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Sustainability Management of Industrial Enterprises and an Assessment of its Effectiveness

Abstract. The article deals with the concept of sustainable development (SD) management and conditions to achieve SD of an industrial enterprise. The structure of sustainability management is presented. It is proved that organizational structure of management is the basis for assessing the effectiveness of the SD of an enterprise. It is shown that to assess the effectiveness of the management of SD of the enterprise, there should be indicators used characterizing the level of manageability and the growth level of the organizational management structure. It is shown that with the help of an indicator like the manageability level, it is possible to determine the stability boundaries of an enterprise.

Keywords: sustainable development (SD) of industrial enterprise, the system of sustainable development management, organizational structure of management, technology of transparent governance, monitoring of the business environment of an enterprise, the stability boundary

1. Introduction

One of the 17 sustainable development goals after 2015 is to ensure the sustainable consumption and production patterns. High level of consumption is achieved at a great cost - intensive exploitation of natural resources and ecological imbalance, irrational use of production and human potentials.

Today, for civilized consumers it is already not enough to have guarantees of the "right" course of business. The consumer wants that activities of the company would not cause damage to the environment, the working conditions at the plant would not cause harm to the health of its employees, the social atmosphere in the

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company would be favorable, financial activities of the company would be transparent for employees, investors and society [Young, Hwang, McDonald & Oates 2010].

Currently, much attention is paid to the SD of industrial enterprises. Various indicators and indices which can determine the growth and development of the company are highlighted. However, we often consider only the factors of development in the form of changes in the external and internal conditions of life: macro-economic processes in market conditions, the condition of the property and intellectual potential of the organization. In addition, one of the main problems of SD of industrial enterprise is the problem of creating a unified management system that will ensure the SD, and the lack of the technology to define the sustainability boundaries of companies.

2. The concept of SD management system of industrial enterprise

By the type of metabolism and energy exchange with the environment, the company is an open dynamic system characterized by stability as an important feature. An industrial enterprise belongs to complex systems which are characterized by such properties as: non-additivity, purposefulness, emergence, desire for the establishment and maintenance of homeostasis [Krishans, Mutule, Merkuryev & Oleinikova 2011].

One can imagine the system of industrial enterprises as the interaction of economic, environmental and technological subsystems. Currently, the development of the enterprise management system is subjected to economic priorities which can lead the management system to an unstable state. Thus, it becomes apparent that to ensure SD of enterprise management system it is needed to change the priorities of economic development for the environmental ones as only the sustainability of ecological subsystem makes it possible to ensure the stability of the other two subsystems [Farber, Costanza & Wilson 2002; Hasna 2007; Mamingi 2011].

The system of SD management of the enterprise is a unified enterprise management system based on a targeted, collaborative, coordinated management of all types of its operations, knowledge of managers and employees and ensures the achievement of the main goal – the sustainable development of the quality of stakeholders' life on the basis of competitive enterprise activities [Danilava 2015].

Thus the sustainable state of enterprise management system, in terms of natural laws, is "the ability of a dynamical system to keep traffic on the planned trajec-

tory of development (to maintain the intended mode of operation), despite the indignation impact on it."

International Standard ISO 9004-2009 "Managing for the sustained success of an organization – A quality management approach" focuses the enterprise on setting quality objectives and achieving them by improving the activities of all the structures of the enterprise in cooperation with the stakeholders on the basis of the quality management system, replacing the internal and external audits by self-control (ISO 9004:2009). In turn, one of the key needs and expectations of stakeholders is the transparency of governance. Transparency is required at all levels of the organizational structure and in all functions and technologies of transparent management. It is also necessary to speak about the environmental, financial, technological, and social responsibility of the enterprise.

3. Technology of implementation and assessment of SD management system of the enterprise

To implement the system of SD management and to assess its effectiveness, we can use: technologies for SD of the enterprise and technology of transparent management. These technologies use 3 modern management theories:

– The theory of manageability measurement [Vysotskiy 2004],
– Theory and Methodology of transients [Vysotskiy 2013],
– Transparent management in the system of SD management [Vysotskiy, Garchuk & Danilava 2015].

Table 1 indicates the basic functions of the SD management of the enterprise.

Table 1. The major functions of the SD management of the enterprise

Function description				
Enterprise policy creation, planning and implementation	System procedures for enterprise sustainability management (including elements and their specifics)	Resource management (including human resource management)	Monitoring, measurment, analysis and forecasting of correctives for enhancing the enterprise sustainability management system	Enhacing, implementation of innovations, mentoring in enterprise sustainability management system

Source: own elaboration.

The structure of the system of SD management of enterprises consists of four levels – strategic forecasting, strategic planning, short-term (tactical) and operational level.

Strategic forecasting level (10-15 years) reflects:

– the concept of SD of the enterprise on the basis of scientific and technical progress.

Strategic planning level (5 years) reflects:

– the company's mission and strategy, including conditions for the development of organizational structure and its elements,

– the purpose of the management of SD of the enterprise and the challenges based on the sub-levels and elements of the organizational structure.

