



Virtualisation as a New Trend of Applications of the Global Information Technology (IT) - Analysis on the Example of Transformation of Small and Medium Enterprises (SMEs) in the Global Market

Jerzy Kisielnicki, Warsaw University, Poland
jkis@wspiz.edu.pl, j.kisielnicki@mail.wz.uw.edu.pl

1. THESIS AND ITS REASONING

A new trend of applications of the global IT has appeared in the contemporary management that is called virtualisation. Virtualisation is such a process of transformation of an organisation that allows small and medium-sized enterprises (SMEs) to break through various limitations in their functioning. Most of them were difficult to overcome without application of IT. One of the existing barriers is limitation of the scale of SMEs functioning. Such enterprises were commonly associated with a local market, and their operation in the global market was a rarity. Even if they existed in it, their operation usually concerned specific products or services. Their operation in the global market was mostly restricted to operation as subcontractors of LEs.

The thesis to be justified in the paper is: Virtualisation changes dramatically the image of SMEs. Those enterprises, which use new trends of IT development for their own development, become fully competitive for large organisations. They may, *inter alia*, operate as equal organisations in the global market. Barriers of the economies of scale between them disappear. Thus, owing to virtualisation and the global IT connected with it, SMEs become flexible, new type organisations. They are often called 'modern organisations' in the literature. In organisations of this type, we deal with a very high speed of decision-making, and their functioning is based on economic criteria. In effect, opportunities to grow and to appear in the global market for SMEs are greater than if they operated as traditional organisations. Hence, it is a commonly assumed hypothesis that:

1. Virtualisation allows individual SMEs to enter strategic co-operative alliances with other similar businesses. A new organisational form, emerged in the form of virtual organisations, occupies a competitive position in the global market. For achievement of the goal outlined in such a way, SMEs use the opportunities, which the global IT provides. These opportunities mean creation of virtual organisations as well as creation of virtual branches for individual enterprises. Hence, we can say that an SME has today opportunities to grow in two planes:

- horizontal (merging new organisations with the existing organisation),
- vertical (creation of new branches for the existing organisations).

2. Large enterprises - LEs utilise IT quite differently than SMEs. They do not create virtual organisations, and they restrict the process of virtualisation to establishing new branches connected with the parent organisation.

Irrespective of the size of enterprise, we may assume that virtualisation is a significant element of a 'new economy'. Fundamentals of the theoretical process of virtualisation are yet under way of creation.

2. RELATIONS, PROBLEMS, QUESTIONS

Reasoning the previously put thesis, we want to discuss the relations occurring between the following elements:

- Virtualisation,
- SMEs,
- LEs,

- Global market.

The four elements specified may be discussed as a whole because of use of the global IT. An analysis of individual elements and of relations occurring between them requires answers to a number of questions. In the paper presented, we would like to focus on the following theoretical and practical research problems:

- a. The notion of virtualisation and of virtual organisation, its framework and basic forms of implementation. Virtualisation as a new trend in business co-operation.
- b. The notion of 'terminal point' as a theoretical construction, which achievement enables answering the questions:
 - (i) When SMEs can be considered as functioning and having a significant position in the global market, and what is the role of global solutions of IT in it?
 - (ii) What is the role of IT in liquidation of barriers between SMEs and LEs?
- c. The practical case study. A specific construction enterprise, although it is in the class of SMEs, owing to application of the global IT and to creation of virtual organisation, was able to win an international tender for construction of a hotel complex. In result, it appeared in the global market for construction services. The enterprise in question won that tender having a renowned, large international enterprise as their competitors for construction of the said complex.

3. VIRTUALISATION – NOTIONS AND FORMS

Virtualisation, as we have already noted, is a herald of a new direction in sciences of organisation and management, having its theoretical and practical dimension. We understand it here as the process of continuous transformation. In the context of analysis carried out, this is a process, owing to which enterprises, irrespective of their size, may assume such a form that will allow them to become fully competitive in the permanently changing global market. The process of adjustment consists in a very quick adjustment of the enterprise to new requirements of the environment (Hendberg, 2000). This is done through alterations in the organisational structure as well as in the profile of products or services. These alterations are possible owing to a new direction of IT development. This direction is application of the global IT, and particularly application of global computerised networks, such as Internet (Keeny & Marshall, 2000).

