



DEVELOPMENT OF CONTROLLING IN THE ORGANIZATIONS FROM THE SERVICE SECTOR UNDER THE CONDITIONS OF THE FORTH INDUSTRIAL REVOLUTION

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Abstract: *Under the conditions of the already started Forth Industrial Revolution, there are radical changes taking place in the field of service sector organization management, which are related not only to the innovative management toolset, but also to the essentially new nature and content of the business processes, the character of the changes and the deviations of the actual from the planned indicators. On the background of these realities, controlling as a concept supporting management requires the application of new tools, models, concepts and methodologies, which should be at the basis of the restructuring of the service sector business organizations under the conditions of the already started Forth Industrial Revolution. The advance of intelligent robotized smart systems and tools supports management and contributes to taking efficient and optimal management decisions in an environment of uncertainty, global volatility and risk.*

Keywords: *controlling, business organizations, service sector, Forth Industrial Revolution, tool*

INTRODUCTION

In the mid 1990s, “Cable and Wireless” assume as their primary tasks the expanding of data analysis about the status of their activity and the timely management of the expected and occurring negative impacts and threats.

Business organizations are like a living organism. New economic entities are being born and old ones disappear, which is an evidence for their capability to adapt in the dynamically changing global economy.

Radical changes are taking place nowadays in the business organizations – the consequences of the economic crisis, the keen desire to attain competitive advantages and the challenges of the Forth Industrial Revolution lead to launching, in a long-term aspect, of a continuous cycle of measures for decreasing the cost of the produced goods, and



optimizing profits, for creating essentially new products and individualizing the manufacturing. The dynamics of the external environment and the strategic challenges change substantially the role of the service sector organizations within the globalizing world economy. A conclusion is becoming ever more evident that the quick and timely responding to and managing the expected, occurring and/or occurred changes in the internal environment is a guarantee for restricting the negative impacts and commotions.

In the history of business, the companies which have been active and operating for one hundred years are just 40. Among the big and well established organizations are “DuPont”, “Kodak”, “WR Grace”, “Hudson Bay Company”, as well as several Japanese companies, the beginning of which is hidden somewhere in 17th and 18th century – the department store “Daimaru”, the companies “Mitsui” and “Sumitomo”. Having in mind that there were tens of thousands of business organizations towards the end of 20th century, the question is only reasonable, why so few of them managed to exist as long as a human life will last?

Maintaining the viability of the business organizations is an art, which combines a set of measures, instruments, strategies and policies. What is the secret, however, of those 40 organizations, which have survived for more than 100 years?

The former director of planning at “Shell” – Arie de Gaise, in a speech before the Royal Art Society, the industrial producers and commerce representatives, said that Du Pont de Nemur started as a gunpowder producer, and in 1930s became the biggest shareholder in “General Motor`s”, while, currently, they manufacture primarily specialized chemical products.

In 1673, the founder of “Mitsui” opened a shop for manufacture goods in Edo, which was then for some time involved in money changing, until finally becoming a bank. The company added to the range of its activities coal mining, and in 19th century it started its own manufacture business.

The history of each of the 40 business organizations, which survived for more than 100 years, shows that they responded with adequate measures in adapting to the changing conditions, both in themselves and in the environment, in which they existed. Therefore – they were successful in skillfully managing the emerging or occurred in them changes, to neutralize the negative impacts and optimize their activities.



The fundamental changes in the service sector business organizations and in the surrounding environment call for the need of managing the expected, occurring and/or occurred changes and require such a fundamental restructuring in the internal structures, which would ensure harmony with that environment. This may be achieved through the application of innovative approaches and toolset in management, which would provide a reliable mechanism for:

- timely detection of the changes;
- risk evaluation;
- elaborating and taking efficient management decisions in the conditions of a growing uncertainty.

Nowadays, controlling in management is a functional mechanism, whereby methodologically, instrumentally and informationally facilitating, providing and supporting management in the elaboration, taking and implementing strategic, tactical and operational decisions. In the course of the constant and comprehensive monitoring and detecting the expected, occurring and/or occurred changes, the concept of controlling contributes to the performance of the functions of integration, system organization and coordination between the separate subsystems of the organizational system and their components. Thus, of particular theoretical and practical importance for the successful and efficient functioning of the business organizations is the implementation in their management of the methods of controlling.

