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Information Systems and Innovativeness in the Enterprises

The aim of this paper is to present the role of information flows in innovation creation process in enterprises. Theoretical and empirical researches confirm the existence of a number of determining corporate innovative activity factors. These factors set include exogenous and endogenous features like technical, organizational, informative, legal, political and social. One of the most important factors that impacts on the innovative process effectiveness is the information and the information system architecture.

Рассмотрена роль информационных потоков в создании процесса введения инноваций на предприятиях. Теоретические и эмпирические исследования подтверждают существование определенных общих новаторских факторов. Эти факторы имеют экзогенные и эндогенные особенности, а именно технические, организационные, информационные, правовые, политические и социальные. Один из наиболее важных факторов, влияющих на эффективность новаторского процесса, — это информация и создание информационных систем.

K e y w o r d s: information systems, innovative activity, innovativeness.

Introduction. Presently, in the literature on management there are numerous business concepts discussed. They are frequently a compilation of the so far ideas, characterised by the fact that the centre of gravity is moved from particular functional areas of a company to a complex process approach. Changing conditions of business activity, external and internal environment requirements as well as customer demands are reflected in the transformations taking place in production and service companies. Business processes do not always keep pace with the changes concerning quality, service and innovation requirements. Reaching the desired level of effectiveness and efficiency of actions undertaken in the sphere of quality, cost and time often necessitates a thorough reconstruction of processes and concentration on constant introduction of innovations. It turns out that a single change aiming at the introduction of a new concept into an organisation management system (including the processing subsystem) is not enough to fulfil corporate mission and reach the strategic objectives of a company. Special meaning is assigned to the ability to identify the main processes – mega processes, taking into account resource limitations and possibility of reor-

ganisation, identification and limitation of the negative impact of the already existing determinants of innovative activity — for example technical, economical, social, organisational, legal, political and informational factors. They may be of internal or external character, depending on the type of environment in which they are observed. The fact justifies the attempt to present the importance of information and efficient information system in corporate innovative activity.

The core of innovative activity. Many management theorists and practitioners are of the opinion that in the present era of global systemic, organisational, capital and social transformations, change is the only constant element of corporate activity. Changes are often identified in the sphere of technical resources, technology, organisational systems and stock structure. Also business processes (primary, secondary and management) undergo constant change. The practice of contemporary enterprises proves the necessity of implementing innovative changes being the result of innovative processes concentrated on research and development. Innovative processes are managed with the point of reference not here and now but in further perspective so that innovation is recognized as a constant element of the corporate restructuring process.

Detailed analysis of an innovation process supplies a division into three basic stages [1]:

S t a g e 1. Initiation — identification of the idea, its development and initial steps towards its adoption.

S t a g e 2. Development — idea development process culminating in its detailed form, ready for implementation.

S t a g e 3. Implementation — necessity to implement innovation into business practice, for example production of a new product, implementation of a new process or organisational solution.

In result of an innovative process a company develops a new product, a new technical object or new technological and organisational solution. It is reflected in corporate effectiveness and efficiency as e.g. quantitative growth and enables a company to reach further priority goals. The last stage of the innovative process — implementation — is undoubtedly of greatest importance as companies often put less effort into it and as there is a number of factors that may hinder efficient innovation implementation (mostly of social character).

Developmental cycle of an innovation, especially its scope, time and efficiency in reaching corporate goals influences directly not only the degree of innovativeness of the goods produced or services rendered but also of the whole company. Contemporary technological progress results in shortening development cycles and thus faster implementation of innovative solutions into business practice.

From the point of view of retrospective analysis, the character of innovation processes has changed considerably, starting from the linear model up to net-

work integration approach. There are five basic generations of innovation process models (see Table) [1].

In case of the four generations, the innovation process took the form of subsequent linear stages (Generation I / II). In Generation III, interactive relations between different factors (including feedback) were identified. The fourth Generation of the innovation process is a parallel model, taking into account the importance of key suppliers, customers and numerous interdependencies. For most of the 20-th century, the «closed innovation» model worked well — internal R&D focus, product innovation orientation, self-reliance, tight control and generation of own ideas to develop, manufacture, market, distribute and service new products [2]. Another, fifth generation of the innovation process is characterised by erosion of the «closed innovation» phenomenon. Networks are created, tests and experiments are very popular in the sphere of new technological and organisational solutions.

