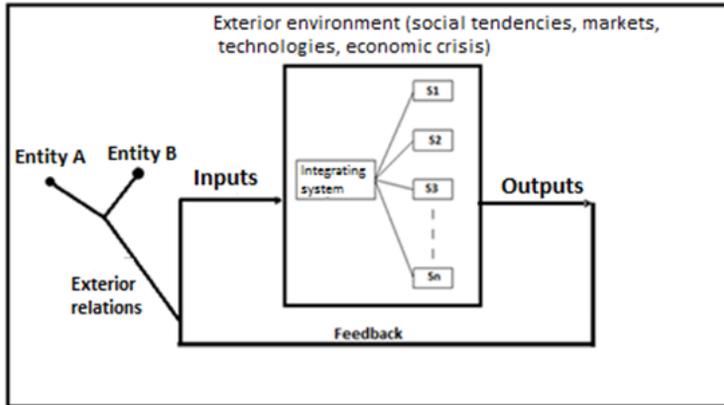


Fig. 2. Structure of a holonic system (original contribution)

Approaching business organizations as holonic structures

In the economic field, a holonic organization is formed by a group of economic units that must act in an integrated way. If they do so, holonic organizations are able to self-configure to take advantage of any occurring business opportunity. Each component of the holonic network or holonic organization offers different capacities of performing processes and is called holon.

The use of holonic network favors knowledge exploitation as a new type of source. The information processed by this type of networks may be distributed in quality information, about system feed-back, maintenance or ecological information and others.

Managers must adapt permanently their general profile and management style as against the requirements imposed by the competitive environment in which the activity is carried on. Holonic management will focus on the exploitation of classical knowledge as well as on the unconscious knowledge based on intuition or imagination. The important characteristic of a holonic organization consists in its possibility of forming extremely efficient complex systems in using resources, resistant to negative events from outside, having a high degree of adaptability to changes.

Holons are standalone functioning entities (fact which allows them high stability and resistance), with a certain degree of

independence, they can be controlled by superior level holons (this characteristic provides the whole holonic structure with activity efficiency). High level holons establish tasks and it is obvious that a holonic organization may be considered as a macro system made to reach a macro objective. Still, there is a basic difference between a holonic organization and a hierarchy of organs: a holonic organization does not accord with the hierarchy of its own organs, but stands for the final holon of the hierarchy [7].

The organization of economic activities under the form of holonic systems allows the fulfillment of economic objectives with maximum efficiency (starting from the fact that each holon or a set of holons within the hierarchy involved in carrying out a process benefits by a high level of excellence in dealing with it, the whole hierarchy will automatically benefit by this).

The modeling of an economic organization by means of holonic concepts is facilitated by a series of characteristics of hierarchies such as [8]:

a) **bidirectional communication**: each holon may receive and send signals to its partners within the hierarchy, irrespective of the levels they are situated on;

b) **flexibility**: holonic systems are not rigid structures, they allow changes and adaptations (an extremely important aspect in economy). A holon may belong to more hierarchies. More hierarchies may also be concatenated or interconnected.

c) **behavior on level:** the holon from a level is not necessarily the sum of its subordinates. The characteristics of a holon from a certain level are not representative of the level above or below the inferior one.

d) **a holarchy is open and close as well:** holarchies are not absolute in the upper side and in the down side. A holarchy may be developed or interwoven with another holarchy.

RESULTS

Case study

To exemplify the theoretical notions previously mentioned and to notice their practical use, we shall present the case of **"RACOVA Vaslui"** firm system which consists of 9 private integral capital companies carrying on diverse activities in the following fields: agriculture, food industry, commerce, tourism and service delivery. Mention must be made that this group of companies includes over 2100 employees, totaling a turnover of more than 140 million Euro, being formed by 9 private integral capital companies: [15]

-SC RACOVA SA Vaslui – tourism, commerce, service delivery;

-SC COMCEREAL SA Vaslui – cereal and technical plant growing, animal husbandry, bread manufacture;

-SC AGROCOMPLEX SA Bârlad – cereal and technical plant growing, animal husbandry, viticulture, bread manufacture, milling;

-SC R-AGRO SA Falciu – cereal and technical plant growing;

-SC MOPAN SA Suceava – milling and bread manufacture, commerce;

-SC ULEROM SA Vaslui – manufacture of raw and refined vegetable oils, biodiesel;

-SC ILVAS SAVaslui–milk and dairy product processing, commerce;

-SC COMPREST SA Vaslui – road transport services, build;

-SC COMGUARD SA Vaslui – guard and protection services;

From the perspective of our research we shall mention that the system of RacovaVaslui companies holds in the field of

food industry three wheat mills, 9 bakery factories, one biscuit and wafer factory, one oil factory (sunflower oil, soy oil and rapeseed oil), one milk and dairy product processing factory and a wine making plant).