From the theoretical point of view, we can separate the following three basic forms of virtualisation:

1. Extension of the function of enterprise activities, i.e. a vertical development of the organisation. This occurs when the enterprise wishes to be closer to the customer, and it does not have adequate resources, or when the economic calculus indicates that establishment of a traditional branch is profitless. For this purpose, the enterprise does create virtual branches or kiosks.
2. Creation of the virtual organisation, or the horizontal development. Such a development occurs through budding of the organisation, which is a virtual incorporation of other organisations in a given enterprise. There is lack of a

unanimous definition of this notion in the literature (Hendberg, 2000; Quinn, 1992; Scholzch, 1996). In an earlier publication, there was carried out an analysis of the definitions used (Kisielnicki, 1998). We assume, for the purpose of the analysis being carried out, that:

The virtual organisation is such an organisation that is being created by the principle of a voluntary nature of action, and its members enter with one another in relations of various types in order to achieve their common goal. Every member who creates the organisation fixes duration of the relation. That of the members, who first admits that the existence of that relation is unfavourable for them, may make the decision on its liquidation, and they withdraw from it as the first. The virtual organisation operates in the so-called cyberspace, and its functioning requires existence of the global IT. It is just because of functioning of solutions such as Internet activities of the virtual organisation in the global market are possible.

SMEs apply this form of development. LEs develop 'internally'. IT is used in them in order to strengthen their competitive position in relation to other enterprises. As Hammer and Stanton (1999) rightfully notice, IT becomes, for a certain class of organisations, a 'wall' that divides them from other enterprises.

3. Specialist structures being created in order to train and improve the future, and the present, employees. In physical terms, this is a computer or a network of computers equipped with specialist software. This form of virtualisation is used for raising qualifications of the personnel by both SMEs and LEs.
4. Virtualisation as an opportunity for SMEs to come to existence in the global market

Development of the global IT causes that more and more enterprises go out from the narrow framework of operating in the local market, and become global enterprises. Thus the global market, which over many years was only accessible for the chosen, thanks to IT and its growth, stands open to functioning of a wide class of enterprises, including also SMEs. An enterprise that wishes to come into existence in the global market should meet a number of conditions, such as, *inter alia*:

- a. Possession of a well-known and reputable brand,
- b. Built-up distribution and support service network,
- c. Having at its disposal such a product or services provided, which, owing to quality and utility values, are unique and sought,
- d. Possession of an up-to-date management infrastructure adjusted to supporting their activities in the global market, i.e. the global IT.

In order to meet the specified conditions, the enterprise must have at its disposal adequate financial, material and human resources. In confrontation of SMEs with large enterprises, the former are in a very difficult position. To come into existence in the global market, the enterprise must incur a definite outlay; or to exceed a certain volume of that outlay. Only having it incurred, we can say that the enterprise has chances to come into existence in the global market. We can describe an amount of that indispensable outlay as a 'terminal point'; sometimes, one may find the term 'barrier to entry in the global market' in the subject literature. Height of the 'terminal point' is determined by

volumes connected with:

1. Incurring costs for an advertising and promotional campaign in order to promote the enterprise or specific product(s) or service(s) in the global market.
2. Economies of scale, i.e. such volumes of production or services, which should be fulfilled below the market price, what will allow to occupy a favourable competitive position in the market.
3. A high quality of the product or service corresponding with international standards, such as, for example, in Europe, the ISO standards.
4. Having an access to the distribution channels existing in the global market or creation of alternative channels.
5. Observance of formal barriers, or adjustment of their activities to the regulations in force.

The specified parameters could only be met if the enterprise has got possibilities to use the global IT. Having such possibilities, it may make decisions under the conditions of full information, as well as reduce the risk of action. We should remember that functioning in the global market is much more difficult than in local markets, as it requires application of the global IT, and particularly of the global computer networks as well as an access to the international warehouses and data bases.