Object of examination in the present study is controlling as an innovative conceptual-and-governance system for purposeful-and-adaptive management, operating in the business organizations from the service sector under the conditions of the Forth Industrial Revolution.

Subject of the presentation in the research are the capabilities of controlling, which it provides for optimizing the management of the service sector business organizations under the conditions of the already started Forth Industrial Revolution.

The specific objectives of the paper are:

- to determine the importance and the role of controlling in the business organizations from the service sector;



- to study the influence of the Forth Industrial Revolution on controlling and its toolset.

HISTORICAL DEVELOPMENT OF CONTROLLING AS A MANAGEMENT ACTIVITY

The term “controlling” originates from the English word “to control”, which translated into Bulgarian apart from “to control” also means “to manage” and “to regulate”. Controlling in translation means managing or guiding, i.e. leading, navigating to practical achievement of the set goals.

The roots of controlling date back to the Middle Ages, and more specifically – to the area of state governance, when in the 15th century in Great Britain was introduced the official position of a “comptroller”. The main activities of the comptroller in Great Britain included documenting and controlling the stock reserves. It was only in late 19th century that in the USA for the first time the term “controlling” started to be used as signifying an area from company management. A prerequisite for that was the higher industrial growth in the country, which required improvement of the management tools in the field of planning, accountability and control. Controlling and its development are a result of the growing needs for improving the management functions in the business organizations under the conditions of a dynamically changing environment. The historical development of controlling since 1878 to date can be divided into five stages:

- the period from 1878 until 1931, during which the official position of “comptroller” is specified, which is different to that of an “accountant”, and has the main task of coordinating the management activities in the business organizations;
- the period from 1931 until 1979, during which the comptroller was transformed from a “coordinator” into a “navigator” of the manager within the management process and was to choose the right way for development of the organization in the complex economic situation;
- the period from 1980s until the end of the 20th century, which was characterized with the development of controlling as a management concept;
- the period after the year 2000 until 2010, which is defined by the introduction into controlling of the principles of the process approach and the prioritized management of the changes;



- the period from 2010 to date, during which the beginning Fourth Industrial Revolution has been transforming the communication “human – human” into communication of the type “machine – human” and “machine – machine”.

Controlling unifies into a single and comprehensive concept the achievements of economic analysis, planning, managerial accountability and management (Фалько, С., Keith, A. R., 2002), and it is focused on the future development and achieving the objectives of each of the organizations from the service sector. In a historical perspective, the scope and borderlines of controlling are constantly expanding, while its essential specific characteristics are being further developed, clarified and defined.

Controlling is a conceptual-and-governance system for purposeful-and-adaptive management, developed on the basis of the integration of managerial accounting, planning, control and information provision of management in the service sector business organizations (fig. 1.). It has a systematic and comprehensive nature in respect to all the activities performed in them, while being permanently related to their management.

The term “controlling” can be defined as: a conceptual-and-governance system oriented towards the future development of the business organizations operating in the service sector. The controlling concept is based on the systematic approach and is focused on achieving the organizational goals, as well as on the information-and-analytical and methodological provision of the business organizations’ management in the realization and coordination of the management functions: goal setting, planning, organizing, regulating, motivating, control, accountability and decision making. On this basis, defining the concept of “controlling” requires taking into account of the systematic relation and interaction between:

- the management functions;
- the information provision, the analytical work and the toolset of controlling;
- controlling and management.