Informational demands of enterprises undertaking innovative activities. Information relations between an enterprise and its environment. While analysing innovative activity of companies in the light of permanent changes taking place in different branches of industry one may come to a conclusion that passive observation and slow accommodation to changing market conditions are not sufficient to fight strong competition and keep up with technological progress. Business practice proves that only enterprises equipped in complex and flexible information systems communicating them with external and internal environment are able to efficiently manage its technical, organisational, economic and social potential. Moreover, they often introduce new restructuring solutions in the sphere of production, technology and organisation.

Higher market position on home and international markets achieved thanks to rapid development is accompanied by radical changes in the system of organisation, management, processing and information. These changes are aimed at

Five generation of innovation process models

Generation	Periods	Key features
I / II	1960's	Simple linear models — need pull, technology push
III	1970's	Coupling model, recognizing interaction between different elements and feedback loops between them
IV	1990's	Parallel model, integration within the firm, upstream with key suppliers and downstream with demanding and active customers, emphasis on linkages and alliances
V	2000	Systems integration and extensive networking, flexible and customized response, continuous experimentation and testing

greater efficiency and safety in the sphere of technology, materials, power, capital and information of the enterprise — environment system. One may enumerate here a number of factors supporting the innovative process implementation.

For example [3]: knowledge; technology development; R&D activities; information and communication technology network; other trajectories (institutional, technological, service professional, managerial, social) and actors (shareholders, competitors, customer, public sector, suppliers).

Innovative activity necessitates great efficiency of the information system. The importance of information is valued both during the stage of generating new technical and organisational solutions and during the idea development and implementation stages. Other success factors include the company intellectual resources, character and scope of cooperation with external research and development centres as well as detailed analysis of external and internal environment, including market analysis.

Identification of the direction of innovative activity is based on the information resources gathered: information on the development perspectives in the particular branch of industry, new technical solutions and possibilities of their application, activity of the main competitors, customer requirements, resource and social limitations as well as environmental regulations.

Moreover, many theorists point to the crucial role of the information/communication system in corporate innovative activity. Its objectives are the following [4]:

it enables employees to familiarise with the vision of changes;
it informs on the current process stage;
it explains changes and enables their right management;
it facilitates staff development by pointing to different perspectives;
it helps people solve problems encountered;
it promotes behaviours and attitudes of people supporting changes.

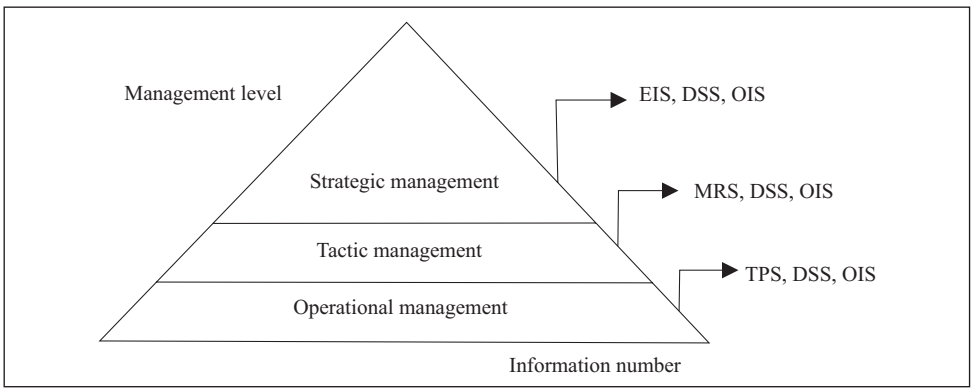
Reaching the desired objectives depends to a great extent on the form of the corporate information system. It seems that it is advantageous to create a system of bi- or multi-directional information flow, a system that is equipped in tools and means enabling fast and reliable information transfer. Moreover, it should be stressed that the information necessary in the process of implementation of innovative activities that is transferred only by official channels is considered a message, what hinders understanding the aims, method of implementation, possible profits and necessary costs of innovative actions. This way, staff engagement in the transformation process is consciously limited. Active form of an information system, based on feedback ensures smooth and fast information transfer, what in result of communication between management levels facilitates and simplifies decision-making processes and provides a clear view of the company's situation on every stage of the innovation implementation process.