Short-term (tactical) level depends on the sublevels and organizational structure and includes:

– the processes and procedures of SD management of the enterprise, adjusted for the peculiarities of the current organizational structure and the conditions of its adjustment,

– the monitoring system including indicators and criteria of processes of SD management, procedures for the collection and analysis of data on the processes and results of sustainability management, methods of assessing the effectiveness of management processes of sustainable development and the mechanism for the development, adoption and implementation of management decisions for each of the processes and elements of organizational structure,

– the operational level deals with industrial process control where the main target of management is personnel.

To achieve sustained success the company's senior management should take an approach in terms of the perspective of quality management. Processes of SD management should be implemented through a special functions of management, which are regulated by the "quality loop" of international standards of ISO 9000. The special functions of management include: policy control; marketing management; sales control; procurement management; financial management; quality management system; human resource management and "knowledge;" production management.

The process of special functions management is implemented through the general functions of management and assessment of their manageability level, and allows to determine the effectiveness of the special function in the sustainable development management of enterprise. The general management functions include: management decisions; organization of control and monitoring of the implementation of decisions; controlled accounting decisions; planning of actions to implement the decisions; analysis and evaluation of performance management and indicators of control; adjustment of administrative decisions to

achieve the level of control in the plans; encouraging achievements of administrative decisions.

All of these functions consider the peculiarities of implementing them into strategic, tactic and operational modes adjusted for the organizational structure of management.

4. The role of organizational structure in the assessment procedure of SD management system of industrial enterprise

Diagnostics of SD management efficiency of enterprises covers eighteen functions of management and involves measuring the manageability level at a certain stage of development of the enterprise. The manageability level is the integrated indicator of the effectiveness of the management process. It describes and evaluates the state of the system as a whole, integrating administrative, economic, organizational and social aspects at a specified time [Vysotskiy 2004: 70].

This diagnosis is based on the organizational structure of management of the enterprise; staffing and functional responsibilities of employees.

Diagnostics of the effectiveness of the SD management on the basis of organizational structure of management allows to evaluate:

– links between departments and specialists in the implementation of the basic functions of SD management of the enterprise,

– completeness of management functions for implementing basic functions of SD management of the enterprise,

– feasibility and fullness of information flows in implementing basic functions of SD management,

– problem areas in managing the implementation of the main functions of SD management of the enterprise.

For the distribution of the goals, objectives, procedures at every level of SD management the manager should use the organizational management structure and assign responsibility for managing the implementation of the strategy for SD at every level of management. Job descriptions help to determine the completeness of the regulated responsibilities at all levels of SD. Duties missed in the job descriptions are included in "problem areas," since it is not clear who implements them and the failure rate of management actions is determined for the successful development of manageability levels of the enterprise.

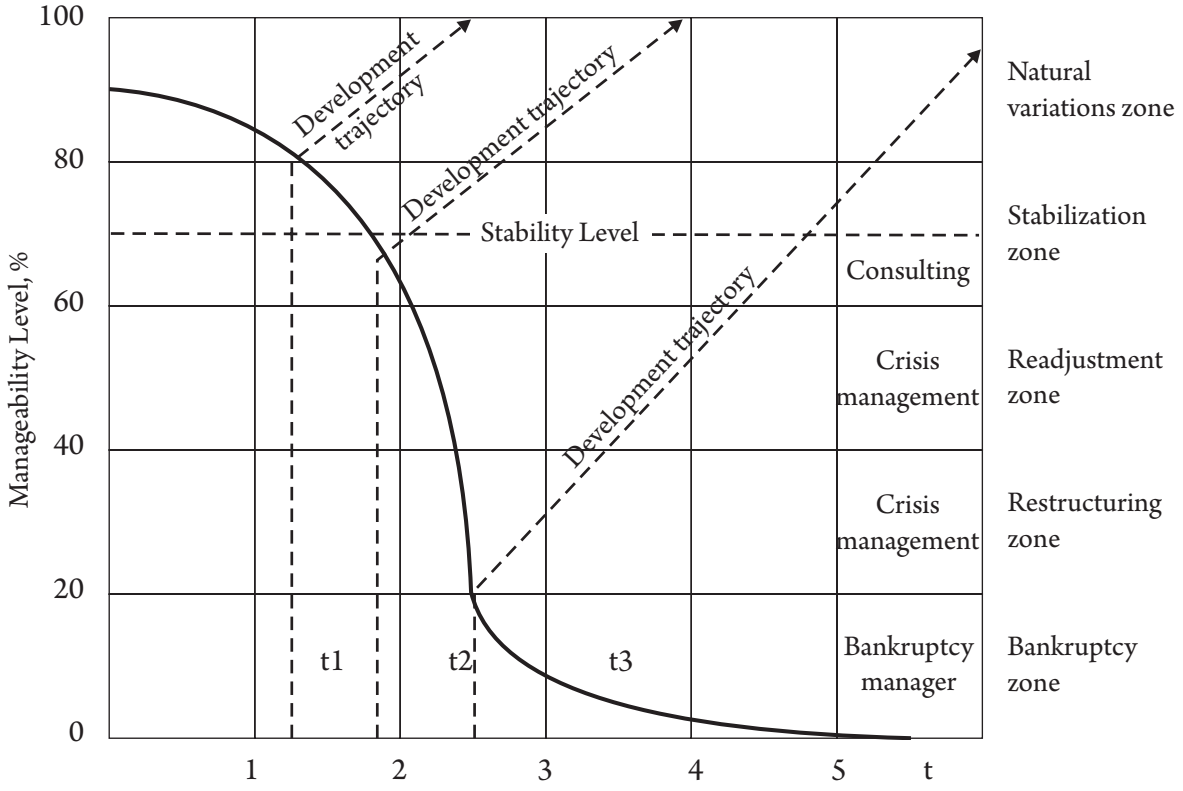
Problem areas in the SD management of enterprises have their own:

– executors,

– boundaries in the manageability levels,
– negative effects as a "braking force" that prevent the successful development of the enterprise,
– costs to neutralize the problems in management,
– losses of the market and time during which problem areas exist.

Analysis of problem areas at manageability levels and management processes of SD stipulates the starting point for management process development and corresponding indicators of effectiveness. Application of the theory of measuring the manageability level, makes it possible to model the chart of the company's development or determine deviations from it (Chart 1).

Chart 1. The company's development



Source: Vysotskiy 2004: 60.

Figure 1 shows the stability boundary conditions of the enterprise, the boundaries of the transition from one area to another and the actions contemplated by the definition of the level of danger.

Each zone has its tolerances and management system must respond adequately to the discrepancy amplitude:
– zone of normal operation (discrepancy amplitude in the range of ±2,5%),
– zone of natural discrepancy (discrepancy in the amplitude range of ±5%),

Manageability Level, %	
97.5	Transfer zone to new managerial conditions
95.0	Zone of attention
92.5	Zone of natural variations
90.0	Normal conditions zone
87.5	Normal conditions zone
85.0	Zone of natural variations
82.5	Zone of attention
80.0	Transfer zone to new managerial conditions
77.5	Sustainability loss zone

Figure 1. Zones of enterprise manageability

Source: Vysotskiy et al. 2015: 302.

– zone of increased attention which requires more intensive monitoring, transition monitoring control points (the discrepancy amplitude in the range of ± 7,5%),

– zone of transition to the new conditions of management consulting part in determining the causes and stabilization programs of SD of the enterprise (the discrepancy amplitude in the range of ±10%),

– zone of stability loss (the discrepancy amplitude in the range ≥10%).

The business environment of enterprise may be volatile and uncertain, therefore, to control the development of the sustainable success of the organization, the manager needs to determine (through procedures of transparent management): a long-term forward planning; monitoring the business environment of the organization; regular assessment of compliance with current plans and procedures; emerging markets and technology; potential risks; ongoing improvement and innovation.

The monitoring procedure (as an element of transparent management technology) allows to monitor the development of tolerance for developing and braking forces among personnel, determine the speed of developments and to inform the leaders of the sustainable management on the need to make decisions adequate to the situation.

5. Conclusion

This paper describes the situation occurring at the competitive market. It is proven that the task of implementation, development or adoption and certifying the unified management systems for enterprises is very typical for sustain-

ability managers. Applying contemporary approaches to enterprise management allows to evaluate effectiveness of these systems using specific indicators. Those indicators help to determine the reserves of time to neutralize the problems in the management of special functions and discover the compliance of them with operational, current and strategic development plans and programs given vectors of development.

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Zrównoważone zarządzanie przedsiębiorstwem przemysłowym i pomiar jego efektywności

Streszczenie. Artykuł poświęcony jest koncepcji zarządzania zrównoważonym rozwojem oraz czynnikom, które warunkują zrównoważony rozwój przedsiębiorstwa przemysłowego. Omówiono w nim strukturę zrównoważonego zarządzania, a następnie wykazano, że struktura organizacyjna jest podstawą oceny efektywności zarządzania zrównoważonym rozwojem przedsiębiorstwa. Ukazano również, że do oceny efektywności zarządzania zrównoważonym rozwojem przedsiębiorstwa powinno używać się wskaźników charakteryzujących poziom zarządzalności oraz poziom wzrostu struktury organizacyjnej. Dowodzi się ponadto, że za pomocą takiego wskaźnika jak poziom zarządzalności można określić granice stabilności przedsiębiorstwa.

Słowa kluczowe: zrównoważone zarządzanie przedsiębiorstwem przemysłowym, system zarządzania zrównoważonym rozwojem, struktura organizacyjna, technologia transparentnego zarządzania, monitorowanie otoczenia ekonomicznego przedsiębiorstwa, granice stabilności