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IITSBE, Vol. 1(14) 2013

The Possibilities of Virtual Learning Environment Tool Usability for Programming Training

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Abstract. Learning (teaching) of programming is a sensitive and hot topic for all scientists all over the world. When we learn to program something we have not only to listen to lectures, to analyze supplied and recommended learning material, to listen to teachers advice but to take an active part in learning process too. Virtual learning environment has been more and more integrated into full time study.

The majority of virtual learning environments provide learning material, organization of learning activities, communication and cooperation means to the students but the standard kit does not meet specific learning programming needs. Active researchers, developers and *Moodle* users community has developed and constantly creates new and additional instruments. This paper analyses virtual learning environment tools that are suitable for teaching programming and corresponds effectively to a student's individual learning style. We have used several learning style methods (formulated by Kolb, Honey and Mumford) that are closely interrelated.

Main aims of this work could be formulated as follow: a) teaching (learning) methods of programming that are tailored to student's learning style are defined; b) virtual learning environment tools that help to implement those learning methods are identified. The learning (teaching) methods by using virtual learning environment tools, mentioned above, are experimentally tested on mathematics and informatics students of Lithuanian university of Educational sciences (LUES).

Introduction

The majority of Lithuanian universities and colleges apply blended learning in educational process: virtual environment tools (the most popular is *Moodle*) are implemented parallely with traditional lectures and workshops. Such platforms are commonly used to present the learning material, to test students knowledge (self-control and knowledge control for evaluation tests), and for communication with students when they are outside classes. According to various studies blended learning is acceptable for both students and teachers. The experience of using blended learning has shown its strengths and weaknesses. We have used blended learning for teaching basics of programming methods since 2004. Increasingly, it comes about the individualization of learning, tutorial adaptation to a particular learner's needs, abilities and learning goals. It becomes relevant to organize teaching process applying it to the individual style of a learner.

Nowadays, programming training is an urgent and serious challenge both in Lithuania and abroad. This issue has been analysed in scientific articles [1-4] as well as in a lot of dissertations that were defended on this subject. In Lithuania the principles of programming are usually introduced in the fifth grade of a secondary school were teachers introduce the design of programs by using visual programming environments (e.g. *Scratch* etc.). Later on a part of the young people start programming while studying at school, i.e. by choosing a programming module in 10-12th grade, the others start programming training after joining a higher school (university or college), whereas others begin to learn later in their lives, i.e. after starting the career. Usually the learning process is accompanied with a teacher providing theoretical learning material and tasks which have to be programmed by using programming environment. School-age children can start individual programming studies at different extramural schools. In this case learning takes place at weekends with learners arriving to a training location. Teachers provide the students with learning material and assignment, in an electronic version, with an electronic mail used for communication.

In this case the learning results could be improved by using

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the *Virtual Learning Environments* (VLE) and their tools. Since 2004 programming training in Lithuanian University of Educational Sciences (LEUS) is provided by applying an integrated mode of learning. The learning material provided in virtual learning environment and part of assignments, are transferred to VLE. However, learning to program for a beginner appears to be quite complicated issue at any age level. One must first of all understand program implementation process, be able to solve problems i.e. should change one's way of thinking and develop algorithmic thinking. The main indication of such thinking is capability to put the problem solution into algorithm and to solve the problem in accordance with it (i.e. to get programmed). Therefore, one needs to learn a programming language, i.e. syntax and semantics and to use its structures while writing a program; furthermore, essence and principles of a programming paradigm to be used should also be understood.

Despite the complex nature of programming, which at the same time causes a lot of trouble while learning to program, still the significant influence for the learning success have training tools. A good tool itself should engage a student into a learning process, encourage a learner to achieve his learning objectives and to gain specific knowledge and skills. VLE also contains different tools that can facilitate the programming learning. Therefore, the focus of this article is to analyse what VLE tools can be used for programming training in respect of techniques suitable for a specific learning style of a learner.

Thw object of the study is focused on VLE tools. The goal of the study contains two aspects: a) analysis of programming training characteristics and selection of the most appropriate training (learning) methods for a learning style; b) analysis of the usability of VLE tools currently used to teach programming.

To achieve the goal the following objectives of the study have been raised: 1) an overview of the programming training problems and difficulties encountered in a training process of programming, 2) an overview of classifications of student learning styles and selection of the most suitable training (learning) methods for a student learning style, 3) discovery of methods effective for implementing programming training with usage of VLE tools.

The methods of study that have been used in this research are presented below: research analysis, analysis of virtual learning environment tools, literature analysis on the issue of programming training, a pilot study, a survey.

1. The Peculiarity of Programming Training

Programming is a challenging cognitive process. For programming learning first of all it is necessary to learn syntax and semantics of a programming language. The beginners need this in order to start solving tasks. Moreover, apart from learning syntax structures it is more important to be able to apply them to solve a real problem. It is also important to master the techniques and methods of a programming language. While learning the programming techniques,

the language is only a mean of expression and application of common programming concepts. Learning programming language also promotes student's thinking skills [5].

Actually, the case of false conception of programming learning is quite frequent, as it is believed that it means learning to put down the task solution in a form of a program text by using structures of a programming language. However, program writing is just one of the programming skills. The ability to read and understand the program text is equally important. Thus a programmer spends some considerable time examining the patterns, i.e. programs written by others [6], and adapting them to the task solving. One might think that while learning to write programs you automatically learn to read them, and to keep track of the program implementation. However, studies have shown that the ability to write a program and the ability to read it has a low correlation [7]. Therefore, during programming learning it should be always kept in mind the importance of developing the reading skills and understanding of programs written by others.

Due to its complexity programming seems to be not very attractive, that is why, in order to engage the learners, it is necessary to present it as easy as possible, in a clear and attractive way. However, no matter how attractively it would be presented, it is not enough to have only knowledge or good patterns, for it is necessary to actively engage oneself in this process, to develop the skills, to think logically and algorithmically. Thus, often skills in creating algorithms (which is an integral part of programming) are implicitly developed in the junior school grades already - by analysing real-life problems, splitting them into smaller tasks, reasoning solution options as well as making synthesis of the results to obtain a general solution to the problem. The acquired thinking skills help to understand the essence of programming and make programming learning more productive [5].

According to the several References [1,6,8-9], the causes that determine programming learning problems have been set out:
  i)   it is difficult to understand program's objectives and their relationship with the computer;
  ii) it is difficult to understand the specific programming language's syntax and semantics;
  iii) incorrect understanding of programming constructs;
  iv) inability to resolve the problems;
  v)   inability to read and understand the code of the program.

There are five components leading to difficulties in programming learning: methods of training, learning techniques, learning skills and attitudes, the nature of programming, and psychological reasons - see Ref. [8, 10]. Table 1 represents causes of programming training difficulties.

To find out learners' attitude towards programming training a survey has been carried out, which involved different groups of respondents who have already completed the programming course.

There were 76 students from different study programmes who participated in this research: 29 respondents from *Technologies of Information Systems* study programme, 13 - *Programming Engineer*, 13 - *Informatics*, 12 - *Mathematics* and

Table 1. Causes of programming training difficulties. Adapted according to Ref. [8].

Component	N	Cause of difficulties
Methods of training:	1)	programming training is still not personalized;
	2)	teacher used training methods are not consistent with learning styles of the students;
	3)	dynamic concepts are often taught through static content;
	4)	a teacher is more focused on teaching a programming language and its syntax rather than dealing with task solving through a programming language and environment.
The use of learning techniques:	1)	learners use irrelevant learning techniques or methodology;
	2)	learners work not enough independently to acquire programming expertise.
Skills and attitudes of learners:	1)	learners must have acquired or wish to acquire a wide range of skills related to program development: understanding of problems, knowledge linking to a problem, reflection of a task and its solution, persistence in task solving, application of basic mathematical and logical knowledge, specific knowledge of programming [8];
	2)	it has been observed that the main difficulty for learners is not to get the result itself, i.e. to write a program, but to go through the development process;
	3)	a lot of beginners improperly use their skills of writing a stepwise specification in a natural language, i.e. they incorrectly transform natural language semantics into a programming language [1].
Programming nature:	1)	programming requires a high level of abstraction;
	2)	programming language syntax is very complex.
Psychological reasons:	1)	learners are not motivated;
	2)	generally they begin programming learning in a complicated period of their life, e.g. adolescence [9].

Informatics, and 9 - *Programming and Internet Technologies*. Almost half of respondents i.e. 48.7 % said that programming is difficult to learn, 39.5 % stated that programming is not difficult to learn, while the remaining 11.8 % could not decide. However, opinions differed depending on a future field of work. Those students who will have to program in the future for their career were more opting for the response that programming was not difficult to learn (88.5 %), while those who will not need to program in the future stated that programming was difficult to learn (56 %). Upon request to identify the reasons why they thought it was difficult to learn to program, the respondents were quite self-critical and pointed out that the difficulty was caused by working not enough independently (as stated by 44.7% of respondents) and also the lack of motivation (47.4%). Such reasons as complexity of the syntax of programming languages (30.3 %), difficulty for learners not to get the result (to write a program) but to go through the full development process (36.8 %) also were identified. The survey also determines student needs: learning when the teacher explains individually; communication and cooperation; learning through technology; fast feedback; the need for imagination (visualization).

No matter how the complex programming learning appears to be it is undoubtedly beneficial to a learner himself. Learning to program develops logical thinking and, consequently, this changes the learning style of the students. Scientific research has shown that programming develops the ability to distinguish between the key stages of task or problem solving: analysis, i.e. splitting a task into separate parts; making a plan, i.e. separating each part of a solution; and synthesis, i.e. making separate parts integrated again. The next chapter examines criteria of learning efficiency.

In order to make programming learning easy and attractive, the efforts should be made by both a teacher and a student, as well as right attitude, favourable disposition and close collaboration between them should be established [11]. It is also important to choose the right, i.e. learning-effective, programming tools, a language and environment. Lately, there has been much talk about personal creativity and its development. Often this is being achieved at an early age already. However, the conventional training model used in Lithuania often acts as an inhibitor of human creativity. Programming training is no exception. Here creativity is particularly important because you have to find a solution to a given problem on your own, as well as to implement this solution in a relevant programming environment by means of appropriate tools. Therefore, a combined method of training has being applied, with the help of virtual learning environment enabling the diversification of training tools.

2. Correlation of Learning Styles and Training Methods

This chapter provides an overview of methods suitable for programming training and their correlation with a learner's *learning style* (LS).

Programming training in Lithuanian schools was initiated around 1986 mainly focusing on algorithms. Due to the lack of computers usually programming was taught just on a theoretical level and along with mathematics. For a long time reproductive training methods aimed to impart the knowledge have been applied not only to programming training but other
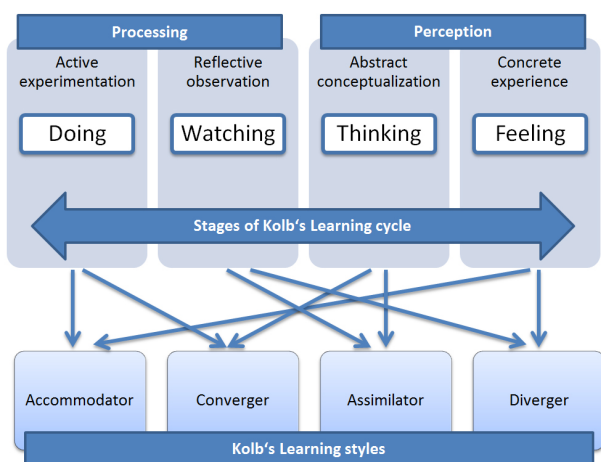
Fig. 1. Cycle of Kolb Learning Styles.
Adapted according to Ref. [15-16].

subjects as well. In these cases a teacher leads and a student just obeys and performs. A modern teacher should not act as a leader but should facilitate learning by encouraging the learners to work actively and thus acquire new knowledge.

Mayes and Fowler as the E-learning researchers refer to a learning cycle with a feedback, in which three stages are distinguished: *Conceptualization - Design - Dialogue* [12]. Each of these stages is related by the authors to a corresponding training theory - *cognitivism*, *constructivism* and *social constructivism*.

First year students enrolled in *Programming basics and techniques* course (*Mathematics and Informatics* study programme at LUES) are taught using combined method of training, i.e. lectures, practical work with some part of learning activities being incorporated into a virtual learning environment. Training is built on the basis of the above mentioned cycle, by selecting the appropriate training methods for each stage.

