Paper presented at the ICSB World Conference 2000.
Brisbane, Queensland, Australia. 7-10 June 2000.

The Use of Organigraphs for the Description of Enterprises as Organisms in an Ecosystem

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Biography of the author

Professor Einarsson is the former dean of the Faculty of Economics and Business Administration at the University of Iceland. He obtained his PhD in Germany. He is the author of 6 books on microeconomics, business administration and cultural economics and over 50 journal articles and conference papers and over 400 shorter articles on economics, fisheries and politics in magazines, newspapers, and on websites. Professor Einarsson is a former Member of the Icelandic Parliament and Chairman of the Board of the Central Bank of Iceland and served as a delegate for Iceland at the General Assembly of the United Nations in New York.

Abstract

The paper describes methods of analysing enterprises by viewing their economic activities as an ecosystem and, bearing in mind the similarity of enterprises and organisms, connecting this to management theory. The methods of the natural sciences are useful to improve our understanding of enterprises, especially as regards SMEs. Competition and co-operation are vital forms of operation in the ecosystem, just as they are in the economy. It is suggested that a kind of genetic ability can develop within enterprises over a very long period which affects their strengths and weaknesses in their day-to-day operational activities. New methods in organisation theory using organigraphs are suitable for describing these ideas. It is possible to describe enterprises with organigraphs in a more complete form than with traditional organisational charts. The application of organigraphs in this context is an important approach to describe the similarities of the ecosystem and the economy and leads to a better understanding of the challenges of a modern enterprise.

1. Introduction

This paper builds upon the concept that enterprises in many ways resemble living organisms existing in nature and then goes on to examine how so-called organigraphs can be used to take this concept a step further. Traditional models used to illustrate enterprises are generally based on the threefold functional operation of an enterprise. First, there are the internal activities, that is the activities taking place within the enterprise, including production and management. Second, the enterprise engages in external

activities as a market participant in procuring factors of production on the factor market, and in selling its products on the market for goods and services. Finally, the enterprise interacts with its surroundings, e.g. by co-operating with other enterprises and by adapting to its regulatory and competitive environment. The organisation of an enterprise involves, among other things, the way in which assignments, power and responsibilities are allocated within a group of people working toward the same goal.

Modern enterprises in their operating environments have much in common with organisms in an ecosystem, and the threefold functional operation of enterprises described above is in many ways comparable with the lives of organisms. Extensive and complex internal activities take place within the bodies of animals, as they do in enterprises. Animals forage for food to survive, which is comparable with the activities of enterprises on the factor market. Breeding is one of their main functions of organisms, and this is analogous the activities of enterprises on the market for goods and services. Every organism is dependent on its environment and on co-operation with other organisms. Organisms, especially in higher orders, have to take account of other organisms, just as enterprises have to take account of other enterprises. One of the main characteristics of a biosphere is the relationship between predator and prey, and every organism, including Man, is dependent on other organisms for its existence, in one way or another. The same is true of enterprises, which often find themselves in the role of predator or prey or both.

The ecosystem with its organisms and their environment is thus used as a kind of metaphor for the activities of enterprises, one of many such metaphors which can be useful in gaining an insight into the structure and environment of enterprises, by utilising parallels from other scientific disciplines to shed a clearer light on some aspects of the operation of enterprises – provided always that generalisation is avoided.

2. The Economy as an Ecosystem

An enterprise can be regarded as a technical solution to the utilisation of limited factors of production. The activities of enterprises are characterised principally by relations with three external entities: suppliers, customers, and competitors. In fact, the economy is often regarded as an ecosystem in academic discourse [Rotschild, 1990; Hodgson 1993]. The ecosystem is a constant cycle powered by solar energy which flows through the system. Information, knowledge and human labour constitute the energy which powers an enterprise. In an economy, production factors, i.e. resources, flow from source to destination. Knowledge and information form a part of the administrative factors of production in modern enterprises. Knowledge is essential for market activities, because competitive advantage is normally based on knowledge. It has been pointed out that enterprises which regard themselves as living communities, similar to communities in the ecosystem, exhibit quicker response times in their struggle to survive competition and external conditions than other enterprises [De Geus, 1997]. Ideas linking

economies and ecosystems can be effective in coping with environmental problems [Gowdy *et al.*, 1999].

Living organisms and enterprises face similar problems in that they are limited by their access to resources. Another key factor for enterprises is demand. In a market economy, enterprises die when there is a shortage of customers. Nature has over a long time developed sophisticated means of protection for individual species, e.g. by enabling them to avoid their foes using camouflage. Enterprises often attempt to avoid their competitors, but they also attempt to attract the attention of their customers, the consumers, and this has parallels in the animal kingdom as well, where flamboyant colours are used to attract the attention of potential mates. Customers can be regarded either as prey or as symbiotic organisms – business partners who are essential for continued operation.

