THE NATIONAL ACADEMY OF SCIENCES OF ARMENIA PUBLISHERS
ARMENIA, 0019, YEREVAN, 24, MARSHAL BAGHRAMIAN AVE.

CSIT 2017

COMPUTER SCIENCE AND INFORMATION TECHNOLOGIES

IEEE

CSIT

Revised Selected Papers
September 25- September 29, 2017
YEREVAN, ARMENIA
http://www.csit.am

COMPUTER SCIENCE AND INFORMATION TECHNOLOGIES

Edited by
Samvel Shoukourian

NATIONAL ACADEMY OF SCIENCES OF ARMENIA
YEREVAN 2017
INSTITUTE FOR INFORMATICS AND AUTOMATION PROBLEMS

2017 Computer Science and Information Technologies (CSIT 2017)

Yerevan, Armenia
25 – 29 September 2017

IEEE

IEEE Catalog Number: CFP1724X-POD
ISBN: 978-1-5386-2831-7

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number: CFP1724X-POD
ISBN (Print-On-Demand): 978-1-5386-2831-7
ISBN (Online): 978-1-5386-2830-0

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CSIT-2017

Table of Contents

Algorithms, Automata and Logic

Artificial Intelligence and Cognitive Models

Design and Test

Discrete Mathematics and Combinatorial Analysis

Information and Coding Theory

Information Technologies and Applications

Parallel and Distributed Computing

Pattern Recognition and Image Processing

Telecommunication and Networking

Workshop on Information Technology Management

The Impact of Business Environment Virtualization on Strategic Planning Activities of Companies

Baizhanova Dina Ondassynovna,
Khisarov Bulat Dzhantemirovich
PhD in Technical Sciences

ABSTRACT

This article discusses some aspects of information and telecommunication technologies development and their impact on the strategic planning process of companies. Particular attention is paid to the impact of the trends of virtualization of market relations and production and service processes to the components of the Balanced scorecard methodology.

Keywords

Information and communication technologies, virtual process, balanced scorecard, company management, strategic planning, business processes

THE MAIN TEXT

The intensive development of information and communication technologies (ICT) causes the wide introduction of information telecommunication services in all spheres of human activity. Great opportunities and high quality of information and network services create a powerful base for automation and virtualization of the processes of companies' activity on a global scale. World resources through ICT become available to Internet users worldwide.

One of the main directions of providing business and social services is the rapid development and implementation of virtual services on the Internet. Virtual banks, universities, clinics, shops, libraries, online games, social networks and a wide range of various remote services are deeply implemented and now occupy an important place in human life. In the near future different types of virtual organizations and new services are expected to appear on the Internet.

Modern ICT create new principles for business organization. Many companies create virtual teams of specialists living in different countries and organize their work remotely over the Internet.

New opportunities create the basis for global modernization and innovation of the organization of work and business relations between companies. Companies are beginning to understand that ICT provide tremendous opportunities and a qualitatively a new level for development, producing, and organization of work. For the business world, there comes a time when the existing theory and practice of planning and managing of the company's work under new conditions are not effective, and it requires the revision of the old and the creation of new principles of organization of companies.

At present, there are many models and methods for organizing, planning and control of the companies' activities. All they mainly are based on traditional management methods, which do not take into account the global changes in production and market environments. We will closer consider impact of ICT on the Balanced scorecard (BSC) system proposed by R. Kaplan and D. Norton in the early 90-ies [1].

BSC is a concept of strategic planning of activity at the different levels of the management hierarchy of company. The BSC includes four components, covering the full range of performance indicators aimed at achieving the strategic goals of the company.

1. Finances. This group includes performance indicators that determine the company's financial achievements in the strategic plan.
2. Customers. The indicators of this group characterize the company's rating on the market, which is ultimately determined by the level of customer satisfaction with the company's services.
3. Internal business processes. The indicators of this group in the strategic plan describe producing and services technologies development program of company.
4. Staff training. The strategic plan indicators of this group are defined by actions aimed at improving the qualification and professional level administrative and production staff of the company.

The strategic planning of activity of the company is centralized. The planning process spreads throughout the hierarchy of the company. The success of the strategic plan depends primarily on the quality of the plan itself and its implementation by company divisions.

The modern ICT create a new environment for organization and management of companies, which in many respects differs from the classical environment described in the works of specialists of management.

Historically, companies have created and organized their activities on the basis of production and market resources of regions (cheap natural resources, cheap labor, high market demand for the manufactured products, etc.).

Under the influence of virtual business processes and access to world resources over the Internet, many of these principles have undergone changes. We will consider some trends of changing of business environment under the influence of new technologies and their impact on the components of the BSC.

1. FINANCIAL INDICATORS OF BSC

At present the profiles, products and services of companies are changing intensively. Before our eyes, many companies whose profiles did not meet the requirements of the modern market or their products were outdated and unclaimed in the new conditions disappeared. For 2-3 decades many generations of personal computers, cellule phones and other electronic systems have changed. New technologies supplant the old ones from production and services sphere.

New generations of cellular communications and telephones, as well as numerous mobile applications, provide a variety of services to people anytime and anywhere the Internet is available. In these conditions, the need of visiting the offices

for information, inquiries or booking services progressively eliminates. People prefer to use services, buy airline tickets, book hotel, download books from electronic libraries, make online payments, watch online movies and sports events and so on. Obviously, Internet services have huge advantages and therefore companies that provide services in the traditional form are losing customers. In strategic plans, a special place is occupied by issues of planning financial resources and indicators. Many companies, especially in poor and developing countries cannot find finance resources for production development and expansion. Lack of financial resources is one of the main reasons for the bankruptcy of many companies.