Enterprise's coming into existence and functioning requires still a greater outlay if it were to operate in the e-market. As the surveys carried out, *inter alia*, by Reichheld and Scheffer (2000, 2001) have shown, the cost of winning the customer in this market is significantly higher than in the traditional market.

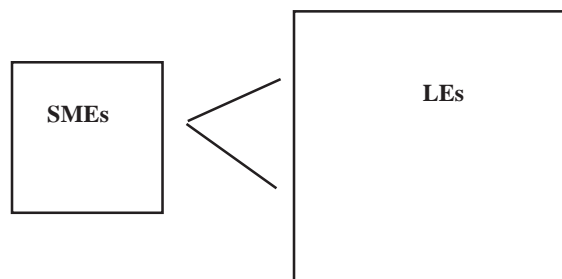
Fixing of the so-called terminal point requires carrying out empirical studies. Its magnitude depends on both the branch and degree of enterprise globalisation, as there are not many enterprises that are operating on all continents. In order to fix a height of the terminal point, we may use methods of the strategic analysis. For example, terminal point's height may be determined by definition of the outlay necessary if we want given enterprise's sales in the global market to be higher than 2%. Sometimes, as an organisation of such a type there can be considered the organisation, in which more than 50% sales value is connected with the global market. Because SMEs individually do not have such resources to be able to exceed the terminal point, that is why they create virtual enterprises with the use of the global IT. Graphically, such a situation is shown in Figures 1 and 2. Theoretically, development of the virtual organisation may be very great. Practically, extent of its development is connected with technical barriers (e.g., communication barriers), and with the need to create such an organisation that may achieve the fixed goal. Modification of the goal causes a very fast modification of the enterprise. In its simplified form, the procedure of creation of the virtual organisation is three-steps.

Point one - goal determination, i.e. the task that must be performed.

Point two - carrying out feasibility study of an independent implementation. In the case of negative result, there should be calculation whether creation of the virtual enterprise is feasible from the economic point of view.

Point three - creation of the virtual enterprise, which - with as high profit as possible for all the organisations forming it - can achieve it (in this step, there should be negotiated tasks for individual elements forming the enter-

Figure 1. Comparison of individual SMEs and LEs (LEs have a competitive advantage over individual SMEs)



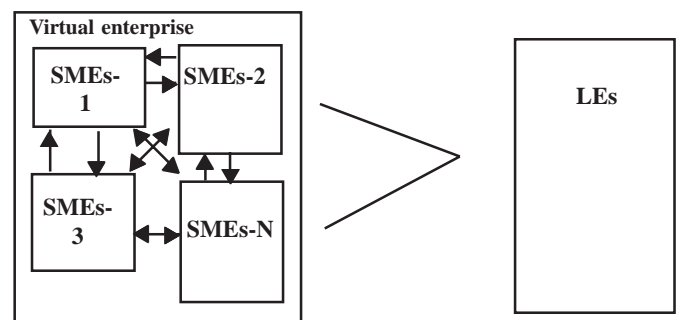
Descriptions:

< Relation of competitive

SMEs - Small and Medium-size Enterprises

LEs - Large Enterprises

Figure 2. Comparison of a virtual enterprise and LEs (a virtual enterprise - set of SMEs, is more competitive than LEs)



Descriptions:

> Relation of competitive

SMEs - Small and Medium-size Enterprises

LEs - Large Enterprises

prise, and conditions for settlement between them).

Having completed the task, dissolution of the virtual enterprise takes place. In practice, enterprises, having completed their tasks, are seeking for new goals and modifying the virtual organisation created earlier to new tasks. It sometimes occurs that the virtual enterprise transforms into various holding companies. Then, virtualisation can be treated as a preliminary stage in creation of traditional LEs.

The global IT constitutes a management infrastructure for the virtual enterprise. The global IT changes a nature of contact between the participants of the process of goal achievement, for which that enterprise has been set-up. This is not a traditional direct contact, for example, between the customer and the seller. Volumes of the necessary outlay on development of the IT infrastructure (and global networks in particular) are very high. Therefore, an adequate state policy is required in this respect, which should support development of the global IT. This is a problem going beyond the framework of this paper.