One characteristic of organisms is adaptation, and enterprises also need to adapt to new conditions, e.g. new taxes or environmental legislation [Morgan, 1997]. A competitor in the environment of an enterprise can be regarded as the equivalent of a predator in the ecosystem. An enterprise attacks other enterprises in competition. Symbiosis in nature is the close association of two organisms for the advantage of both, precisely as in the case of co-operation between an enterprise and its supplier, which often extends over very long periods. Competition and co-operation can take various forms in the ecosystem and in an economy and can differ depending on circumstances [Samuelson, 1993]. Mimicking, which is frequent in nature, is not infrequent in enterprises, e.g. when trade marks are mimicked. Illegal activities in an economy are not only common, but have a clear parallel in nature, as in the case of parasites.

Nature rewards the fittest, although the process may take a long time. The Earth is about 4.5 billion years old, and life began on Earth about 3.5 billion years ago. Mankind is about 200,000 years old and Man began to form organised communities about 10,000 years ago. The concept of incorporation, however, is only a few hundred years old, so that if companies develop like organisms there is still a long way to go. Economic development has been characterised by changes in society which are comparable to changes in nature [Corning, 1995]. Development is not linear in time. Mutations occur in nature, and the same happens in the corporate environment with technical revolutions and new management methods, improved education and increased knowledge [Costello, 1996]. Efficiency is the key to survival in an ecosystem and an economy, while inefficiency leads to extinction [Rotschild, 1990].

Among the key issues of enterprises in the future is information, and the cost of information is getting lower. Modern technology, with its new forms of communication, television, telephones, facsimiles, computers, e-mail, the Internet, fibre optics and satellites, has resulted in a reduction in the average cost of this factor of production. Information as the product of data processing is now among the most important factors in the operating environment of enterprises [Gossain *et al.*, 1998]. Enterprises are

of course dependent on their environment, but they exist independently of individual persons. Even though human labour is one of the driving forces of enterprises, the labour can derive from numerous individuals, just like an individual can enjoy a productive life with another person's blood in his veins or implanted organs, whether transplanted from another individual or manufactured in a factory. Life makes use of all opportunities, as do enterprises. Wherever a new business opportunity arises a new enterprise is created. If the enterprise is successful, other comparable enterprises will form. Just as cells are formed and die, enterprises survive with new people. Organ transplants are comparable with the formation of new departments in enterprises and the discontinuation of others. Sometimes an enterprise will grow stronger, and sometimes it will wither and die.

DNA is the hereditary content of genes and responsible for the transmission of information from one generation to the next. Knowledge and information is often unique to a single enterprise and contain the key to its operation. Sometimes such knowledge enjoys legal protection through intellectual property rights, which shows the will of the legislature that under certain circumstances, information and knowledge should be protected from unauthorised use. The opinion has been expressed that a computer virus is a primitive form of life. Almost 50 years ago, John von Neumann came up with the definition that a machine was a living thing if it could create other machines in its own image [Von Neumann, 1951]. The first book of Moses, Genesis, emphasises procreation as the prerequisite of life and organisms. Linking the definition of life with procreation is nothing new, but it has gained a new meaning in the light of technological advances. Modern technology easily fulfils this condition, whether we look at robots or the process of cloning. Creating a life form has become relatively easy.

Progress in genetics can increase our understanding of enterprises. It can be demonstrated that genetic features and environmental factors affect organisms in important ways, e.g. as regards diseases. If we look at enterprises in this light, it is clear that environmental factors are crucial, both natural restrictions on the procurement of resources and rules established by authorities. Enterprises are not an old phenomenon, so that it is difficult to demonstrate whether modern enterprises have a kind of genetic ability independent of the people who manage them. There are not many companies which have been in existence for a hundred years or more and which have been managed by numerous successive groups of people, not necessarily from the same family. Over long periods of time, enterprises can settle into a course which they follow and hardly ever leave. Time then reveals whether this course leads to a viable situation in a competitive environment or whether the rut becomes so deep and so distant from the mainstream that it cannot be altered. This would mean that the enterprise exists in such an independent environment that its management is no longer a source of initiative, but instead is reduced to the role of responding to environmental circumstances and circumstances which are rooted in the past history of the enterprise.

Globalisation and competition have led to new perspectives. In many ways, contemporary enterprises own themselves. As long as they thrive in their environment of suppliers, customers and

competitors they are more or less left to themselves. So it is also with animals. One of the main characteristics of organisms, deterioration and decay, is also evident in the environment of enterprises. Enterprises are established and terminated, divided up or disappear altogether leaving only historical evidence of their existence. The average life span of global companies has until now not proven more than 40 to 50 years, and many large enterprises that existed twenty five years ago have now disappeared, although parts of them, for instance their human resources, have gone elsewhere [De Geus, 1997].

3. Organigraphs as Instruments for Explanation

Numerous concepts from biology and ecology can be used to improve our understanding of the economy. A new form for the analysis of the organisation of enterprises is well suited to these ideas regarding the common features of economies and ecosystems. The traditional way of describing the organisation of an enterprise is to use organisational charts where the responsibilities of individuals are delimited and the hierarchy is clearly visible as names of individual managers shown in little boxes which are either one above the other or side by side. This gives a limited insight into the activities of enterprises. It shows the administrative relationships between individuals, but it often says little about the enterprise itself, sometimes not even what it produces, what the production process is or who the customers are. The structure of enterprises has changed, and new forms of organisation and relationships have come into existence. Attempts are made to understand how an enterprise works, i.e. how it operates, what the relationships are between individuals and how ideas and information spread through the enterprise. To this end, new type of organisational chart –the organigraph– has been developed by Mintzberg and Van der Heyden [Mintzberg, Van der Heyden, 1999].