The process of creating a virtual environment for the activities of companies also includes financial resources. Like other types of world resources, financial resources also should be easily accessible to users on a global scale.

In the World Bank Forum 2013, it was noted that 2.5 billion of the world's adult population do not have a bank account and about 200 million micro, small and medium-sized enterprises in developing countries have denied access to affordable financial services and loans [2].

This is a huge market, which can bring big profits if the access to financial resources is facilitated. For this reason, groups of organizations of the World Bank have put forward the concept of ensuring universal accessibility of financial services by 2020.“Universal access to financial services is within reach – thanks to new technologies, transformative business models and ambitious reforms,” said World Bank Group President Jim Yong Kim “As early as 2020, such instruments as e-money accounts, along with debit cards and low-cost regular bank accounts, can significantly increase financial access for those who are now excluded.”[2].

All this requires from companies to continuously follow the latest achievements in science and technologies, the development of ICT, the market requirements and the emergence of new access opportunities to global resources and services. Many companies that were unable to navigate properly in the new environment of world business went bankrupt or were in serious condition (Kodak, Nokia, Global Crossing, Olivetti).

At the same time, new companies appeared and in a short time occupied a leading position (Microsoft, Apple, Google, China Mobile, online stores Amazon.com, Ebay.com, etc.). Currently, e-commerce is gaining momentum and in the near future, stationary shopping centers may be without visitors.

2. WORK WITH CLIENTS

Market relations become virtual. National and regional markets are uniting within a common virtual world market. Virtual exchanges, auctions, exhibitions and fairs create opportunities for direct access through the Internet to natural, industrial, financial resources on a global scale. This circumstance blurs the boundaries between national markets and, as a consequence, local companies have to compete with the world's leading companies in their market. Local companies are gradually losing customers in their own market, giving way to other companies. This is one of the main reasons for the bankruptcy of local companies and the destruction of the national economy.

It is important to note that the emergence of virtual Internet services allows direct contact with customers around the world. The local customers lose national color and use internet services on equal terms with customers from other countries. The struggle against such phenomena on the part of national governments for support of local companies (reducing the volume and increasing taxes on imports of goods) has no perspective, since all this is a consequence of global scientific and technological progress. The right way for local producers is to achieve world-class quality of products and services in the country. However, this requires financial resources, specialists of new technologies and, of course, it depends also on level of life, as well as on legislative, social, economic and political situation in the country.

Another solution to this problem is the establishment of branches of multinational companies that use the resources of the country and work in the national market. However, transnational companies restrict the development of the national manufacturers and impact on the economic sovereignty of the country.

3. PLANNING THE DEVELOPMENT OF INTERNAL BUSINESS PROCESSES

The internal business processes of the company are more and more automated and virtualized, which increases the efficiency of production and service. Rapid development of technologies requires continuous modernization and innovation of the company's producing and management systems. Otherwise, the company will not survive the competition not only in world scales but also in its own country.

Technological and production systems of the company determine the quality of products and services. Historically, national companies worked for their own market in accordance with the standards and living conditions in the country. Not all products of national manufacturers were of high quality and basically did not meet the requirements of international standards. Before, this fact was not so important, since the product was intended for selling in the local market. In terms of integration processes and the possibility of direct access to global resources and services, in order to withstand competition in their national market the companies must ensure the quality of products at the level of world standards.

High technologies create the conditions for "deep" specialization and monopolization of production by powerful specialized corporations. Research, development and implementation of a new production require huge finances and high professionalism of the staff. For example, it is difficult to compete with "Intel" on the design and manufacture of microprocessors or with the company "Samsung" for the production of smartphones, not having the appropriate resources.

It is often feasible for many companies to use high quality technology and business processes of other companies (outsourcing). On the Internet, there are many proposals for providing a variety of remote services in almost all areas of activity of companies. Many of these proposals is designed as cloud based services that exempt users from the worries of purchasing and operating expensive technologies.4. Development of professional level of the staff.

4. STAFF TRAINING AND PROFESSIONAL DEVELOPMENT

It is well known that global automation leads to the increasing of unemployment level in the world. In new conditions of works, human labor is used less and less. Many operations are automated and for their operation it does not require special professional knowledge. With the introduction of new technology, the number of employees in companies is more and more decreased. Modern technologies require new conditions for the organization of work. In the labor market, the demand grows for talented highly educated specialists who have deep knowledge in their professional field and can freely navigate and use the opportunities of ICT. Training of such kind of specialists by the company itself is not always possible. Therefore, companies often make up a virtual team

of specialists from different countries to carry out highly qualified work. This approach is beneficial in many respects. The virtual team does not require a room, a workplace, convenience and a permanent salary. However, temporary personal have a big drawback that they do not have a binding to the company and, therefore they have no motivation. However, this is a shortcoming of a modern strategy of the human resource policy of many companies, when labor contracts are concluded for short time with all employees, starting from director to cleaner and there is no confidence among employees that the contract will be prolonged after its termination.

In many production and service companies, the training of personnel is mainly aimed at acquiring skills in working with new systems that implement and automate production, service and management processes. The need for such kind of training is always available, as these systems are often updated. The interface with users of these systems is quite friendly and their use does not require special knowledge in ICT.

The abovementioned factors are very important and should be taken into account during development of a strategic plan for company. In today's world, where everything is changing rapidly, along with estimating the demand for products or providing services, it is always worthwhile to evaluate the expected achievements of scientific and technological progress in field of activity in order to react in time and not continue to produce goods that are obsolete and will no longer have market demand.

REFERENCES

[1] R. Kaplan, D. Norton, “The Balanced Scorecard: translating strategy into action”, Boston, Mass.: *Harvard Business School Press*, 1996.

[2] UFA2020 Overview: Universal Financial Access by 2020, 2013, http://www.worldbank.org