The activities' areas where the constituent companies of the Racova system are involved in as well as a set of data specific to each area are presented in table 1.

Mention must be made that each company / organization of the Racova Group system has a specific infrastructure:

- the company Racova holds RacovaHotelva, Cantemir Hotel, RacovaSupermarket, Dobrina Haltand Dublin Pub;

- the companyComcerealincludes 28 vegetable farms, a bread factory and an animal husbandry farm;

- the company Agrocomplexconsists of 11vegetable farms, 2 animal husbandry farms, a bread factory and a wheat mill;

- the company R-Agroholds 6 vegetable farms;

- the company Mopancomprises 7 bread factories, 2 wheat mills, 2 pastry shops and a biscuit and wafer factory;

- the company Ulerom comprises a vegetable oil factory;

- the company Ilvasholds a milk processing factory;

- the company Comprest holds a car fleet for road transport and construction;

- the company Comguardprovides a guard facility formed by 100 agents.

The **"RacovaVaslui"** system of companies holds also a series of brands: *Mopan* – flour, bread and bakery products; *Andreea*, *Cipy*, *Max* – biscuits and wafers; *Vio* – milk and dairy products; *Ulerom* – refined sunflower oil; *CrameleTutovei* – superior wines *Merlot*, *Fetească Regală*, *Riesling*; *Ploconul Boierului* – table wines.

By analyzing all these public data available on the site of Racova group of companies, we may state that all these companies form a business organization with holonic architecture. The structure of Racova system of companies is shown in fig. no. 3.

Table 1: Turnover of Racova group according to activity fields (source [14])

Activity fields	Description
Agriculture	- 54000 ha croft cultivated by cereals and technical plants; - a vineyard in the area <i>Dealurile Tutovei</i> with a surface of 105 ha; - over 250000 tons of annually stored cereals and technical plants; - 3 animal husbandry farms of over 2000 dairy cattle; - daily milk yield of 20000 liters, milk classified in A quality category; - modern processing equipment: more than 250 tractors with farm equipment, 34 irrigation plants, 100 harvesters, more than 100 transport means (auto-trucks, auto trailers, etc.)
Food Industry	- 3 mills of 83500 t / year yield; - 9 bread factories of 30000 t / year yield; - a biscuit and wafer factory of 2t/day yield for wafers and 20 t / year for biscuits; - an oil factory with an yield of raw oil of 450 t / 24 h for sunflower oil, 200 t / 24 h for soy or 400 t / 24 h for rapeseed; - a milk and dairy processing factory of 120.000hl/year yield; - a winemaking factory of 3000000 liters/ year processing, fermenting, bottle-filling and temporary storing yield.
Biodiesel	- a biodiesel plant of 30000 t / year yield.
Services	- 2 hotels of 244 accommodation places; - a shop network of more than 130 activity units; - a building and road transport service delivery company; - a guard and protection company.

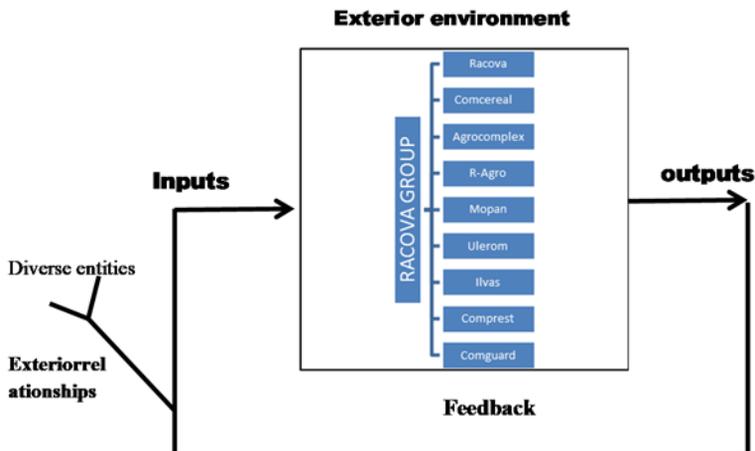


Fig. 3 Structure of Racova Vaslui holonic system

By comparing the structure of a holonic system as shown in fig. no. 2 with the structure of Racova system of companies, we notice the following:

- the role of an integrating system within a holonic system is played by Racova Group within the group of previously mentioned companies;

- in our case, there are 9 autonomous systems, that is the companies belonging to Racova group of companies : SC Racova SA, SC Comcereal SA Vaslui, SC Agrocomplex Bârlad SA, SC R-Agro Fălciu SA, SC Mopan SA Suceava, SC Ulerom SA Vaslui, SC Ilvas SA Vaslui, SC Comprest SA Vaslui, SC Comguard SA Vaslui;

- the entities that the Racova system of companies has exterior relationships with are different other firms / organizations / companies that the group collaborates with. For example, we mention that other types of products, besides those of the group, can be purchased as well in the own shop network. Other entities that the Racova group of firms has other types of relations with are the administrative units, plus other governmental or non- governmental organizations.