At a conceptualization stage a new learning material is interpreted by relating it to an existing experience of the learners. New concepts are introduced in the following ways.

1. Descriptions of new concepts and definitions are provided by a teacher. In this case, the most commonly used informative training methods are the following: a lecture, demonstration, visualization of algorithms, pattern analysis (program code reading and interpretation).

2. Learners independently ascertain the value of the concept from the training material content provided in a VLE. Then, such methods of training as an involving lecture, brainstorming, a concept map, structured notes, visualization of algorithms, discussions, pattern analysis (program code reading and interpretation) are used.

In a design stage, the new concepts are established and customized to help solving a real problems. At this stage the following practical creative work (exercises) is carried out: writing the program code - individually or in groups, by using

intuitive, trial-and-error, step-by-step and other methods, also algorithm block diagrams are drawn.

At a dialogue stage knowledge is solidified by experience sharing, knowledge testing and evaluation. Group work methods and discussions are used with evaluation of individual and group work, together with testing and individual practical work performed.

Learning success depends on how the maximum learning goals are being achieved, i.e. whether the necessary knowledge and skills are being acquired, and what emotions are experienced by learners during the learning process. Learning success is to a large extent determined by learning efficiency, which depends on the willingness to learn and knowledge how to learn. It is also influenced by an attractive learning environment.

However, regardless of attractive learning environment good learning results are still determined by learner's personal qualities and his LS. Big number of LS classifications is presented in Ref. [13]. According to Ref. [14], the aspect of student activity is very important in the process of programming learning. Kolb distinguishes four phases of learning through experience process. Fig. 1 represents cycles of learning style:

Concrete Experience (for example, using the cycle to calculate the sum of the sequence);

Reflective Observation (for example, discussing the experience, i.e. what is easy, what is difficult, what effects the results);

Abstract Conceptualization (after discussion of experience an action plan on how to continue the work is developed);

Active Experimentation (testing theories in practice).

In Kolb theory, learning cycles representatives of four styles can be met, which are identified by Honey and Mumford using several definitions as presented in Fig. 2:

Activist - prefers doing and experiencing;

Reflector - observes and reflects;

Theorist - wants to understand underlying reasons, relations;

Pragmatist - likes hands on.

The LS affects the learner's inherent qualities and his learning activities, learning techniques, the issues raised, his communication and ability to generalize.
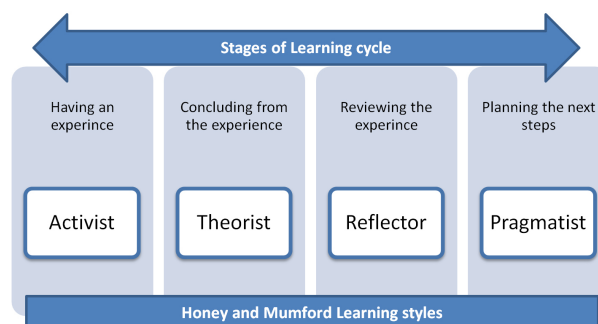

Fig. 2. Honey and Mumford Learning Styles.
Adapted according to Ref. [14-16].

Table 2. Teaching (learning) methods appropriate for the LS. Adapted according to Ref. [14].

Learning style by Kolb - *Diverger*
Learning style by Honey and Mumford - *Reflector*

Features	Most appropriate methods	Less appropriate methods
prefer concrete experience and reflexive observation; have the ability to imagine, to look at specific situations from various perspectives; broad imagination, vision anticipation, improvisation situations requiring find ideas; willing to communicate with people interested in human relationships, there are emotional;	brainstorming; concept mapping; cooperative groups; demonstrations of examples using visualization tools; reference study; self testing; discussions; case studies.	lectures may be helpful if they provide expert explanations and analysis.

Learning style by Kolb - *Assimilator*
Learning style by Honey and Mumford - *Theorist*

Features	Most appropriate methods	Less appropriate methods
prefer reflexive observation and abstract conceptualization; easily creates theoretical models share the information and abstract elements of the whole situation; tend to make inductive conclusions, summarize the results; prefer to work with abstract ideas and concepts than with the people;	lectures; demonstrations; readings; case studies; different observations; individual work; working in step-by-step manner; design of analogies, systems, models, theories, and projects.	talking with experts is normally not helpful (discussions, feedback); group work with activists.

Learning style by Kolb - *Converger*
Learning style by Honey and Mumford - *Pragmatist*

Features	Most appropriate methods	Less appropriate methods
transform theory to prepare for a particular activity; develop ideas; tend to make hypothetical deductive conclusions interested in things and theories (like the check), the specific problems; little interest in people; are not emotional.	practical application of ideas; problem solving; feedback; self testing; example analysis; visualization of algorithms; decision-making; solving technical problems over interpersonal issues; applying new learning to actual practice to see if they work; field work; observations; coaching; simulations.	group work; not evaluated work.

Learning style by Kolb - *Accommodator*
Learning style by Honey and Mumford - *Activist*

Features	Most appropriate methods	Less appropriate methods
distinguishing feature - the need to act, to do, to implement; organization of the activities, coping with situations requiring rapid adaptation to changing circumstances; relies more on intuition than logic, tend to solve problems intuitively, through trial and error; use theories created by others and results of analysis, and therefore prefer to work in teams; most likely to take risks; pay to communicate with people, but sometimes it may seem impatient, demanding.	problem solving in an intuitive and trial-and-error manner; challenges of new experiences, involvement with others, assimilation; to do anything new; problem solving; small group discussions; group work; role-playing; gaming.	individual works; non-interactive lectures; working in step-by-step manner; reference study.

In planning the training more suitable training (learning) methods can be identified with regard to the classification of LSs and characteristics of a LS. Classification of methods based on LS is presented in Table 2.

If there is a purpose to organise the learning based on LS, at the beginning of learning activities the student's LS is determined by using a special test.

However, it happens that the LS changes in the process of learning, therefore, the LS should be diagnosed not once. Both, a teacher and a learner, taking into account the inherent style characteristics can plan their own learning activities.

In terms of a certain learner the above described classification of learning methods according to LS is not absolute.

Table 3. VLE's tools suitable to teaching (learning) methods.

Teaching (learning) method	VLE's tools
brainstorming	blog, chat, questionnaire, feedback, forum, glossary, mindmap, messages, wiki
cooperative groups	assignments, blog, calendar, chat, database, feedback, forum, glossary, IMS content package, lesson, messages, mindmap, url, wiki, workshop, VPL
demonstrations	assignments, file, page, lesson; workshop, url, VPL
Discussions, small group discussion	chat, forum, messages, blog, glossary, choice, workshop
example analysis	assignments, blog, database, file, forum, glossary, hotpot, lesson, page, quiz, survey, url, wiki, VPL
group work	blog, calendar, chat, database, folder, forum, glossary, lesson, messages, page, url, wiki, workshop, VPL
individual work	assignments, feedback, file, glossary, label, lesson, mindmap, page, quiz, url, VPL
lectures	blog, questionnaire, feedback, file, folder, glossary, hotpot, label, lesson, page, url, wiki
problem solving	assignments, blog, calendar, chat, choice, database, feedback, file, forum, glossary, lesson, messages, url, wiki, workshop, VPL
reference study	assignments, blog, database, file, lesson, page, url
self testing	questionnaire, hotpot, mindmap, quiz, survey, VPL
visualization of algorithms	assignments, blog, database, file, forum, glossary, lesson, url, wiki

Taking into account personal qualities of a certain learner, he might like to use those methods which, in accordance with his identified LS, are not appropriate for him. Also, the learner is usually characterized by several LS, with one of them to be more expressed. The attractiveness of the method can be determined by an ingenuity of the teacher.

In the process of studying while using a combined learning techniques there appear more possibilities to personalize the training according to a LS. Methods the most acceptable for a learner can be selected by a teacher or they can be selected by a learner himself. The next chapter will explore VLE tools to help you adapt the above mentioned methods of training.

3. Study of the VLE Tools Usability for Programming

The most popular VLE in Lithuania is *Moodle*. It is used both in many institutions and secondary schools.

In *Moodle*, a training course developer is provided with a large set of standard tools allowing to diversify the methods used. Active researchers, developers and *Moodle* users community has developed and constantly creates new and additional instrumentality. A team of teachers at the University of Las Palmas de Gran Canaria, Spain in collaboration with Innovation Center for Information Society has developed *Virtual Programming Lab* (VPL). VPL is an activity module for *Moodle* that manage programming assignments.

The VLE tools can be used at all stages of learning cycle described by Mayes and Fowler in Ref. [12], i.e. in conceptualism, introducing concepts and their relations, as well as at a design stage, where practical tasks are solved, and at a dialogue stage, with using the tools of communication and collaboration between a teacher and students, as well as between peers. Teaching (learning) methods appropriate *Moodle* tools can be seen in Table 3.

For interactive training material presentation such *Moodle* VLE tools as pages, a file, a glossary were used in teaching programming basics and techniques at the LUES. In the process of training (learning) active training methods (an involving lecture, brainstorming, concept maps, etc.) were used. For implementation of these methods such VLE tools as a blog, a chat, a feedback, a forum, a glossary, a mindmap, wiki were used.

Individual assignments were given in VLE. Students performed their programming assignments in an appropriate programming environment and submitted the result of their work to a teacher in VLE. For this an assignment tool was used. VLE tool VPL for programming training was also tested, however in order to evaluate its efficiency it would require more scientific investigation.

During 2011-2012 academic year a pilot study on usability of group work methods in programming training was carried out in the LUES. The study enrolled 17 students (study programme of *Mathematics and Informatics* at LUES). All students who took part in the study have not yet tested the method of group work in programming learning. The use of this method was evaluated positively. Fig. 3 represents results of student's survey.

For implementation of the group work method the VLE tools, such as a glossary, a mindmap, wiki, were also used. During task performing such VLE communication tools as a forum, a chat, messaging were used for discussions. When assessing tasks performed in groups it was observed that VLE communication tools were rarely used by students.

Participants involved in the pilot study were asked to evaluate VLE communication tools. In comparing virtual and *face to face* communication the students indicated that while performing the task they preferred *face to face* communication, which was "faster, easier, take less time than while you write what you would like to say."
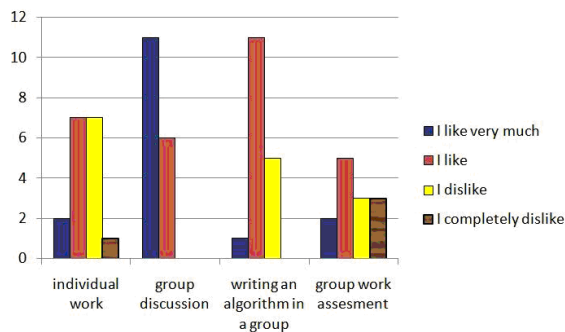
Fig. 3. Results of student's survey.

The analysis of frequency of VLE communication tool usability has shown that students tend to give the priority to a messaging tool.

Conclusion

Programming learning is a complex process; therefore it is necessary to take into account the needs of students. The survey has clarified the following needs of the learners: learning when the teacher explains individually; communication and collaboration; learning through technology; fast feedback; need for imagination (visualization).

To achieve the objectives of his subject a teacher can choose between training methods or make their combinations, use different tools and technologies, and create an authentic style of work. However, it should be always taken into account the actual situation, i.e. the student's age, needs, capabilities, his learning style, the teacher's skills and qualities himself, the objectives of the subject. The study involved the classification of learning techniques according to learning styles of a learner. You can get the training (learning) process more personalized, when you identify the learning style and know the techniques suitable for that style. To assess the effectiveness of this classification requires an in-depth investigation, which will be carried out in the next academic year.

A number of *Moodle* VLE tools are suitable, and can be used, for enriching the programming training techniques. The pilot study carried out with students allowed to verify the appropriateness of the use of selected tools. Although the students have specified their need to communicate using technologies, however, when performing the task, to save the time, they rarely used chats, forums or messaging.

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The Regression Model For Adults Participation In Non-Formal Education: *Public* vs. *Private* Sectors

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Abstract. This paper reveals both theoretical and empirical data on adults' participation rates in non-formal education activities in Lithuania on the basis of public and private sectors. Firstly, the chosen phenomenon is discussed in theory, presenting some relevant schools of thought, such as Functionalism and Conflict theory statements on the importance of participating in non-formal education processes through the life-span. Secondly, authors of this paper deal with some statistical and mathematical evidence about reasons that make the meaning are meaningful in participation/non-participation within such kind of education. The multiple regression analysis is discussed and interpreted leaving some space for readers' reflection on what other influential factors may cause adult decision making to participte in non-formal education in the contemporary world.