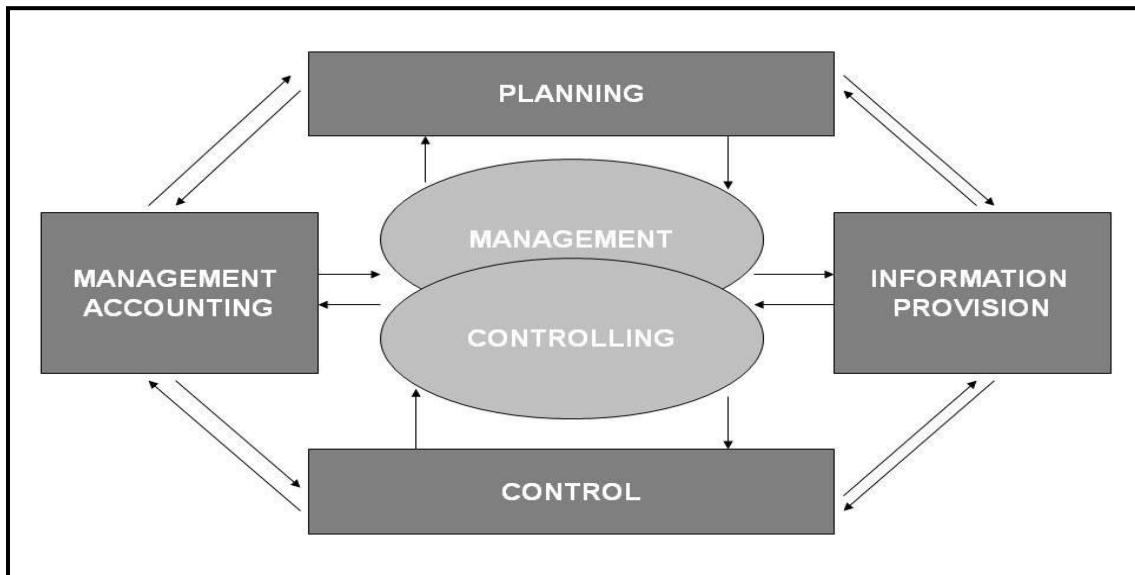


Fig. 1. Controlling as a conceptual-and-governance system for purposeful-and-adaptive management

Controlling is a system, which framework shapes the outlines of regulation in business organizations from the service sector. The interrelation and sequence of the activities taking place in the controlling system facilitate the management of the economic entities, which seek to turn their management into an automatically self-governing system (Witt, Frank-Jürgen, Witt, K., 1996).

When defining the term “controlling”, the major concepts about its nature should be taken into account:

- an essentially new management philosophy, finding its expression in the efficient use of the resources available to the business organizations from the service sector, and their development in the long term;
- a tool for managing economic entities focused on achieving their goals and integrated in all of their functional areas, contributing to the information-and-analytical and methodological provision of management in the process of planning, control, analysis and taking management decisions.

On the basis of those essential characteristics of controlling, in a wider sense, it can be defined as a concept for purposeful-and-adaptive management, which is future-oriented and focused on the prosperity of the business organizations, working in the service sector. Controlling in its nature, puts an emphasis on the ever more evident necessity that the activity of the economic entities should be subjected to long-term planning in compliance



with the utilization of the entire potential of the organizations, and all the advantages issuing from the environment. Thus, the application of controlling mechanisms in the organizations operating in the service sector is a guarantee for their survival and quick and optimal adaptation in the course of the occurring and/or already occurred changes in them, or in their external environment.

In a narrow sense, controlling is a combination of informational, mathematical and organizational models, whereby facilitating:

- the process of taking and implementing management decisions in the business organizations, working in the service sector;
- the achievement of the set objectives;
- the timely correction of any occurring deviations of the actual from the planned results.

Controlling is a means for supporting management. An informational and methodological basis is thereby provided for maintaining and realizing the management functions. On this basis, controlling organizes and controls the processes implemented in the business organizations through the creation, development and application of:

- a system of target indicators for a certain time period;
- standards for their functioning in the form of rules and procedures for planning, reporting, control and information provision of management.

The role of controlling is related primarily to the processes of preparation and ensuring the implementation of the management decisions. Thus, controlling does not take anything from the managers, nor replaces their authority for exercising power and taking management decisions, but only facilitates and supports them in their course of activities.