The nine companies of Racova system purpose to optimize vertical integration of product manufacture cycles, providing in this way the processing of raw materials obtained

from agriculture companies into food industry processing units and their commercialization by means of its own shop network, integration from raw materials to end product meant to final consumption.

DISCUSSIONS

As a result of our analysis, we may state the idea that certain characteristics and the own functioning mechanism of holarchies and / or holonic networks lead to possible applications in the case of companies and in the case of different economic sectors. This is also applied to the companies of food industry field, fact demonstrated by the analysis of Racova group companies.

Paying great attention to the way in which this group of companies is organized, we have noticed that it has a structure of holonic system and this type of organization has allowed the Racova group of companies to get and hold a remarkable position within the business environment in Romania.

This structure also makes easier the whole activity of the group and offers many advantages as everything is carried on within the system: production of raw materials in own vegetable and animal husbandry farms, their processing in own factories and commercialization of products in own shop network including a supermarket.

Mention must be made that the maintenance and modernization activities of the partner companies of the group, the cereal and agricultural product transport as well as food product transport are achieved by own equipment.

Guard and protection services for agricultural, industrial and commercial units belonging to Racova Group are also provided by a constituent company of this system of organizations.

CONCLUSIONS

Possible applications of holarchies and / or holonic networks to business organizations can be designed/ developed in two different directions (from the point of view of applying them and making them function further on in the real economy): first of all, the applicability of these two concepts must pertain to the company seen as a holonic system as any entity of this type is

comparable with a holarchy, namely it is conceived as a hierarchical structure which includes two or more holons; secondly, the applicability of the two concepts aims at diverse formulas of cooperation and/or collaboration between two or more companies which can be or not in direct/indirect competition and which further on will keep totally or partially their juridical, financial and applied management autonomy.

REFERENCES

- [1] Boldur - Lătescu G.: The logic of decision and management systems (in Romanian: Logica decizională și conducerea sistemelor, Editura Academiei Române, 1992
- [2] Burciu A.,: MBO & Business Cycle , (in Romanian: MBO & Ciclul afacerilor), Ed. Economică, București, 1999, p.73
- [3] Coyle G.,: Management System Dynamics, John Wiley&Sons Ltd., UK, 1977
- [4] Hammer M., Champy J.,: Reengineering the Corporation, Harper Business, SUA, 1993
- [5] Koestler A.,: The Ghost in the Machine, Ed. Macmillan, New York, 1967
- [6] Mchugh P., Merli G.,: Wheeler III W.,: Beyond BPR - Towards the Holonic Enterprise, Ed. John Wiley & Sons Ltd., Chichester, England, 1995
- [7] Mella P.,: The Holonic Perspective in Management and Manufacturing, International Management Review Vol. 5 No. 1, 2009
- [8] Mulyonon B. et al.,: Holonic Business Process Modeling in Small to Medium Sized Enterprises, The Asian Journal of Technology Management Vol. 2, No. 1 (2009)
- [9] Von Bertalanffy L.,: An Outline of General System Theory ” The British Journal for the Philosophy of Science, Vol. 1, No. 2, Aug., 1950, pp. 134-165.
- [10] Peters T., Waterman R.,: In search of excellence, Harper and Row, New York, 1982
- [11] Radu I. et al.,: Informatics and management 2005, p.16 (http://www.info-man.ase.ro/sinteza_chr.pdf accessed in november 2014),
- [12] Scarlat E.,: The dynamics of systems (in Romanian: Dinamica sistemelor), Editura ASE București, 1994, p. 9
- [13] Ursachi I., et. al.,: Management, ASE București, 1993, p. 9
- [14] *** - Academia Română, Institutul lingvistic ”Iorgu Iordan”: The Explanatory Dictionary of the Romanian Language, Second Edition (In Romanian: Dictionarul Explicativ al limbii Române, ediția a II-a), Editura Univers Enciclopedic, 1998
- [15] <http://www.racova.com>