Introduction

Education, especially in the context of some particular social tendencies, plays almost essential role in developing economics of society, social and political growth [1-3]. It is impossible to put education aside from all what is hapening within education processes and social contexts as well, i.e. demographic changes, progress of technologies, economy ups and downs, political changes and social transformations [4-5]. Thus, not learning for life, but lifelong learning paradigm becomes extremely important for a person, who wants to remain employed and competitive.

However, there's not much place or even attention paid for adults' non-formal education in Lithuania these days, especially in regards with education as to a separate field, which does not have a long term legal regulations and traditions neither to prepare pedagogues or manage adult education.

Consequently, the research object is the main factors influencing adults' participation in non-formal education on the basis of public and private sectors. The goal is devoted to analyze and describe most important factors/regresses for either participation or non-participation of adults in non-formal education activities in Lithuania.

1. Learning activities. Review of paradigms

Learning activities are important in any period of life when a personal goal is set to upgrade personal features, both civic, social and professional skills along with competences as well [6-7]. In this regard adult education is mainly identified as the tool for developing and sustain *human capital* [8]. This is exactly what is stated in the European strategic and growth scenario plan for the forthcoming decade – *Europe 2020* - which stresses the importance of education in the future society, fulfilled with intelligent and sustainable economy [9]. Besides, in this strategy we may follow the strive of adults (aged 24-35) to learn and constantly upgrade their own skills while satisfying both self-realization needs and the demands of labour market. Functionalists (Durkheim, Parsons, and Giddens et al.) put the emphasis onto adults' successful integration into the labor market and discuss the education as one of the functions – favorable socialization – through effective individual's input into economy growth of the society. They would examine education on the basis of *consensus* perspective: analyse society in terms of how it is maintained for the common good [10]. According to the functionalists point of view, education helps maintain society by socialising young people into values of achievement, competition and equality

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of opportunity. Skills provision is also important: education teaches the skills for the economy; moreover, education allocates people to the most appropriate jobs for their talents, using examinations and qualifications.

Yet on the other hand, education could be seen as a powerful tool to consolidate different social groups or arise even more tension among them. Especially *social conflict* theory [11] deals with such rather paradoxical situation: globally, education is also regarded as an essential tool for human development and poverty eradication; however, efforts to widen access to education need to focus more on how education can affect conflict [11]. As social conflict theorists would argue, that there is an urgent need to develop methods to track whether *progress in education* may also create tensions that could spark or exacerbate conflict; it must be understood as well that education can be either a part of the problem or a part of the solution.

According to the European statistics and indicators (OECD) [12], investing in education and training after leaving initial education is essential for upgrading the skills of the labour force. Globalisation and the development of new technologies have broadened the international marketplace for goods and services. As a result, competition for skills is fierce, particularly in high-growth, high-technology markets. An ever-larger segment of the population must be able to adapt to changing technologies, and to learn and apply a new set of skills tailored to meet the needs of the growing services industries, in order to function effectively [12]. Adult learning, as a part of lifelong learning, is considered crucial for coping with the challenges of economic competitiveness and demographic change, and for combating unemployment, poverty and social exclusion, which marginalise a significant number of individuals in all countries.

Therefore rapid changes in almost every human life's sphere demand adequate individual's educational transformations; thus the whole education system along with its institutions seek for a new quality in order to prepare people to live and work effectively in a changing society [13]. Having this aspect in mind, we may witness even higher education institutions' quite obvious orientation towards the needs of labour market rather than unleashing human's self-realization and creativity. All this is caused mainly by economic and some ideological reasons. Therefore, both formal and non-formal adult education in most cases are interpreted through *sociocultural* and/or *constructivistic* points of view, when *sociocultural* deals with the role of more specific contexts within learning processes (e.g. emotional, organizational, physic, cultural etc.), while on the other hand *constructivistic* - reveals a learner's active participation and the reconstruction of knowledge.

As it is stated in UNESCO (2006) documents on non-formal adult education [14], for adolescents in particular, non-formal educational activities may greatly expand their opportunities for learning. In situations of conflict, many adolescents will have missed years of formal schooling and may not want or have the time to attend primary classes with younger children [14]. As a consequence, they may drop out of the educational system completely if other options do not exist. Some may want to enter the formal school system but may be prevented from joining because of space constraints or due to legal age restrictions. Adolescents who do not have readily available and accessible educational options are much more vulnerable to dangerous situations, such as recruitment to armed militias, engagement in illegal activities and involvement in unsafe income-generating activities.

Non-formal education therefore serves as a positive alternative, and can often be a vital protection strategy. In this way non-formal adult education in Europe is well known and clearly identified as sociocultural phenomenon both sociologically and educationally. Such education is dedicated for several purposes: a) give an impulse for personality's growth, its active citizenship and solve issues of peoples' employability rates within modern labour market; b) guarantee individual's socialization favorability [2, 7, 15]. Besides, Lithuanian experience and goverment movements show the acceptance of European standards for adult non-formal education – to form a person, through upbringing the competences, who is able to become an active role player in the society and also a person who is willing to satisfy the needs of knowledge, education, and self-realization [16].

2. Research: materials and methods

Within this research, that was carried out back in 2011-2012 among Lithuanian adults from public and private sectors, the main task was to identify main factors that could be a cause for adults' participation in non-formal education activities; also their attitudes towards lifelong learning, course content, experienced obstacles etc. The most important feature of this survey – the scientific attention to participants' expectations, reasons for learning and the ways that adults learn in todays society.

While preparing the research instrument, firstly the international project *LLL2010 – 2010* was taken into account with some of its methodological suggestions and way-outs to explore adults' participation in non-formal education [17-19]. Also the questionnaire was constructed along with the previous experiences of surveys such as: *Applied Research on Adults' Education* [20], *The Adult Education Survey* [21] and *Significant country differences in adult learning* [22] demographic indicators.

The questionnaire was sent to adult learners throughout Lithuania who were targeted on purpose, having their contacts from several learning centers (e.g. JSC *Pačiolis* etc.). Statistic data was analyzed by using *SPSS* package [23] with its descriptive methods, *Chi* test, *Student's T-test*, *Factor analysis* and disperse *ANOVA analysis*, *Spearman Rho* correlation and multiple linear regression analysis, when adult partici-

pants were treated as separate cases who make much influence to a non-formal adult education processes [24-25].

The reliability analysis confirmed that the questionnaire both internally and externally is constructed appropriately, i.e. valid and homogenious (Cronbach α=0.58, ANOVA F test=131.81, p<0.000)). In this case ANOVA p mean shows those regresses that are closely related with dependant variable: if value p<0.05 then the regression model is considered to be sufficient enough for that kind of statistics. *Factor analysis*, using the method of *Principal Components* and the rotation of Varimax along with KMO (Kaiser-Meyer-Olkin) normalization (0.65) and Bartlett's test (χ^2=1125.062, p<0.000), has revealed that most of identified components are quite important in this research.

The *sample* of the research was based on *non-probable and convenient sampling* principle, when picking those who keep learning through their life-span (in sum n=613). According to the work of several sociologists. for example Ref. [26], not only the ammount of participants but their active participation ratio must be present in such kind of researches. Thus in this study we paid much attention on contextualization of problematic field and correlation between empirical indicators and it was more quolitative approach rather than quantitative [27-30].

3. Research ethics

The research was conducted following/matching all necessary ethic requirements, when main principles were taken into account:
a) research participants' free will to be a part of the survey;
b) all data presented is strictly used for only scientific purposes and confidentiality is guaranteed;
c) the same level of communication with the respect of human rights based on humanistic values and the equal partnership between researcher and participant was established;
d) research participants are updated with the data that was obtained after making both quantitative and qualitative approaches within analysis of chosen problematic field.

4. Results

In mathematical statistics, multiple linear regression in most cases is defined as the regression that attempts to model the relationship between two or more explanatory variables and a response variable by fitting a linear equation to observed data, see Ref. [31]. Every value of the independent variable x is associated with a value of the dependent variable y. According to M. Friendly [32], using of multiple linear regression within social sciences let the researchers to prevent/avoid of some systematic flaws: for instance, the evaluation of all tests' answers/items, especially in cases of ANOVA, MANOVA, ANCOVA or MANCOVA tests. For more detailed info – see Refs. [25, 32]. Putting into other words, such kind of analysis, when we have too many variables, helps to understand the structure of correlations among those variables, i.e. the importance and meaning of participants' choices for dependent variable – towards constant [24, 32].

Therefore, after making the Spearman Rho correlation analysis, the existence of correlation between some variables was set; thus it has become highly important to assess the consistency of those correlations. The multiple linear regression model was used, especially in the context of public (Yv) and private (Yp) sectors as in this research several independent variables were of much importance. Only significant values are presented in this paper.

Results are expressed by the following equation of multiple linear regression:

$$y = \beta + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k \qquad (1)$$

Therefore symbols, presented in this equation, have the following explanation: Y (constant) – teaching sector;

Table 1. Symbols and explanation.

X_1	gender	X_{13}	projects management courses
X_2	education obtained	X_{14}	accountancy and finance courses
X_3	living/working place	X_{15}	learning for better professional performance
X_4	respondent's age	X_{16}	learning for knowledge
X_5	duration of participation in non-formal education	X_{17}	learning because of duties/responsibilities
X_6	learning areas	X_{18}	learning for the certificate
X_7	learning languages	X_{19}	learning for not losing a job
X_8	IT literacy and skills upgrading	X_{20}	learning because of meeting with others
X_9	knowledge deepening in entrepreneurship	X_{21}	organizers of non-formal education
X_{10}	art/craft courses	X_{22}	willingness to participate in non-formal education
X_{11}	health courses	X_{23}	obstacles
X_{12}	psychology courses	X_{24}	relation between personal intentions and chosen courses

$$Y_v = 0.013 \cdot (B) + 0.206 \cdot X_8 + 0.117 \cdot X_{12} + 0.143 \cdot X_{13} - 0.250 \cdot X_{14} + 0.120 \cdot X_{24} \qquad (2)$$

$$Y_p = 1.974 \cdot (B) - 0.206 \cdot X_8 + 0.117 \cdot X_{12} - 0.143 \cdot X_{13} + 0.250 \cdot X_{14} - 0.109 \cdot X_{19} - 0.120 \cdot X_{24} \qquad (3)$$

After getting the regression's numbers the equation of multiple linear regression was set for public sector (when model's $R=0.54$, ANOVA $F=9.029$, $p<0.000$), including only statistically significant and influential variables - see Eq.(2) and Eq.(3). Therefore we may observe that much of influence in public sector is made by learning areas, especially choosing such courses as IT literacy, Psychology, Projects' management, and accountancy. Also one of the regresses was the relation between intentions that learners would have and what courses they choose. All of this is much clearly demonstrated in a figure bellow where normal probability plot is presented (see Fig. 1).

Again it is obvious that variables, mentioned above, crossing the line, are significantly influential for adults' participation within non-formal education, while other variables have scattered quite away and are not considered as significantly important ones.

Respectively regression equation was set for private sector as well (when model's $R=0.54$, ANOVA $F=9.029$, $p<0.000$) - see Eq. 3.

Also presenting the normal probability plot for the private sector, we may see quite similar distribution of variables, except one that differs from the public sector case, i.e. the reasons of participation in non-formal education (see Fig. 2).

Thus, after having these equations, it becomes much easier to analyze some of variables' direct influence in regard of teaching sectors. The regression analysis has shown existing differences between those two sectors, especially having in mind learners – adults' – decisions whether to choose or not non-formal education activities/courses. Even though there were only few significant differences within public and private sectors, however, in both cases much influence to the organization/management of adults' non-formal education is made by:

i) learning areas that adults would choose (i.e. IT literacy and skills upgrading $p<0.000$, psychology $p<0.005$, projects' management $p<0.000$ and accountancy – $p<0.000$);

ii) relation between personal intentions and chosen courses ($p<0.002$).

Also it was found that in private sector, as the significant regress, is one of the reasons that force adults to choose non-formal education courses – learning for not losing a job ($p<0.05$). Thus it is one of the major influential variables within private sector that separate both sectors and reveals some further tendencies of human vs. social capital expression.