5. THE CONSTRUCTION S.A. ENTERPRISE AS A CREATOR OF THE VIRTUAL ENTERPRISE

In the subject literature, there are described many various types of virtual enterprises. Here, in order to support the thesis on the role of IT in creation of the global enterprise as well as its role in liquidation of barriers between SMEs, we shall present the problem of accomplishment of the project of construction of a hotel complex on the shore of the Mediterranean Sea. For the purpose of construction of that complex, tenderers were called to bid. The tendering procedure was held in accordance with the rules in force in the European Union. The Construction S.A. company won the tender. The value of the contract amounted to •160 million. The Construction S.A. company is a construction enterprise of a medium size. The basic size of employment is 180 people. A normal activity of the firm is designing and construction of housing estates and office buildings. Its assets are constituted by, among other things, an office building with a surface of 600 square metres, together with an adequate infrastructure and a multi-place computer network, technical background, comprised of heavy and light construction machines, cars and repair workshops. The enterprise has a very good opinion in the local market. They have also been awarded with international references for accomplishment of several contracts as subcontractors.

At the end of 1999, in the newsletter published by the International Federation of Consulting Engineers (FIDIC), and in accordance with the EU procedures, a tender was announced for completion of the said hotel complex. The Construction S.A. enterprise took part in the tender despite the fact they had had poorer experience and performance potential than other competitors. In order to take part in the tender, a special virtual enterprise was established that took part in the tender under the name of Construction S.A. That enterprise consisted of 15 organisations operating in various countries. They were such firms as:

1. The Construction S.A. firm,
2. A consulting enterprise that dealt with preparation of the tender bid,
3. An accounting and financial office,
4. An agency enterprise, in the area of labour and personal consultancy,
5. A specialist enterprise that was performing such tasks as, among other things, construction of swimming pools, facility protection, lifts, kitchen complex, air conditioning systems, greens arrangement.

The Virtual Construction S.A. enterprise (this name was nowhere used in the official materials) was created of both the firms that had been cooperating with Construction S.A. and with the use of IT.

The IT share in creating the enterprise that won the tender was as follows:

1. Finding out via Internet of specialist enterprises that had relevant references and expressed their wish to participate in the project.
2. Carrying out, also via Internet, of a partial employee recruiting campaign.
3. Operational management of project accomplishment, and exchange of information with the use of e-mail.
4. Management with the use of specialist software, such as the System Project, and systems of the MRP II/ERP class.

The firm's owner asked of the reasons for tender winning, said, among other things, that:

1. A very high contribution is at the side of global IT, and of Internet, in

particular. It allowed creating a strong virtual enterprise that was fully competitive for LEs.

2. A very serious treatment of the tender, and many hours lasting work of the team, Construction S.A. and collaborating firms, especially at the stage of tender preparation.
3. Luck that the companies selected for the purpose of creation of the virtual enterprise were fully competent.

At the same time, he uttered the following opinions:

1. Investors worse perceive the virtual enterprise than the traditional enterprise. These fears correspond with the above-specified characteristics of threats connected with functioning of virtual enterprises.
2. Firm's employees as well as the entire organisations creating the enterprise are exposed to an intense activity of 'head-hunters'.

6. FINAL REMARKS

The success of enterprise is decided by the whole complex of factors and adopted solutions. The global IT plays a very important role here. But to make it effective, even the best technology is not enough. IT must be supported with actions of the creative personnel. Obviously, IT is a very important factor that determines the strategy of firm's growth. It is also an initiator of a new direction of changes in the theory of organisation and management. Through virtualisation, it enables to create new organisational forms. Currently, the virtual enterprise, particularly in the global market, has yet not been treated in an equal way as large traditional organisations. The behaviour of the owner of Construction S.A. is characteristic, as he had some resistance in providing specific data related to his firm and to the virtual enterprise established. Such behaviour consists both in a business secret as well as in the fact that the entire tendering procedure did not contain the term 'virtual enterprise', though the enterprise created was an organisation of this type.