Controlling is a management concept aimed at ensuring the successful functioning of the organizations in the long run through:

- adapting the strategic plans to the changing conditions of the environment;
- compliance between the operational and strategic development plans;
- coordination and integration of the operational plans in the various business processes;
- developing an information system for the various management levels within optimal time periods;



- developing a system for control over the execution of the plans and adjusting their content and time scale;
- adapting management organizational structure in view of enhancing its flexibility and ability to quickly respond to the changing conditions of the environment.

GOAL, TASKS AND FUNCTIONS OF CONTROLLING

The goal and tasks of controlling in the service sector business organizations should foster their development and prosperity in the long-term perspective.

The goal of controlling should be adequate also to the requirement for obtaining maximum benefit, while investing minimum resources both in the short-term and long-term time periods. It is a result of several essential characteristics, such as:

- defining controlling as a management concept targeted at facilitating the course of the management process;
- navigation, finding its expression in a set of alternative options for the future organizational development as a basic essential characteristic of the controlling system.

The main goal of controlling is result optimization through supporting and orienting management towards meeting the long-term and short-term planned objectives in the service providing organizations. This should bring the economic entities to reaching the strategically set as a goal synergy in the long run – i.e., the results pursued by an organization in the long-term time period (production or finance related) should be better than the sum of the effects set as a goal, prompted separately by each short-term time aspect.

Synergism (from the Greek word *συνεργός* – assisting, supporting, and *synergeia* – cooperation, partnership) as the main goal of controlling is represented as the desire to reach a long-term strategically set as a goal optimal total aggregate result in the organization, which would be bigger than each separately realized and planned result in a short-term period. The achievement of synergy as an objective of controlling can be defined as: a purposeful strategic decision for the future long-term development of the economic entities, while using the method of combining and interacting. On the background of the dynamic changes in the environment and the quickly occurring in the service sector organizations deviations of the actual from the planned indicators, synergy as an objective



of controlling requires optimization of resources – production, technological, financial and human; reduction of the production costs as well as of the administration and management costs; and optimal values of the financial, production and technological result. Undoubtedly, that would lead to improvement in the competitiveness of the service providing business organizations on a strategic level.

The goal of controlling – a long-term synergy strategically set as a goal, requires the achievement of a long-term and short-term planned results within the system of the business organizations operating in the service sector. This calls for optimization of the financial result and is achieved through the search for a synergy effect in the following 4 fields:

- sales;
- management;
- operational subsystems;
- finance.

The goal of controlling is specified in quality-determined and quantity-measurable indicators for the results of the activity. On this basis, the main tasks of controlling include:

- supplying the necessary information for taking management decisions;
- provision of suitable toolset for attaining management that would lead to the desired synergy results – i.e., to achieving the planned objectives in the long-term aspect.

The realization of the goal and the tasks of controlling are related to the fulfillment of a number of functions. As main functions of controlling in the work of the economic entities, economics literature most often mentions:

- coordination of the activities on planning, organizing, fulfilling tasks, motivating, control and information provision (Темелкова, М., 2010; Хорват, П. и коллектив, 2006);
- information provision of management decision taking (Хан, Д., 1997);
- provision of methodological basis for performing management functions;
- regulation of the deviations through of the elaboration of corrective measures for their remedying (Дайле, А., 2001).



In line with the specific characteristics of the production activity and the nature of controlling, the main functions of controlling in the service sector business organizations include the following:

- coordination of the management activities on the identification and reaching the objectives;
- information provision in taking management decisions;
- developing management information systems and maintaining their functioning within certain parameters;
- developing and applying a system of methods for planning, reporting and controlling the costs and results from the activity;
- carrying out a production-and-technical and financial-and-accounting analysis of the activity with an emphasis on the financial result, profitability, efficiency, liquidity and solvency;
- performing control via the establishment of standards, comparing the planned with the actual results, analyzing the deviations and preparing alternative corrective measures;
- monitoring, analysis and elaborating alternatives for regulating the processes of planning, reporting, control and performance of the production activities;
- ensuring transparency in respect to the obtained results from the activity.