Conclusion

1. Non-formal adult education is defined as the main socio-cultural instrument to form a person, through upbringing his/her competences, who will be able to become an active role player in the society and also a person who is willing to satisfy the needs of knowledge, education, and self-realization.

2. Multiple linear regression analysis has revealed some significant differences between public and private teaching sectors and that the most important reason for adults to become a lifelong learning participants is rather highly expressed fear not to lose a job and this fact is mainly predominant within private sector.

3. Public sector differs from a private in few aspects as well: people become learners because of more quolitative work, meeting new friends and socialization ($N=57$, $t=4.10$, $p<0.000$), duties at work ($N=35$, ANOVA $F=21.66$, $t=55.76$, $p<0.000$).
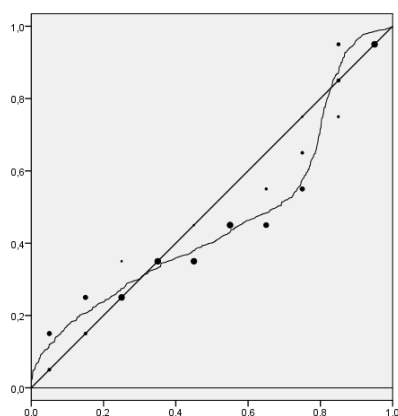

Fig. 1. Normal probability plot for adults' participation in non-formal education (case of public sector).
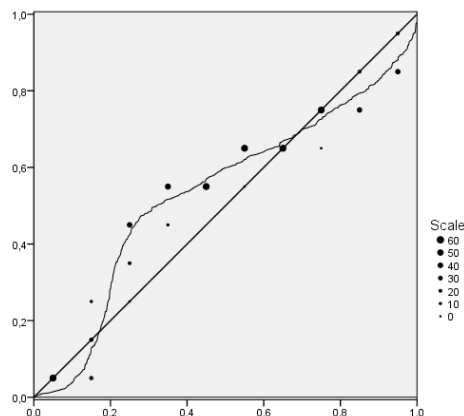

Fig. 2. Normal probability plot for adults' participation in non-formal education (case of private sector).

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Knowledge, Innovations and Technologies Integration Nurturing Electronic Insurance Business

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Abstract. This paper potentially focuses on the country's insurance business as economically and politically sustainable business development when knowledge, innovations and technological integration become a key resource in the formation and directly influence main development factors. The electronic insurance development is coherently discussed in this paper.

Introduction

Nowadays, technologies are developing very fast and the companies, which are able to meet customers needs at the right time and with the lowest time resources have become most competitive. The modern customer is always busy, constantly rushing and requires high-quality, well-timed and appropriate service. The principles of traditional business are outdated and require new, more efficient methods of working, which leads to traditional business transformation into an electronic. The development potential of electronic business (further – E-business) is increased by the newly acquired knowledge, nurtured innovations and new technologies development. Recently, E-business penetrates into the insurance sector but not all customers are willing to use electronic insurance (further – E-insurance) services, considering it as obvious advantage.

Insurance companies expect greater number of customers, better service quality and short-time working which E-insurance services provides. However, here is the main problem, which should be taken into account: irrelevant principles in life insurance sector implementation prevents development of many insurance companies. This paper potentially focuses on the country's insurance business as economically and politically sustainable business development when knowledge, innovations and technological integration become a key resource in the formation and directly influence main development factors. The electronic insurance development is coherently discussed in this paper.

In order to achieve these objectives it will be necessary to choose an adequate methodology, to define the electronic insurance businesses sustainable development model and to link the categories of information, innovations and technologies. The following phases are to be considered in order to achieve the main objectives:

i) disclose and explain the purpose of knowledge, innovation and technology integration;

ii) describe the key E-business models;

iii) carry out the analysis of the E-insurance concepts, disclose the main E-insurance processes and their participants;

iv) prepare the principal E-insurance business models.

The research is based on theoretical analyses and hands on experience.

1. Essential indispensable condition

Knowledge, innovations and technologies integration must be treated as an essential indispensable condition for the development of E-business. Rapidly expanding globalization enhances the demand and the importance of fast integration into innovations and technologies. Knowledge, innovations and technologies integration are the key factors that define the creation of sustainable business. Our knowledge, innovations and technologies complex treatment as integrated system should require taking into account the diversity of situations and would be directed for the implementation of the strategies [1].

The growth of knowledge demand and importance [2] promotes the creation of specialized multidimensional cluster. The core of such cluster is to create generally available/newly

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Table 1. Structure of the IT competitiveness.

Explicit IT knowledge	+	Tacit IT knowledge	=	IT competitiveness
		Vision of the IT		The help of the IT
		Additional business		IT business integration

acquired knowledge, innovations and technologies system that can improve company's management the system that fosters company's sustainability and enhances competitiveness of a company or even a country.

Multidimensional cluster is based on knowledge – the essential resource for promoting the ability to compete in unusual environment. Knowledge is seen as the ability to perform the special tasks and as the way to transfer the information [3] so, it is necessary to accumulate new knowledge also improving skills and expanding the experience. Ineffective management of knowledge loses its value faster than material resources, so a multidimensional cluster management requires a new concept, new management techniques when the fundamental object is not profit generated by the business, but the sustainable development of business and customer satisfaction.

By reducing the demand of knowledge there are presumptions how to implement innovations into business processes and technologies. Technological innovation is considered to be a key factor for competitiveness which encourages new technological advances and becomes a condition to foster the possibility of a profit, developing experiences and knowledge [4]. In general terms, innovations promote the interactive process of knowledge generation and application because the potential innovation is possible only through the usage of the acquired knowledge.

The implementation of innovations in business processes results in: the improvement of the strategic activity, reduction in demand of investment, penetration into new markets. Focusing on actions that influence the significant changes in organizational structure, that implement better management techniques, that ensure new, completely changed strategic directions, new organizational methods and new business practice emerge. In terms of new organizational methods, one of them is E-business. E-business requires appropriate structure and implementation of new technologies. [5] The service-oriented structure enables more efficient methods to manage the challenges of IT implementation.

By widespread use of IT in business processes it becomes extremely important to foster the technologies success and to focus attention on such key factors as asset, knowledge, skills and organizational processes. No less important factors are the support of the staff in IT implementation, IT management experience, IT business strategy, the appropriate organizational structure, management processes, support of managers and knowledge about the characteristics of the industry. Information is invisible asset that can be used to value creation as an important resource. Therefore, proper management

of information helps to get information about competitors and to gain competitiveness.

Table 1 represents the structure of the IT competitiveness. Here are three factors influencing the development of IT competence [6]:

i)   IT competence of companies (IT skills, "know-how" tacit knowledge);
ii) IT competence of managers (explicit and tacit manager knowledge);
iii) competence of information management (practical activities).

The whole of these factors can be expressed by formula presented in Table 1.

The competitiveness of the business IT and success of the IT business integration depend on the available explicit knowledge (regulations, rules and other important documents entity) and the available (or acquired) tacit knowledge (staff experience, personal characteristics, their attitudes towards new technologies) and additional business knowledge (existing partner or suppliers knowledge).

2. E-business models

Defining what E-business is and when this concept began to be used, it turned out that there is no one general concept. Sometimes e.business concept is synonymous with e. commerce but here are two different concepts. E-business – is the whole of business processes that is carried out using digital technologies and e. commerce – it is a commercial transaction between the company and the client. It follows that E-business is a broader concept which includes the concept of e. commerce.

Some researchers claim that concept of E-business links to the World Wide Web (WWW), since people were able to take advantages of online resources. In 1996 IBM corporation described E-business as an improvement of business process using digital technologies. [7] As one of the E-business assumptions is the use of digital technologies and E-business is associated with the use of IT, so e. business is the use of IT data transfers (computer) networks during organization of business processes [8].

IT is defined as general conception that defines any technology that helps to produce, manipulate processes, sales and communication or exchange any information using appropriate equipment [9]. The base of E-business is Internet, which is the main tool for connection and improvement of business processes. E business can be defined as automation of traditional business through the computer networks.

Due to rapidly growing information and communication technologies development [10], companies are competing with each other in particular use of technology. As soon as company's business processes are transferred to the electronic environment, it becomes possible to provide the best quality products/services to meet customers' needs.

E-business has become constantly changing activity due to constantly evolving information technologies. It is necessary to mention the main E-business development phases [11].

1st- E-business phase which covers the years 1995-2000. During this period the companies began to purchase online and support business activities through usage of technological solutions.

2nd- E-business break phase which occurs in 2000. At this stage several unsuccessful business models revealed how to improve information and communication technologies (ICT) and to reduce business costs.

3rd- the current E-business phase. The main objective is to create and improve the information structure which is fully supported, important and necessity for E-business.

The rapidly changing era of computers and communication technologies has been gradually affecting the system of economy and changing business models. Business model is a method of business organization, which is used by company to make a profit [12]. Depending on the parted subjects, the following E-business models are usually distinguished [13].

1. *Business to business* (B2B) – it is one of the most widespread E-business models where the services are provided among two business subjects – companies or institutions.

2. *Business to client* (B2C) – it is often used model when business subjects provide services to client directly.

3. *Business to business* to client (B2B2C) – complex form of business when the business provides the service to client – business, which also has its own clients and provides services for them.

4. *Client to business* (C2B) – it is now rapidly expanding business organization model where individuals use the Internet in providing appropriate services to organizations/business.

5. *Client to client* (C2C) – it is a business model which requires a low cost where the on client sold available products (services) to another client directly.

6. *Mobile commerce* (m-commerce) – it is a business process which is carried out by use of the wireless technologies.

7. *Business to employee* (B2E) – it is e. commerce model where business delivers products/services to a particular employee.

8. *Business to government* (B2G) – business model promoted by the government when payments for routine activities and corporate taxes are carried out electronically.

9. *Government to client* (G2C) – it is currently used business model that provides electronic public services to clients directly.

Finally, it can be said that every company can stay competitive and adequately meet the customers' needs if it transfers traditional business processes into electronic environment. Moreover, it is necessary to choose the best E-business model which is acceptable to both, the owners and the customers. The operating principles of regulation helps to act purposefully and to meet customer needs faster and better.

3. Nurture of E-insurance business

Constant growth of importance of information and communication technologies and nurturing development of the Internet has accelerated changes in business processes. The most important outcome remains business processes transferring into the electronic environment. In the turn of changes occurs E-insurance business. E-insurance has emerged as a result of communication and information technologies evolution when all insurance operations are carried out through the Internet. At the same time it is improving the quality of life, the insurance companies require more information and more efficient use of necessary methods. From this point of view, E-insurance reduces the resources of time and managing costs [14].

Here it is also necessary to distinguish the three main E-business development opportunities: website, the automation of business operations and processes, cardinal change of organization from traditional to the virtual [15]. However, not all companies are able to improve existing business processes as fast as IT innovation. In the context of information sharing and exchange, insurance companies promote such IT solutions es presdented below.

1. Website, where all the basic information about the insurance company is given, the proposed insurance products and contract conditions.

2. Web portal, indirectly related site to the customer, which contains links to various pieces of the most interesting information. Later, insurance companies agents will verify the information which sites are mostly visited by customers and what is the most interesting to visitors.

3. Portal of the point of sales, information about the concrete site in the other related to insurance site (for example: insurance services advertising in car sales websites).

4. Intermediate brokers, website of brokers who do not sell insurance products directly but these that offer to choose a certain companies' services.

Foreign insurance companies are developing E-insurance in two ways [13]:

a) reverse auction is a situation when a potential insurer declares wish to insure himself/ his company and they are offered the best insurance option and conditions (insurance company, type of insurance, the terms and amount, price of insurance);
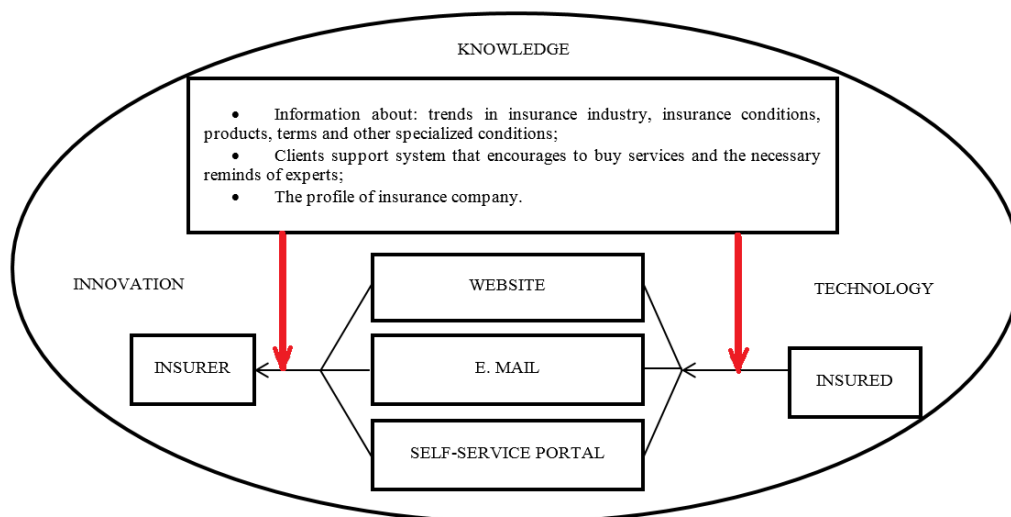
Fig. 1. E.insurance "business to client" (B2C) model. Adapted according to Ref. [18].

b) aggregator is a websites where you can find all the information about proposed insurance services (E-Helath Insurance).