Analysing the role of global IT, one should pay attention to its two parallel directions of development:

The first of them concerns its role in SMEs. IT development acts towards an increase of the degree of cooperation of the entire organisation. It also reduces the barriers existing between individual enterprises, which form a single organism - the virtual enterprise. This enterprise, while seeking to achieve the common goal, behaves as a single organisation.

The second direction concerns large organisations. IT strengthens the existing management structure within them. A result is creation of LEs 'castles' separated from other enterprises by the wall of computer encryption systems.

One may only suppose that a more common creation of virtual enterprises in the future on the basis of the global IT will reduce differences between the potential of both types of organisations, and thus it will contribute to levelling barriers between SMEs and LEs.

REFERENCES:

- Hammer, M., Stanton, S., (1999). *How Process Enterprises Really Work*. Harvard Business Review, Nov-Dec, p. 108
- Hendberg, B. & Dahlgren, G. & Hansson, J. & Olive, N., (2000): *Virtual organizations and beyond, discovering imaginary systems*, John Wiley & Sons, Ltd., Chichester, N-Y, Toronto.
- Kenny, D. & Marshall, J.F., (2000). *The Real Business of the Internet*. Harvard Business Review Nov-Dec 2000, p.119
- Kisielnicki, J., (1998). *Virtual Organization as a Product of Information Society*. Informatica, 22, p. 3.
- Kisielnicki, J., (1999). *Management Ethics in Virtual Organisations*, in: Managing Information Technology Resources in Organisations in the Next Millennium, ed. M. Khosrowpour, IDEA Group Pub. Hershey, London.
- Kisielnicki, J., (2001). *Virtual Organization as a chance for enterprise development*, in: Managing Information Technology in a Global Economy, ed. M. Khosrowpour, IDEA Group Pub. Hershey, London, p. 349.
- Quinn, J. B., (1992). *The Intelligent Enterprise*, The Free Press, N-Y.
- Porter, M. E., (2001). *Strategy and the Internet*, Harvard Business Review, March, p. 62.
- Reichheld, F. F., (2001). *Lead for the Loyalty*, Harvard Business Review, July-August 2001, p. 76.
- Reichheld, F. F. & P. Scheffer, (2000). *E-Loyalty: Your Secret Weapon on the Web*, Harvard Business Review, July-August, p. 105.
- Scholz Ch., (1996). *Virtuelle Unternehmen - Organisatorische Revolution mit Strategischer Implikation*, Management & Computer, 2, p. 16.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/proceeding-paper/virtualisation-new-trend-applications-global/32163

Related Content

Anger and Internet in Japan

Hiroko Endo and Kei Fuji (2018). *Encyclopedia of Information Science and Technology, Fourth Edition* (pp. 7946-7955).

www.irma-international.org/chapter/anger-and-internet-in-japan/184491

Improving Efficiency of K-Means Algorithm for Large Datasets

Ch. Swetha Swapna, V. Vijaya Kumar and J.V.R Murthy (2016). *International Journal of Rough Sets and Data Analysis* (pp. 1-9).

www.irma-international.org/article/improving-efficiency-of-k-means-algorithm-for-large-datasets/150461

An Empirical Analysis of Antecedents to the Assimilation of Sensor Information Systems in Data Centers

Adel Alaraifi, Alemayehu Molla and Hepu Deng (2013). *International Journal of Information Technologies and Systems Approach* (pp. 57-77).

www.irma-international.org/article/empirical-analysis-antecedents-assimilation-sensor/75787

Systems and Software Engineering in IT System Development

Marcel Jacques Simonette and Edison Spina (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 7381-7389).

www.irma-international.org/chapter/systems-and-software-engineering-in-it-system-development/112435

An Exploration of Designing E-Remanufacturing Course

Bo Xing and Wen-Jing Gao (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 688-698).

www.irma-international.org/chapter/an-exploration-of-designing-e-remanufacturing-course/112383