DEVELOPMENT OF CONTROLLING UNDER THE CONDITIONS OF THE FORTH INDUSTRIAL REVOLUTION

The exponential speed of developing of the Forth Industrial Revolution leads to quick upgrading of digital revolution's achievements, as well as to the combination of numerous innovative and smart technologies, to new technological breakthroughs, which cover areas such as artificial intelligence, robotics, the Internet of things, driverless autonomous motor vehicles, 3D and 4 D printing, nanotechnologies, biotechnologies, material science, energy preservation, quantum calculation. This preconditions both some unprecedented changes in the paradigm in economy, business and society, and a deep and long-term transformation of the entire model of controlling and the toolset ensuring it.

The tectonic shifts related to the advance of the new technologies in all the sectors of the public and social-and-economic living, require the searching and finding of new tools,



models, concepts and methodologies, which should be in the basis of the restructuring of the business organizations from the service sector under the conditions of the already started Fourth Industrial Revolution.

It is expected that the Fourth Industrial Revolution will be accompanied by a megatrend in production, as well as with the introduction in the economic reality of smart network factories and supply chains as perfectly relevant facts from the objective reality. The forecast of the experts is that the new method of production and management will gradually increase productivity, where over the next 5 to 7 years it is expected that this productivity growth will reach 50%.

A starting point of each industrial revolution is the employment of new technologies and toolset, which would lead to improved organization and management along the entire chain of supply, production process, distribution and accountability. The new method of production and management, which has been notably establishing itself over the last 5 - 6 years, forms essentially new conditions under which the service providing business organizations should work. These new conditions require the use of an innovative management and controlling toolset, whereby there could be generated accurate, precise and adequate to the actual dynamics of the environment reports and analyses, trends and tendencies, which would facilitate the identification of the reasons for the occurring or already occurred changes in the organizations.

The Fourth Industrial Revolution has already established the second wave of the digital technologies, where there has been an essential change not only in the mobile communications and the social media, but an intrinsic part of our reality have become the cloud technologies, the virtual analysis of large bulks of data, the virtual management and production, the Internet of things, the innovative business models, which are already contributing to the self-organization of the production compounds, as well as to the management of the so-called "factories of the future". Determining prove to be the communications of the type of: "machine – machine" and "machine – human", and also the dominant technologies mechatronics, informatics, electronics, robotics, sensorics, biotechnologies, nanotechnologies, which precondition the high level of intelligence of the organizational systems and their connection into a network, determined by the advance of the Internet connections into the production processes. The individualization of the mass



products and the creation of “tailor-made” products meeting the individual consumer requirements, expectations and wishes are also part of the consequences outlined by the already started Fourth Industrial Revolution. This prompts the need of a new toolset with which controlling should respond to the enhanced economic risks coming from the macro-environment.

Over the recent years there have been substantial changes in health care, in the conditions for living and working, as well as in economy and industry. Ever more often emerging are destructive technologies, such as 3D and 4D printing (Additive Manufacturing), 3D stimulating of the production, dramatic shortening of the time gap between the idea and the market, flexibility and “individualization” of the mass production, distance management and facility maintenance.

After the year 2010, the ever clearer, in the course of time, merging of the digital with the material world has been leading to generating new opportunities in respect to the usefulness of the goods, products and human potential.

On the background of this reality, where competition and race between the organizations will become more evident over the next decade, the business organizations face the problem of developing their own potential and competitiveness in a particular niche, branch or region.

This requires that the controlling concept should be set as a goal over long-term strategic orientation points (mission, vision, goals and strategy) and an innovative toolset, which would lead to the development of the business organizations in their external environment. In spite of the integration of the artificial intelligence principle in the machines and robots, people are still the qualified key factor for taking decisions in the production environment. The forecasts, however, are that the role of the human resources and the nature of their work will be radically changed within the scope of industry 4.0. (Spath, D., Ganschar, O., Gerlach, S., Hämmerle, M., Krause, T., Schlund, S., 2013)

THE INNOVATIVE SMART TOOLSET OF CONTROLLING UNDER THE CONDITIONS OF THE FOURTH INDUSTRIAL REVOLUTION

Under the conditions of the Fourth Industrial Revolution, the innovative toolset in the field of controlling creates favourable prerequisites for developing the potential and competitiveness



of the business organizations working in the service sector (Темелкова, М., 2016). This toolset enables:

- the timely processing in real time of business related structured and non-structured data;
- the fast responding to the changes issuing from the global external environment, whereby saving time and creating space in respect to the accuracy of corporate management.