The potential customer can be provided with spreadsheets and get the necessary information about the most favorable insurance conditions. Currently aggregators are widely used by most insurance companies.

Therefore, sometimes it is avoided to include life insurance (further – LI) policy online which is influenced by the complexity of LI as it requires thorough health check of life insurance policy holders. On the other hand, it is very difficult to evaluate cash value life insurance. Unfortunately, it still lacks a unified model how E-insurance should be carried out, how to check the reliability of data, how to ensure the security and how to provide the best LI option to the client. The following factors make it complicated to sell LI online [16].

i)   illegal electronic signature;
ii)   unacceptable credit card;
iii) an insurance policy must be delivered to the customer physically;
iv)   wrong document format;
v)   agents and brokers must show their license physically;
vi)   prohibited from receiving payment for a policy if they do not have a license;
vii) physical involvement of a third party.

It has become obvious that E-insurance business needs to develop an appropriate legal framework, which legally recognizes the legitimacy of online transactions (in compliance with the laws), the certainty of sent e. documents or to establish a unified legal framework (portal), where registered users could checks e. copies of approved documents.

4. E-insurance processes and the main participants

The insurance industry is one of the most important assets in financial services because of economic growth and fostering the public health. In the countries where risk prevails and individuals are trying to accumulate funds for future, insurance is necessary. Moreover, insurance is used to provide an investment into available funds. E-insurance reduces the costs of management and administration of business processes and improves the management of the data while reducing the payment of commissions to the intermediaries [14].

Both, the literature and practice distinguish the three main entities that occur in an insurance contract: the insurer, the insured and the insurance company. From this point of view, we can define the basic stages of the E-insurance contract procedure [17]:

a) select the appropriate insurance companies providing insurance products and compare them;
b) in accordance with the best offer, calculate insurance rate, insurance amount and overview the additional products/services;
c) prepare the order and complete the necessary forms;
d) pay for an insurance contract through electronic banking or by other available tools;
e) meet with an insurance agent and get an insurance policy, use courier services to get a policy or get it through the Internet.

It is also necessary to consider two things: the needs of a market and how to attract new customers. The most appropriate way to implement all of these processes is the adoption of "business to client" (B2C) model - see Fig. 1. Displaying E-insurance "business to client" (B2C) model adaptation, it is necessary to visualize the flows of information between po-

licyholders and insurers [18].

Fig. 1 illustrates the information flows among the insurer (insurance company) and an insured (insurance company's client) implementing the "business to client" (B2C) model that is specified to the insurance sector when insurance services are provided directly to the customers. This e. business model is explained through the main flows of information and it is used in many countries.

The basic part is the integration of knowledge, innovation and technology that provides information flows among insurer and insured. Depending on the level of IT use in the insurance company's here are different method, amount and efficiency of policyholder available knowledge transfer. Information can be expressed in three ways: on the website, by the email or by the self-service portal.

Website presents the basic information about insurance company: mission, vision, the objectives and values. Here you can find the description (insurance regulations, terms and conditions) of the main insurance products provided. Some insurance companies provide the possibility to access the spreadsheets and determine the costs of possible insurance policy in order to get the desired amount of possible payment by the contract term and conditions. If the information provided on the website runs out, clients are given the opportunities to communicate with insurer by the email. In order to prepare insurance contract and to give the insurance claim, customers are to send the necessary data by email and confirm the validity of the data in the insurance company later. However, each client needs quick and efficient service. To save customers time and to attract new policyholders every insurance company should set the objective to create the perfect self-service portal where customer , entering password could get the necessary information, communicate with insurer or contract with insurance company by one button click. In self-service portal the client can see the details of the insurance contract (expiry date) and report back about current event. It is also necessary to allow online payment of insurance premiums or receive compensation to their even person account directly. Such portals are the most beneficial for hard working, busy clients who can fill in insurance contract or an accident declaration without leaving home, just with one button press on computer.

Analyzing E-business principles in the insurance sector in Lithuania, it has been observed a link between the insured (client) and the insurance company, taking into account the needs of the client, the insurance company gets the benefit i.e. profit and, most likely, the customer's loyalty. E-insurance in Lithuania contains not only the advertising guidelines, recommendation of the insurance company but also insurance contracts, policies of insurance premium payment and reporting about accidents through self-service portal. Undoubtedly, these processes are not automated in all companies and some insurance companies communicate with the clients only by email. Thus, technological innovation market in insurance industry in Lithuania is not sufficiently developed and liberalized, however it has its own advantages and disadvantages of traditional insurance business transformation into E-insurance.

5. E-insurance strengths, weaknesses and main barriers to growth

E-insurance business is constantly expanding and its value is growing. However, it is possible to distinguish some E-business principles using insurance industry strengths and weaknesses. This chapter describes strengths, weaknesses and barriers which cause the e. insurance business growth.

Insurance strengths can by found in the scientific literature and in practice [19] which are presented as follows.

1. The price reduction. A big number of intermediaries lead to increase in prices (especially in the monopoly market), in developing e. business technology the chain of intermediaries decreases due to the service provider, lower supplier prices and transaction costs which, subsequently, lowers the prices of service;

2. Flexibility of the service provider results in capability to communicate with customers online easier and more efficient. The product (insurance contract) is to have an appropriate price and is suitable to the client (condition created especially for him);

3. The changes in service quality, flexibility to customers needs requires improved service level with customers making insurance services of higher quality;

4. Increase in the amount of contacts and communication with customers, E-business opportunities make it easier to communicate with clients, it becomes easier to segment customers by the appropriate criteria: geographic area, interests, age, etc.

However, strengths do not exist without weaknesses, so E-insurance has also its weaknesses. In general, all weaknesses can be grouped into few groups:

a) more complex structure of the Internet – development of business and online processes leads to more complex Internet architecture: an increase in number of communication channels, the processes are specified to meet the clients needs, so it is hard to standardize all processes;

b) Information security issue – due to the increasing amount of information the security and quality play the major role, so here it becomes very important to develop better safeguard to ensure data (storage and transfer) security.

It is necessary to mention that alongside E-insurance weaknesses E-business barriers to growth emerge. The key barriers are according to Ref. [20]:

i) lack of resources (time and financial, because of large establishment and operating costs);

ii) lack of the necessary skills (inadequate staff, mistrust in personnel, lack of knowledge, difficulties in IT systems integration);

iii) non-compliance with business (lack of appropriate technology, lack of interest, defects in changes of processes);

iv) security gaps and disturbances.

To summarize, it can be stated that E-insurance is useful and has a lot of advantages that reduce the negative impact of defects. Reducing E-business barriers of growth (constraints) in insurance business industry will decrease the resources of time and finance and increases the benefit.

Conclusion

Nowadays, each operating company is provided to use the key E-business principles or fully transfer the whole processes to the electronic environment. The intensive integration of knowledge, innovations and technologies leads to the spread of key E-business assumptions and due to its application, the company will be able to stay competitive and efficiently operating as a result of rapid business activity, more efficient innovative IT and better quality of customer service.

The most appropriate for E-insurance is business to client (B2C) E-business model, which includes all required information and qualitative service to a client directly. The simplest business transactions must to be taken to reduce the amount of intermediate links and its impact on the final result. At the same time the company should be able to get feedback from customer complaints or queries.

Through E-insurance model it is reasonable for the insurance companies to have their own web site to communicate with customers through email and that is better to create a self-service portal. Even if insurance company is unique it should be taken into account during the E-business model selection. The choice appropriation is led by the current share of the market, the satisfaction of existing customers or as a response to customers' complaints about service quality and necessary time or financial resources.

Fostering E-insurance is beneficial to both insurance companies (operating costs are reduced, new markets are captured, competitiveness is increased) and policyholders/the public (lower fees, greater choice of insurance products, rapid meeting of needs), but there are disadvantages because business processes become more complex and create an additional need for new knowledge acquisition.

The transformation of traditional business processes to the electronic is also influenced by the following key limitation (barriers). The best solution is to take the appropriate actions and remove the gap of necessary knowledge, reduce the need for the addition funds. It is also necessary to ensure the security of data, appropriate its transfer and understanding.

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Innovation Activities in Lithuanian Companies

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Abstract. In the course of this thesis an attempt was made in order to determine the level of innovation activities in Lithuania and to offer some other ways how to increase the degree of novelties in Lithuanian firms. Theoretical aspects of the installation of innovations are reviewed, numerous authors' opinions are studied. Moreover, strengths, weaknesses, possibilities and threats are revealed, considering competitiveness of the Lithuanian economy and changes promoted by innovation development. Furthermore, the difficulties of innovation measurement system are presented. Also, internal and external factors having an influence on the activity named above are examined. Referred to the conducted analyses: measurement of innovation index, correlation analysis between components of innovation index, questionnaire for defining the level of innovation culture, analysis of statistical data, it is stated that there are some problems in Lithuanian innovation system. The recommendations for problem solving are presented in the article also. Following the main aim of scientific work, a modern and revolutionary service is offered - "Self-service cash register as a free lottery". After the presentation of main parts the conclusions and recommendations are introduced in the article.

Introduction

An indispensable ground to start any business is to make profit and growth of revenue over time and innovation is the central subject in economic prosperity. Businesses, whether dealing products or services, are facing transformation like never before. Introduction of new or improved product defines the fate of any company these days. Innovation is the successful introduction of specific novel and useful things. In the organizational context, innovation may be linked to positive changes in efficiency, productivity, quality, competitiveness, market share, and others. All organizations can innovate, including for example hospitals, universities, and local governments.

However, just coming up with something that is 'out-of-the box' does not mean that it will always work, because, the thing that is required more than just the generation of a creative idea is to put that thought into a process of action to make a visible difference to the product or service that is considered to be innovated. Hence innovation typically involves risk. The success or failure story of any business depends largely on how well a system is managed within an organization. Nowadays the economy in Lithuania has been facing its deepest

recession since the independence was regained. When the economy is slowing down, the sales and production in majority of economic sectors decline. During this period of global economic crisis the topic of innovation activities is especially relevant. Innovation provides many ways to increase revenue, to enhance the competitiveness and to attract new clients.

Speaking about the level of innovativeness in Lithuanian companies, only a small amount of firms are interested in the invention novelty. In addition, financing of investment projects is not enough high-qualified and effective. The object of the article is an opportunity of innovation activities development in Lithuanian companies. The aim of the article is to offer some ways how to penetrate novelties into Lithuanian organizations.

1. Innovation Activities in Business

Innovation has long been argued to be the driving force of growth. It is important to note that it can also provide growth almost regardless of condition of the larger economy. Innovation has been a topic for discussion and debate for hundreds of years [1]. Schumpeter was among the first economist (in year 1934) to emphasize the importance of new products as

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stimuli to economic growth. He argued that the competition posed by new products was far more important than marginal changes in the prices of existing products [2].

Each firm's unique organizational architecture represents the way it has constructed itself over the time. This comprises its internal design, including its functions and the relationships it has built up with suppliers, competitors, customers, etc. This framework recognizes that these factors will have a considerable impact on a firm's innovative performance as well as the way it manages its individual functions and its employees or individuals. The mentioned above factors are separately identified within the framework as being influential in the innovation process [1].