Organigraphs do not eliminate the boxes of the organisational chart, but activities are combined and linked using the concepts ‘set’, ‘chain’, ‘hubs’ and ‘webs’. Organigraphs are not intended merely to show individuals and their positions, but to provide an overview of the activities of an enterprise, much like a map shows mountains, rivers and cities and the roads that link them. Thus, organigraphs are extensions of organisational charts. Organigraphs are a convenient method of illustrating what an enterprise is, why it exists, what it does, and how its individual components work.

The set refers to the fact that each enterprise is a set of things, e.g. machines or people. They are linked, but at the same time they are to a considerable extent independent. Examples of sets are inventory waiting to be sold, an auditor and his clients, or a teacher and his students. The main element in the activities of an enterprise is the connection of individual components in a production process, and this is illustrated by a chain. A chain illustrates the linear connection between components, i.e. one component takes over from another, as in assembly lines. This concept cannot be used to describe all the components of an enterprise, as many of them are too complex and one thing does not always lead to another.

In order to get a better grasp of the activities of an enterprise, the activities are illustrated in the form of hubs and webs. A hub is a co-ordinating centre or the place where people, things or information come together and move within a delimited area from A to B. A hub may be a building such as a school, or a machine such as a computer. A manager can also be a hub, e.g. the coach of a football team. Some relationships are of the nature that they have no centre and no end, and this is where the web comes in. An example of a web is when a new product is being developed. All the employees talk to one another, e.g. during coffee breaks, and toss up ideas, some ideas are developed further, others are not. The activities of artists or scientists, e.g. in universities, often have this form. This description is related to logistics. The flow of products and services is one of the main characteristics in the framework of logistics [Coyle *et al.*, 1992]. The use of the Internet as a means of communication of enterprises and individuals is a clear example of a web. The appropriateness of the concepts set, chain, hub and web to individual enterprises varies. For example, a chain can be appropriate to illustrate a production process in one enterprise and the web more appropriate to another. Thus, organigraphs vary for enterprises under different conditions.

An example of this is a fisheries enterprise which operates several factory vessels. Each vessel is a hub, but the relations between the captains at sea take place within a web. The engineers aboard each vessel are a separate set, and the seafood production process is linked together in a chain. Mintzberg and Van Hayden described the organisation Medicins sans Frontieres (MSF), which was awarded the Nobel Peace Prize in 1999, in an organigraph [Mintzberg, Van der Heyden, 1999]. MSF does not have an international centre; instead, the national organisations form centres which are linked together by a web. Each national organisation is a hub with an inflow of public contributions and volunteers. In the hub, work is in progress on financial management, recruitment, training and organisation of individual projects. In the event of an emergency, three elements are combined, i.e. expert staff, supplies and funds in a hospital in a danger zone. This hospital then becomes an independent hub which requires a flow of information between the danger zone and the national organisation. This illustration gives a clearer picture of the projects, work methods and activities of the MSF than a traditional organisation chart could.

Organigraphs illustrate relationships and processes. There is no single correct organigraph; instead there can be many kinds of organigraphs describing the activities in question, based, among other things, on the vision of individual managers. An organigraph describing enterprises fits in with the idea that enterprises have much in common with organisms in an ecosystem and their activities. Organisms are like elements in a set, as in the case of fish living in an ecosystem, e.g. in a lake or in the sea, and this ecosystem can be described as a hub. The complex social processes of organisms often resemble a web, as in the case of bees. The co-operation of organisms in foraging for food or hunting, as in the case of lions, or under other circumstances, in the case of ants, has the form of a chain as is frequently the case with enterprises engaged in production. An organigraph of the photosynthesis of green plants in a forest

includes the forest as a hub where the plants, as elements in a set, synthesise, in a chain production process, organic compounds from carbon dioxide and water in the presence of sunlight.

4. Conclusions

Progress in the biological sciences can improve our understanding of our economic environment. Enterprises have only been in existence on the Earth for a short time and there are various trends in enterprises which are still unknown, but there is much in their activities which resembles the workings of nature. It is possible that over a long period of time a form similar to the genetic features of organisms will develop within individual enterprises and affect their daily activities.

Although it is possible to identify a substantial correspondence between economies and ecosystems, this does not mean that the struggles for existence of animals and enterprises are identical. Of primary importance here is that the natural sciences can be used to enhance our understanding of the economic environment. The approach suggested of using organigraphs extends the analysis of the activities of enterprises. In many ways, this methodology is useful in highlighting various factors which are common to enterprises in an economy and organisms in an ecosystem. For SMEs, which are often more dependent on their environment than other enterprises owing to their size, it is important to be able to describe such relationships as clearly as possible in order to improve their competitive positions.

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