Under the conditions of the Forth Industrial Revolution, controlling is based on instantaneous analysis and process automation, which comprise almost all the aspects of the service providing business organizations' activities. At the same time, of particular importance is the definition of the importance of digitalization for the service sector business organizations in general. The data and information bulk, with which controlling works, are of primary priority for the planning and programming of the entire work and management processes. Thus, the focus is gradually shifting from hardware, products and processes to software, services and analyses in which the information data base, supplied by controlling, is the driving force of the adequate running of all the processes in the service providing business organizations. Thus, through the innovative toolset of controlling, organizations become information-based business units, in which information runs in a two-way traffic in cloud technologies. This also determines the transition over the last 5 – 6 years from process-oriented to analytical controlling toolset.

The innovative toolset of controlling under the conditions of the Forth Industrial Revolution includes robotized intelligent systems, which gather, process and analyze in real time information from the external and internal environment of the service sector business organizations for fractions of a second, turning such information into new commands, which become part of the memory of the system. The innovative aspect here is that the robotized tools of controlling integrate into their functional scope activities, which used to be unfamiliar, but are becoming part of the activity in the process of the actual performance of a particular task. The modernization costs are dramatically minimized through that toolset, while the business organizations from the service sector become more flexible and adaptive, and capable of identifying at an early stage any risks or occurring changes, as well as on the



basis of accurate forecasting – they are able to overcome more easily the already occurred changes.

ADDED VALUE FOR THE BUSINESS ORGANIZATIONS FROM THE SMART TOOLSET OF CONTROLLING

The data and information collected and summarized by the robotized intelligent systems of controlling are available not only to the robotized smart tools, but also to all the participants in the value chain. Thus, on the basis of the indicators from the controlling system for the resource expenses of the business organizations for production and distributing of services for past time periods, management has up-to-date production indicators, on the basis of which the smart management systems are capable to take organizational-and-management decisions. In this way, under the conditions of the Forth Industrial Revolution, data and information become an operational centre of the business organizations, working in the service sector.

The innovative smart toolset of controlling provides the following added values when management decisions are taken by the intelligent management systems in the business organizations:

- transparency: through data based processes, the information in respect to all the critical in financial aspect “bottlenecks” in production is available in real time, where the processing of large bulks of data is completed by providing detailed and exceptionally fast generated reports and accounts from the controlling toolset;
- detailization: through various quantity-oriented and visual methods for analysis, information is evaluated with unprecedented density, accuracy and scope, and according to all the available connections and interactions in the business organizations, such as the correct expert assessment giving a quick solution to an occurred problem, it is founded on information-based analysis and process automation;
- forecast: forecasting is no longer based on statistical models as it used to be in 1990s, and due to the large amount of data describing the situation and information, the forecast under the conditions of the already started Forth Industrial Revolution is much more accurate and precise, which leads to providing new services, offers, individualization of production (“tailor-made” products), focused on consumers;



- optimization: when all the processes are based on data, information can be used with specific recommendations for certain current operations, where, on the basis of experience and good practices, there are timely conclusions made from the data for a past and current period, and optimization models are generated, which lead to reaching the planned strategic orientation points in the future.

An information-based strategy is developed through the innovative smart toolset of controlling. It safeguards and develops digitalization in the production process of the service sector business organizations by providing them with information in management decision taking by the intelligent management systems. The implementation of this strategy with the economic entities should be supported by controlling in respect to the organization and management.

CONCLUSION

Digitalization, as a main tool of controlling, leads not only to the development of an organization infrastructure of a new type, but also to the provision of a substantial technical-and-technological basis for the service offering business organizations. The strict organizational and hierarchical structure should be purposefully and project oriented.

Under the conditions of the Forth Industrial Revolution, controlling is a comprehensive approach, which should be applied in its entirety. There is an evident change in the paradigm related to the transformation of information into digital data and smart systems, which organize and manage the business organizations from the service sector.

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