Innovation matters - but it doesnot happen automatically. It is driven by entrepreneurship - a potent mixture of vision, passion, energy, enthusiasm, insight, judgment and plain hard work, which enables good ideas to become a reality. The power behind changing products, processes and services comes from individuals - whether acting alone or embedded within organizations - who make innovation happen. As the famous management writer Peter Drucker (1985) put it: Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. It is capable of being presented as a discipline, capable of being learned, capable of being practiced [3].

Porter has defined innovation as an attempt "to create competitive advantage by perceiving or discovering new and better ways of competing in an industry and bringing them to market". More broadly the concept can be defined as the introduction of a new or changed product, process, service or new form of organization into marketplace. In short, innovation is the commercialization of new ideas. In addition it should also be noted that innovation is not just a technological and economic process. It is also a complex in which individuals and groups exchange that knowledge [4].

A lot of studies have confirmed that all businesses want to be more innovative. One survey identified that almost 90 % of businesses believe that innovation is a priority for them. The conclusion is that the importance of innovation is increasing, and increasing significantly. [5].

If a company is going to manage innovation and make it as continuous process that produces a steady stream of innovative new products and services rather than a happenstance, hit-or-miss proposition, company is going to have to measure it [6].

Some researchers state that it is difficult to identify clear directions of innovative activity development, hence, innovation measurement system seems to be poorly developed, what does not allow set targets and monitor deviations, respectively. Other authors indicate particular metrics for measuring innovation activities. One of the examples could be the method of using two types of metrics: innovation performance metrics and innovation program metrics. But the calculation of a new product success rate (dividing the number of new

products exceeding the 3-to-5-year original revenue forecast by the total number of new products commercialized over the same period) remains unclear, because of word "forecast". It is difficult to predict something precisely and the results of measurements could be inherently inexact. Moreover, such intangible metrics as customer satisfaction or brand loyalty hardly allow indicating and managing innovation development efficiently. Innovation measurement has always been a thorny issue for researchers.

To evaluate the strength of the relations between different components of innovation index correlation analysis was made. For the final results it is important to test following hypotheses ($H_1 \div H_5$, all hypotheses are formed using proper scientific literature).

H_1 The more company receives public funding, the more expenditure on innovation activity it has.

H_2 The more innovation expenditure is spent, the more process innovation is created.

H_3 Cooperative arrangements for innovation activities promote more organizations, which introduce innovations.

H_4 New organizational methods in companies have no influence to turnover of innovative enterprises.

H_5 New marketing methods are a clever way of increasing turnover of innovative enterprises.

The main variables are determined as follow: enterprises which received public funding; expenditure on innovation activity; innovators by type of process innovation; cooperative arrangements for innovation activities; innovative enterprises; enterprises which introduced new organizational methods; enterprises which introduced new marketing methods; and turnover of innovative enterprises in Lithuania (the case of wholesale and retail trade, 2002-2010). All calculations of correlation analysis are performed by a software tool (Microsoft Excel program). The results of analysis are presented in Table 1 and Figs. 1÷5. All statistical data are received from Lithuanian Department of Statistics.

Fig. 1 shows that B=f(A) data lie on a perfect straight line with a positive slope, positive correlation indicates that both variables increase together (Table 1, AB dependence), correlation coefficient r_{xy}=0,91. It is strong positive correlation, it means that enterprises which received public funding have more innovation expenditure (statement of H_1 is correct). It will be important to underline that the financial help of the state to innovative projects will encourage the creation of innovations. The more Lithuania companies will allocate financings for innovations, the more firms will introduce new products or processes.

Fig. 2 shows the scatter plot of the C=f(B) data, indicating the reasonableness of assuming a linear association between the variables. It means that the strength of association between innovation expenditure and innovators by type of process innovation is high (r_{xy}=0,88) (Table 1, BC dependence). The more innovation expenditure is spent, the more process innovation is created (a statement of H_2 is true).

Table 1. Correlations between parameters: enterprises which received public funding (A); expenditure on innovation activity (B); innovators by type of process innovation (C); cooperative arrangements for innovation activities (D); innovative enterprises (E); enterprises which introduced new organizational methods(F); turnover of innovative enterprises (G); enterprises which introduced new marketing methods (H); turnover of innovative enterprises (I); 2002-2010 (wholesale and retail trade)

Year	A	B	C	D	E	F	G	H	I
2002	27,6	25,1	10,3	31,5	16,0	21,1	47,6	16,2	47,6
2003	54,9	219,1	48,2	36,7	41,1	22,3	43,5	21,0	43,5
2004	58,5	371,5	54,2	35,5	35,6	19,6	36,3	19,8	36,3
2005	42,3	151,6	36,8	25,8	15,2	18,3	32,4	16,3	32,4
2006	36,1	116,8	11,2	47,3	42,7	16,6	48,5	23,3	48,5
2007	29,6	26,5	8,5	61,2	38,0	17,8	43,4	22,1	43,4
2008	46,6	307,5	40,0	32,8	35,4	23,6	54,1	25,4	54,1
2009	50,7	201,7	20,5	23,1	12,4	21,2	38,0	24,4	50,0
2010	25,6	39,5	11,7	33,7	39,0	23,6	51,1	26,7	51,1

A cooperative arrangement is defined as participating with another organization, institution or individual in activities for the purposes of innovation. Businesses can cooperate with many different kinds of partners for innovation, main of them are higher educational and research institutions.

According to distribution in Fig. 3 (Table 1, DE dependence), correlation coefficient is significantly different from zero (r_{xy}=0,66) and indicates that cooperative arrangements for innovation activities promote more organizations, which introduce innovations (hence a statement of H_3 is accepted as consistently valid).

The relationship between enterprises which introduced new organizational methods and turnover of innovative enterprises is not so strong, correlation coefficient r_{xy}=0,46 (Table 1, GF dependence). But Fig. 4 shows that between variables exists moderate correlation, it means that new organizational methods have a small but positive influence to turnover of innovative enterprises (a statement of H_4 is wrong).

Fig. 5 indicates the moderate correlation between enterprises which introduced new marketing methods and turnover of innovative enterprises (Table 1, HI dependence).

Positive correlation coefficient r_{xy}=0,72 means that enterprises with new marketing methods have more chances to increase their turnover, than organizations without any new processes (a statement of H_5 is correct).
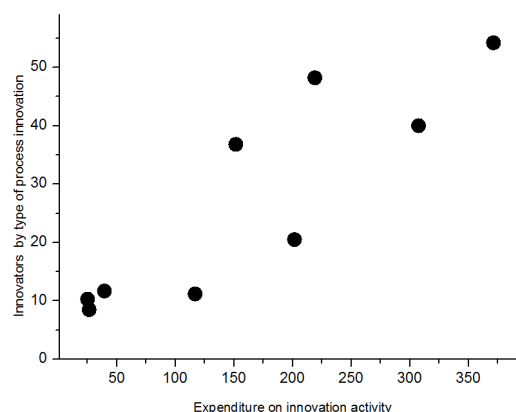

Fig. 2. C=f(B). Dependence of innovators by type of process innovation (C) on expenditure on innovation activity (B); 2002-2010 (wholesale and retail trade).
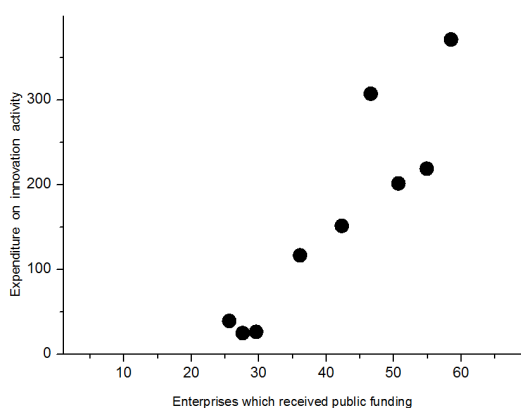

Fig. 1. B=f(A). Dependence of expenditure on innovation activity (B) on enterprises which received public funding (A); 2002-2010 (wholesale and retail trade).
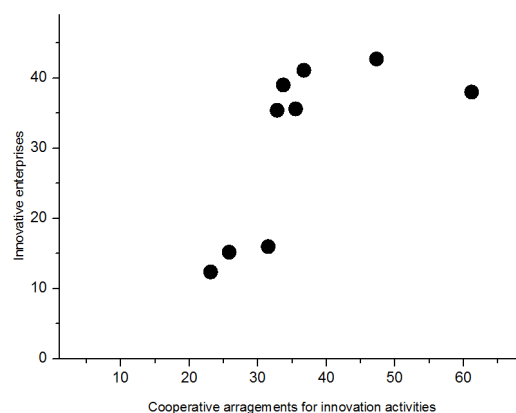

Fig. 3. E=f(D). Dependence of innovative enterprises (E) on cooperative arrangements for innovation activities (D); 2002-2010 (wholesale and retail trade).
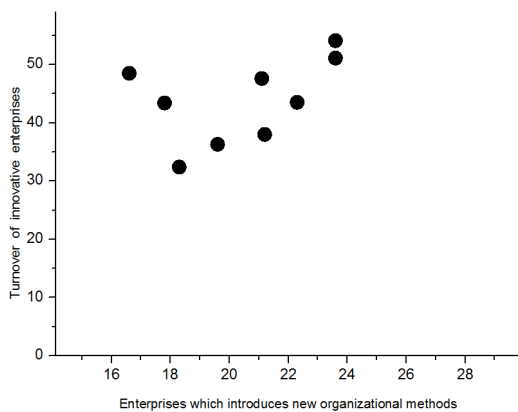
Fig. 4. G=f(F). Dependence of turnover of innovative enterprises (G) on enterprises which introduced new organizational methods(F); 2002-2010 (wholesale and retail trade).

Fig. 5. I=f(H). Dependence of turnover of innovative enterprises (I) on enterprises which introduced new marketing methods (H); 2002-2010 (wholesale and retail trade).

By correlation analysis some important factors were determined that affect the level of innovativeness. For example, governmental intervention through public funding for corporate innovation activities is an important instrument within innovation policy to create and increase the incentives for innovative activities. The second way to accelerate innovation process is cooperative arrangements, for example, cooperation with higher educational institutions. Moreover, organizations with innovation expenditure, enterprises which introduce new organizational and marketing methods have a chance to increase their turnover ant to improve their position in the market.

3. Innovation Activities in Lithuania

Speaking about Lithuania, the Lithuanian Innovation policy governance structure is based on the dual ministry model, with the Ministry of Economy responsible for innovation policymaking and implementation, and the Ministry of Education and Science responsible for higher education and R&D policy design and implementation

Differing from the other two Baltic states, Lithuania did not experience a complicated ethnic situation at the time of re-independence in 1991, thus, there were prospects for a smoother transition. Neither was Lithuania industrialized like the two other countries. However, Lithuania did not embark on such a rapid transition like its northern neighbours, which left Lithuania lagging behind in many areas, such as attracting FDI [7].

Compared to the other European Countries, Lithuania remains among the catching up countries with the SII 0.27, although improvement is approached. The general strengths of Lithuanian national innovation system lies in the well developed and continuing its academic tradition higher education sector with strong science and technology research tradition and engineering orientation.
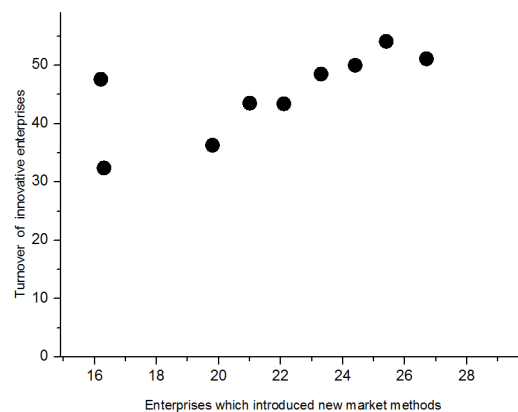
This result makes relatively high share of population with tertiary education (26.8%), high numbers of S&T graduates among them (18.9%), and high enrolment of youth (88.2%). However, low participation in lifelong learning (4.9%) leads to obsolete qualifications, actually not suitable for high skill work. The weak links between business and higher education and R&D communities result not only in obsolete qualifications of the highly educated labor force, but also in low value added innovations, developed without input from the R&D sector [8].

Strengths, weaknesses, possibilities and threats (SWOT) are revealed, considering competitiveness of Lithuanian economy and changes promoted by innovation development.

Strengths.
1. Close economic relations with the other EU countries and countries, belonging to the European Economic Area.
2. Lithuania is the leading country among EU member states according to a number of inhabitants, having higher or post-secondary education. [9].