Application of information systems for the purposes of innovative activity. Information system may be defined as a computer data processing system generating information, that is an information development system comprising of data input, processing, output and storage stages [2]. A data processing system is the core of the information generation process necessary to take strategic, tactic and operational decisions. Also decisions concerning innovative activity (both during the stage of initiation, development and implementation) necessitate special information characteristics with regard to its scope, character, and complexity. Efficiency of corporate innovative actions may be thus considered a resultant of availability of all necessary information.

The character and scope of information gathered on the output of an information system determines the possibility to create advantageous conditions for innovation implementation. It is assumed that the information is useful and ready for application not only with respect to present innovative actions but also in case of any future undertakings. It should be stressed that business practice proves that the process of information gathering is limited mostly to the necessary data as complex and messy information collection may exert negative influence on the efficiency of the actions undertaken. Redundancy, understood as excess information leads to distortion of decision-making processes, reflected in lower efficiency of innovative actions resulting in demotivation and discouragement of the staff. Moreover, the fact that only «formal» information describing a company with the use of pure ratios, without additional descriptions and explanations is available may lead to unnecessary atmosphere of fear, resulting in social resistance.

Undoubtedly, one cannot let information gap appear in corporate innovative activity. Information gap is understood as a principal difference between the necessary information and the known information. All necessary information should come to addressees always on time, with no delay. The phenomenon of «concealing» or «embellishing» information is unacceptable. The task of an information system is thus to generate and store information necessary to manage the company on particular management levels: strategy, tactics and operation. It is advised to apply executive information systems, reporting systems or information processing systems (see Figure) [2]. Managing innovative activity, especially as far as decision-making processes are concerned may be considered a domain of strategic management. Executive information systems (EIS) and office information systems (OIS) are often applied here.

Due to the special character of innovative activity, quality information tools applied, right input data and primarily the people responsible for a corporate information system are considered extremely important. Application of efficient information tools enables and facilitates the introduction of innovative changes



Information system and corporate management levels: TPS — transaction processing systems; DSS — decision support systems

thanks to for example the possibility of simulation, detailed comparative analysis, data storage, easy access and flow of information via computer networks. The systems applied frequently include: Computer Aided Design, Computer Aided Manufacturing, Computer Aided Software Engineering CASE, data bases, etc. Moreover, enterprises implement integrated and advanced applications assisting in the process of managing innovations, e.g. TI: IEF/Project Manager, Microsoft: Project for Windows, Primavera: Suretrak, CA: Superproject for Windows.

Summary. In response to the demands of contemporary business practice regarding the quality, costs and flexibility of a company, enterprises implement more and more innovative ideas. Innovation has become one of numerous constant changes taking place in companies in the sphere of technology, organisation, economy, information and society. In the branches of industry characterised by high degree of innovativeness, an innovative idea has become a starting point of the process of constant improvement, exerting a very positive impact on technological progress and leading to economic development of a country.

Possibility of winning competitive advantage in the sphere of quality, cost and flexibility is undoubtedly determined by the necessity of constant changes, especially of developmental character. Innovative actions of Polish enterprises prove that success in this field is only possible thanks to intensive innovative actions facilitating synergy and coordination of corporate activity.

The factors facilitating synergy are thus, among others, constant quality improvement, customer service and efficient information system.

In order to provide the right information flow within a company, management information systems (MIS) are introduced. The main task of these systems is to support decision-making processes. Other functions include the following

[5]: result control; problem identification; data identification, necessary to plan and analyse.These systems are also applied in the sphere of innovative activity, supporting the innovative process on every stage: initiation, development and implementation.

Розглянуто роль інформаційних потоків у створенні процессу введення іновацій на підприємствах. Теоретичні та емпіричні дослідження підтверджують існування певних загальних новаторських факторів. Ці фактори мають такі екзогенні та ендогенні властивості: технічні, організаційні, інформаційні, правові, політичні та соціальні. Одним з найважліших факторів, що впливають на ефективність новаторського процессу, є інформація та створення інформаційних систем.

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