Weaknesses.
3. Few companies develop innovation; their research and abilities of (technological) development and innovation are not sufficient.
4. Education system (secondary schools and universities) is fragmented and quality of studies does not correspond to economy and society needs of today.
5. Innovation system is fragmented; internal relations among participants of innovation system are poor [9].

Opportunities.
6. Approved joint research programs will enable the coordination of research development and ensure proper use of EU structural funds.
7. Increase of extent of joint project activities implemented by EU companies and education institutions will allow using financial and intellectual EU resources

better and take over experience of innovation dissemination.

8. Demand of products, having higher added value, is growing.

9. EU financial support for business innovation in the year 2007-2013 is provided [10].
   Threats.

10. Lithuania does not withstand international competition; therefore, the most talented students, doctoral students and scientists leave Lithuania.

11. Political instability and political decisions made are often inconsistent.

12. Strong and constantly developed R&D and innovation infrastructure, stable policy and financial resources in developed neighbouring states may reduce advantage of innovation system created in Lithuania in competition for business innovation.

13. A lack of strategic (long-term) innovation [10].

4. Analysis of Innovation Activities in Lithianian organizations

According to Statistics department in 2006÷2008, innovation activities in Lithuania were carried out by 28.8 % of enterprises [11].

In comparison with other countries of the European Union this number is very small. The minimum quantity of information for innovation Lithuanian companies receive from the government, public research institutes and universities or other higher education institutes. Education and business sectors cooperate to a limited extent. This leads to intensive, but not always productive and high value added innovative activities of enterprises. Also the government doesnot take active part in motivation of firms of creation innovations [12].

In the past five years, important regulative efforts were made in order to improve business conditions and facilitate entrepreneurship. However, the economic crises and tax reform have brought new challenges for businesses and caused reductions in innovation investments, forcing the search for new ways of doing business. These include negative behaviours such as cutting investments, jobs and an increase in 'shadow' operations, but also positive behaviours such as the search for new export markets, value innovations and more efficient ways of operations in domestic and international markets [7].

Many external and internal factors can affect product innovations, business process innovations or their combination [13].

Analysis of external and internal factors affecting innovation process development indicates some circumstances that most of all disturb to novelty's creation. As an example could be the impact of global financial crisis on national innovation performance or policies/ new laws which encourage or limit the implementation of innovations. At the same time,

research findings show that the most dramatic effect on business have technological factors.

To analyze the innovation culture on the organizational level and to define the other problems connected with low level of innovation activities in Lithuanian companies a questionnaire has been made with participation of some workers and managers of different organizations. According to statistical data of 1 January 2012, the number of operating in Lithuania organizations was 83624, about 28.8 % of them are innovative. It is important to calculate the number of innovative enterprises in Lithuania for determining the number of respondents $83624*0,288 \approx 24083$.

The questionnaire was sent by e-mail to 43 different organizations to analyze the level of innovation culture in Lithuanian companies. The answers were received only from 40 firms.

25 % of respondents are from service industry, 45 % of participants of questionnaire are from finance, transportation and other organizations. Another 10 % of respondents have been working in manufacturing industry; also few participants are members of information technology, communication, hospitality and nonprofit organizations.

The size of the company plays a big role in the effectiveness of innovation's creation. A large part of respondents (75 %) have been working in small and medium companies (less than 150 employees). And only 25 % have been working in big organizations (more than 151 workers). 45 % of estimated innovative level in the organization is considered to be as sufficient, 20 % - bad and only 15 % - perfect and high; 20 % of respondents could not define it at all. It means that innovative level of organizations in Lithuania is too low. Also to questions "Does the company create an innovative culture" and "Whether workers of Your organization are motivated to create innovations", majority of questioned answered "No". This allows us to draw a conclusion that management of the companies (about 50 %) are not interested in creation of innovations. Organizations have to use a variety of tools to motivate employees to participate in their innovation efforts.

Speaking about circumstances that most of all disturb the creation and implementation of innovations, 50 % of participants of questionnaire blamed lack of funds. It means than organizations in Lithuania have not enough money for financing the innovations. Another 40 % of respondents approve that the lack of ideas disturb the creation and implementation of innovations. On the other hand, employees may generate plenty of ideas, but if management does not appraise them properly, they lose potentially valuable opportunities. These ideas should be assessed in a structured way. 50 % questioned answered that the lack of funds is the circumstance that most of all disturb to create new ideas.

Many companies refuse to make innovation as core component of their strategy. The others think that generating ideas is enough, but without the right process and people this

is just paying lip-service to innovation. Even with structured ideas appraisal, it is not all mechanical. Ideas appraisal should also involve people who are creative - someone who thinks "outside the box" may see it from an angle which can deliver value even if it fails the other tests.

Moreover, the results of questionnaire show that lack of information and organizational culture which doesnot nurture risk are also factors that disturb to creation of innovations.

To a question "What incentive is received by the worker for new idea" 40 % of respondents confirmed that there are no incentives in their company and only 25 % answered "salary increase/premium pay", another 25 % confirmed that they receive other type of incentives. It once again proves the absence of motivation of new ideas in Lithuanian companies (40 %). Nevertheless, comparing with other countries, the result is not so sad, 50 % of companies motivate workers to create innovations.

Speaking about financing of innovations, only 10 % of questioned specified that they can receive some help from the government or from EU. As it was noted above business-people do not have enough means for introduction of innovations and the state in turn does not render them with any help. Here lies the main reason for absence of new ideas and products. 80 % of participants of questionnaire declared that support from the government, public research institutes and universities or other higher education institutes could help their organizations to be more innovative. And the last question "Would you personally like the company each year to implement more and more innovations" only 50 % answered "Yes", another 50 % of respondents probably do not understand the advantages of innovations and accept new product /service implementation neutrally.

The above presented survey which was based on questioning 40 randomly chosen companies lets us formulate the following considerations about innovation management practice in Lithuania. The results of investigation confirm that about 50 % of Lithuanian companies are innovative or make attempts to be more creative. Another 50 % of answers show that management is not interested in creation of innovations, does not use a variety of tools to motivate employees to participate in their innovation efforts. The majority of questioned, agree to the lack of funds and new ideas disturb to creation and implementation of innovations. Moreover, the questionnaire showed that the government also does not play active role in motivating the firms to create something new.

5. Proposals for Development of Innovation Activities in Lithuanian Companies

Making a picture from an available data (correlation analysis and questionnaire), it is obvious that there are some problems in Lithuanian innovation system.

The first problem is, that the minimum quantity of information for innovation in Lithuanian companies is received from the government, public research institutes and universities or other higher education institutes. In addition, new knowledge is generated and remains largely in the same sector, without the transfer into business. Therefore, education and business sectors cooperate to a limited extent.

Small business sector's low integration level, low application of scientific knowledge are obstacles to recognize and apply scientific knowledge and to use their innovation activities. To solve this problem, education and business sectors should cooperate more actively and much more closely. Moreover, business organizations in cooperation with other social partners should actively participate in advice and guidance systems and assist providers in developing work-integrated learning and new methods.

Another problem is that the government does not play active role in motivating the firms in creating innovations. Firstly, the government should allocate more means to business sectors to finance the innovations. Secondly, the government should hold competitions and carry out the programs to motivate the managers to create and to implement the innovations. Thirdly, the government should organize free of charge seminars and conferences for business beginners who are eager to studying and to learn about advantages of new ideas.

When heads of the organizations are motivated to implement innovations in their firms, and when they have sufficient financial supply, there might evolve one problem - lack of new ideas, effective at work and bringing income in future. The first step to new ideas is to create innovative culture in the organization. It should be explained to the employees about the importance of innovation, they should be trained to think creatively which might evoke interest and desire to create new things. A good idea here is to use economic methods of management. For example, employee appraisals, salary increase, promotion every new effective idea. And finally, any firm which introduces innovations should be ready to be exposed to huge risk. It should be taken into consideration that innovation might fail and,the market can accept or also reject it. At the same time it is necessary to keep in mind that those who do not risk, never become the leaders.

According to correlation analysis it was determined, that: the more company receives public funding, the more expenditure on innovation activity it has; the more innovation expenditure is spent, the more process innovation is created; cooperative arrangements for innovation activities promote more organizations, which introduce innovations; new organizational methods in companies have an influence to turnover of innovative enterprises; new marketing methods are a clever way of increasing turnover in innovative enterprises. Correlation analysis has confirmed that the effectiveness of innovation activities depends on innovation expenditure, public funding and cooperative arrangements. To increase the degree of novelty in Lithuanian companies, according to the correlation analysis and the questionnaire made, it was determined that there should be allocated more finance on de-

velopment and research and on financing the innovations and cooperation with educational institutions.

Following the main aim of the scientific projects, a modern and revolutionary service is offered - "Self-service cash register as a free lottery". This type of novelty could be used in IKI and Maxima retail chains for development in new directions. The main principle of the innovation is an installed system that shows a lottery in the register screen, in case when a customer spends more than 20 lt. The lottery is represented in the form of keys and the buyer has to choose one of them. The main aspect of the idea is following: customers, using self-service cash register, have a chance to win money (the more money they spend the greater share they could win). The novelty may be of mutual benefit: a customer has a chance to win some money, the corporation, in its turn, may notably increase its selling. The trade's spending on the installation consists of two parts: a remuneration of programmer labour and means for active advertising.

Innovation is a positive change to make someone or something better. Innovation leads to increase in productivity and is the source of increasing wealth in an economy.

Conclusion

Critical overview of scientific literature shows that in business and economics innovation is the catalyst to growth. Entrepreneurs have continuously look for better ways to satisfy their consumer base with improved quality, durability, service, and price which come to fruition in innovation with advanced technologies and organizational strategies.

Moreover, article emphasizes the importance of measuring innovations. Survey data provides a number of different opinions about it. Besides, the information reveived from SWOT analysis shows some weaknesses and threats considering competitiveness in Lithuanian economy and changes promoted by innovation development: education system is fragmented and quality of studies does not correspond to economy and society needs of today; business sector invests in R&D too little; low quality of research and technological development; lack of strategic innovation; internal relations among participants of innovation system are poor.

According to the Statistics department in previous two years innovation activities in Lithuania were carried out by 28.8 % of enterprises. In comparison with other countries of the European Union this number is very small. According to te research of statistical data, financing of investment projects lack in high-quality and effectiveness.

In order to provide with insight view into the innovation culture of different organizations and to define the main innovation activities problems in Lithuanian enterprises, correlation analysis and questionnaire were made. The first problem is that the government does not play active role in motivating the firms to create innovations. In addition, new knowledge is generated and remains largely in the same sector, without transfering it into business. Therefore, education and business sectors cooperate to a limited extent. Small business sector's low integration level, low application of scientific knowledge are obstacles to recognize and apply scientific knowledge and to use innovation activities. Another part of problem is that in Lithuanian organizations emploees ate not motivated to create innovations and to be more creative at daily work.

There are some suggestions to solve the innovation activities problem in Lithuania. For instance, education and business sectors should cooperate more actively and much more closely, the government should allocate more means to business sectors to finance the innovations, also it should be carried out competitions and programs in oder to motivate managers to create and implement the innovations. At the same time, managers should create an innovative culture by using economic methods of management.

According to correlation analysis it was determined, that the level of innovativeness mostly depends on innovation expenditure, public funding and cooperative arrangements. To increase the degree of novelty in Lithuanian companies, according to correlation analysis and the questionnaire the focus should be placed on: more expenses on development and research, financing of innovations and cooperation with educational institutions.

Moreover, the article presents novelty named "Self-service cash register as a free lottery", which could be used in such retail chains as Maxima and IKI. The unique innovation will attract clients and will encourage buying goods in larger sums. The novelty may be of mutual benefit: a customer has a chance to win some money, the corporation, in its turn, may notably increase its selling.

Company needs to innovate to harmonize with the advancing technology; evolving society needs advanced products; the products, processes and services of the company need to be one step ahead of competitors. If the company does not innovate, the customers stop buying the products which leads to the decrease in sales, revenues, stock prices, shareholder returns, the employees might start looking for som other jobs and the company put at danger to collapse.

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Mechanical Implementation
Of Business Process Reengineering

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Abstract.　　The purpose of this paper is targeted, systemic understanding of the need to introduce reengineering of business processes at the most modern factories depending on the requirements of the environment, since it is business processes which are, ultimately, subjects of any innovations. It employs the object-oriented approach that allows us to describe both data of the essence of the process and its behaviour provides a transparent, easily modifiable business models that allow the recycling of individual components. Reengineering process provides the maximum improvement, nevertheless, it remains time-consuming and the most expensive of all approaches meant to improve business processes and it is also related to the greatest degree of risk. This approach can be applied both at the level of an individual process and at the level of an entire organization. This paper outlines a range of possible measures for implementation reengineering of business process, its adaptation to minimize the cost and time, improving the competitiveness of a business entity by creating a comprehensive framework for organizational design.

Introduction

The choice of a control method is dictated by the requirements of the times - each epoch was characterized by its methods - and realized by the head of the firm based on his/her perceptions and beliefs.

Business reengineering, as well as many other methods of management, came to us from the West. There, during 80 years it has become a widespread method of the revolutionary transformation of the company, a radical restructuring of its business, which was called "reengineering". Its ideologues - M. Hammer and J. Champy - expressed the essence of reengineering in the following words: "This is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvement in critical areas of their performance - price, service, quality, pace" [1].

One of the key concepts that underlie the re-engineering of business processes is that their improvement is a huge reserve for increasing the efficiency of the enterprise. And for this it is necessary to comprehend the nature of business processes, to understand what value they have for the enterprise, how they should be properly modified.

Needless attention to business processes, improvement of

them demanded managers of a non-standard approach. Gradual re-engineering, which offers the company to break the existing system and build it anew on the basis of a revolutionary change in business processes, became transformed into the control system, "cluttered" technology in order to stand on the ground of scientific justification. Relevant software products began to appear. Business reengineering of paramount process approach appeared, where the object of control is the processes in the enterprise [2].

This article will consider the application of the methodology of business process reengineering, which, in our view, improves the consistency of procedures, methods and instrumentation support for management and its adaptation.

This necessitates the transition from task management to the management processes. In such an organization result of the work will be visible to each participant of the process as a "client" of the study results to determine the original and, therefore, the result is predetermined, based on customer expectations [3]. From the perspective of the process approach, the organization appears as a set of processes (with a functional approach - a set of functions). Management now becomes the management processes. Each process thus has its purpose, which is a measure of its effectiveness - how the

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process leads to its achievement in the best possible way.

The objective of all the processes of the lower level can be achieved through the implementation of top-level goals. That is the lower-level-purpose as a part of the higher-level goals. The relationship of these goals plays an important role in the process of reengineering. By managing processes and continuously improving them, the company achieves high efficiency of its operations [2]. Consequently, the basic focus is on processes, as they permeate all elements of management and focus on building the necessary processes and managing them.

Re-engineering of business processes has been widely discussed in theoretical papers, textbooks and practical manuals, which nevertheless does not give an answer to the question of how to properly implement a reengineering project. Even if the project was designed by consultants, we must remember that, according to various estimates, the percentage of failures of reengineering projects in Western companies is 70%. There are many examples that developed projects were not implemented [4]. The reason for this, from our point of view is the rejection of other approaches to the management of the organization, the formal implementation of the principles of reengineering.

The forerunner of the process approach was the functional approach. Now it is already outdated, and there is a modern alternative to the process approach as a tool of reengineering. But the rejection of the functional approach requires removing the concept of "function" and therefore "functional principle of the creation of organizational structure". Then only process structure is built up. It turns out that the distribution of specialists will be on the basis of their belonging to the processes. The company, as a rule, is each member of the multifunctional type [2].

Therefore, it is the combination of functional and process approach to company management, usually the "golden mean". Functional structure of the company defines "what to do", but the process defines "how to do". These are two inseparable sides of management. If a manager, the head of the firm is able to look at the organization from this point of view, reengineering will be a really useful and effective tool for managing [2].

Business process reengineering is a comprehensive method that allows you to set the company strategic goals and objectives by optimizing the performance of all divisions of its functions and operations. Therefore, its application to optimize business processes is in line with the strategy of the company to provide transparency for business owners and senior managers, to effectively manage operating activities, to make processes predictable, formalized processes for later automation.

Practical activities to manage and improve business processes by using the technology of business reengineering, implement the following possibilities described in several Refs. [5-7]:

1) creation (design) of future business processes;
2) diagnostics of business process management;
3) change (adaptation) of business processes;
4) business process optimization;
5) documenting business processes.

1. Creation (design) of future business processes

For this purpose, a special language for describing business processes is used. It allows us to describe the current state of business processes and create models for the future. The model includes a description of all components of the process - the functions, resources, participants, objectives, information, results, events, the direction and sequence of actions - thus reflecting the current reality or representation about it in the future. All the actors perform their responsibilities in accordance with this model. Each staff member clearly knows all their actions through all the processes in which they are involved [2].

In describing the business processes as a rule the method SPA (Structured Process Analysis) [8] was used. The SPA method does not discard the possibility of description using various schemes of algorithms. SPA allows to describe the processes in detail and also allows to operate at a level that is necessary for current business process reengineering [13].

The description of a multilevel structure (which first describes the process at the macro level, at the enterprise level, and then goes on to describe the lower level with a higher degree of detail) provides a systematic, structural interconnectedness. Actions of all departments and staff performing their duties in accordance with such a model must be adapted, coordinated and directed into the channel of the overall process to achieve system-wide result [2]. Systematic implementation of a business process requires coordinated efforts of all the subjects of management, which confirms the words of an American scholar M. Mesarovich [10]: "The system needs to be designed as an integer, rather than start with the process and then just add the necessary control. One can cite examples in which the design process technology takes into account the presence of control sub-systems, but system-wide approach, without separation, is still not implemented".

Process management system is as much necessary to form a process structure, that is, arrange them in a particular, interconnected manner. Since each process is designed to produce a result, which is further used to obtain further results at later stages and higher levels, this structure must provide, ultimately, the overall objectives of the company. It is them that process improvement is the most effective way to achieve [2]. In this case, today it is unlikely that many understand the urgency and necessity of maintaining the integrity structured around an object, activity. The second point, which prevents the achievement of high performance analytic business process management, is a multipurpose, variegated direction, and the subjects of the head. As a result, it seems

there seems to be a lack of "professional" integrity, both in the understanding of the analyst and the manager [11].

First of all, this is due to the standards that are used when describing the business process management to link schema of the current operating performance to that of managers, analysts, etc. The organization is described as a combination of structural units and positions, rather than as a single "organism", and based on the possibility of applying a process approach. As a consequence, an incorrect statement of the problem description and the inefficient use of the models themselves arose. In the best case, the simulation of the head is limited to a single function with multiple inputs and outputs that do not help in overcoming the difficulties in achieving integrity [12].

Creation (design) business process involves the following:
i)   development of an image of the future organization and
ii) development of the business model of the new organization [13].

2.1 Develop an image of the organization

A promising way to develop the organization should be performed using a comprehensive approach based on a combination of strategy development process and requirements for the business. The composition of the first stage includes specification of the main goals of the organization based on its strategy, customer needs, the overall level of business in the industry and the current state of the organization. The purpose of this stage is to develop a view of the new organization and formulate it in terms of specification of goals of the organization.

2.2. Develop business models

In recent years, a four-stage process of model building is widely used to redesign processes or the development of a "new" organization. The four phases are presented below.
1. Development of an external model of the future organization.
2. Development of an internal model of the future organization.
3. Creating an information system to support future business processes.
4. Testing the redesigned business process on a small scale before implementing it.

Modelling of processes is carried out with the obligatory use of a modelling language. The modelling language must be expressed as an internal or external process is realized by means of human or technical resources, and from what functions these resources will be taken. It is particularly important to show how the process could be supported in information system.

Information technology now in principle performs a powerful "locomotive" of change that sets in motion all the other parts of the organization. The change of business environment to the enterprise faces not only new operational issues, but there are new strategic development tasks which require new information and new quality, which reflects not only the state but also the very structure of the business. The information systems reflect the latest technical advances and expertise in the subject areas of management. The information system integrates all business units, it will automate many functions of collecting and processing information [12]. The main condition that must be fulfilled with the new information system is the flexibility and ease of modification, monitoring changes in the business [9].

According to Popov, Robson, Subanova and Filinov, with the help of information technology one can achieve the various categories of changes that can improve not only the temporal characteristics of processes, but also reorganize the sequence of steps in carrying out operations in business processes, control parameters in certain cases. Information systems permit unification and acceleration of the diagnosis of business processes [7-8, 14-15].

2. Diagnostics business process management

Process model (existing or projected), due to clarity of description, enables the effective analysis of how it will lead to the goal in the best possible way. Analysed factors may act a logistics process, its duration and cost (including distribution of them in stages). In other words, it may affect the efficiency of execution. Data analyses enable you to change the process, constantly improving its quality [2].

Quantitative indicators of the processes demonstrate the effectiveness of their controls in a certain stage of development of the organization. Resources are managed processes, and they also transform resources into finished products, which can quantitatively evaluate the effectiveness of management processes. Quantitative indicators of process management include: the complexity of processes; causal relationships between processes, control of processes, resource consumption processes, the degree of controllability of the processes [13].

Business process analysis is conducted to develop proposals in order to address the problem areas in the processes of the organization.

For this there is a "snapshot" of technology performance processes - a model of business processes "as it is", which allows the customer to obtain a comprehensive picture of what's happening in the company. In the analysis, the model identifies current problems of business processes: double subordination, duplication of functions, lack of data communication between processes, inconsistency of processes. According to the analysis, a proposal puts forward a direction of change (adaptation) of business processes.

3. Change (adaptation) of business processes

Any changes to the business environment - the emergence of new activity, diversification, changes in the supply chain, technology - all require an immediate transformation of the affected business processes. The existing model is adjusted, the changes are communicated to the performers, and they begin to act in accordance with new conditions. A continuous adaptation of business processes to changing conditions is an effective mechanism for business management [2].

Implementation of changes is the most complex and critical phase of reengineering. To minimize the risks associated primarily with resistance to the internal environment, a detailed and consistent work with staff must be done; staff at all levels are involved in the process of change and are motivated to achieve its results, i.e. to optimize the work and flexibility of an organization. For this purpose it is necessary to check staff compliance with the new job responsibilities, to determine the need and quality of qualified personnel; employees adapt to new job requirements and verify the correctness of the implementation of the new rules.

The result of this stage is not only the immediate implementation of all changes, but also that employees are trained to the new style of work - dynamic and therefore competitive. The company enters a new level of organization of work. The main result of the introduction of changes is that the company laid the mechanism of re-engineering - the continuous change and adaptability to environmental conditions. Organization receives an additional competitive advantage in the marketplace, the ability to optimize business processes in order to develop a new business model.

4. Business Process Optimization

In order to determine reserves for increasing organizational effectiveness and optimize business processes, also to monitor and analyse business processes, the company has to eliminate the following factors: the duplication of functions, "bottlenecks", excessive cost and availability of redundant operations, as well as poor quality of their execution, lack of coordination between the participants, etc. Optimization can be of two types - continuous improvement processes (evolutionary distances) and the periodic radical change (Revolutionary Path). The first method is used in the ongoing activity when an enterprise does not need drastic changes. The second way is used when the necessary changes in connection with a major change are necessary in the order of activities, such as integrated automation. In such cases, the task like "start from scratch" is implemented. This approach avoids the use of old processes of new technologies.

There is a need to fix the existing business processes in order to assess their effectiveness. If you do not do it today, then in the future there can be significant costs associated with inefficient staff performance, breach of contractual obligations, the need for restructuring, etc. This entails considerable financial costs and the loss of company's image [16].

The company has to see the bottlenecks in the activities and effectively manage an organization to link the performance of certain processes, work with its target strategic ones. A comparison of strategic goals and objectives of the company have to be in line with input and output processes. Company's performance depends on its results and processes. In accordance with the dependence of selected indicators, this will involve management. As a result, the organization at all levels is aimed at achieving results, and company owners and managers with an objective mechanism have to assess results of its operations and activities in the organization.

Further, the results of the analysis of business processes should be modified: from the model "as it is" to form a process model "as it should be".

During the optimization, the following procedures could be defined.

1. Elaborate proposals for the optimization of business processes are put forward (functions are redistributed between actors, duplication of functions is avoided, the information gaps between the blocks are bridged, optimize workflow system between the structural units is involved in each process).

2. Together with employees the company develops the scheme of information flows to streamline business processes, lists incoming and outgoing structural units of information: the type of outgoing documents, the recipient, responsible for implementing and approving the document's official terms of delivery.

3. Regulation scheme of the movement of documents, development (optimization) of the document management (regulation) on the basic building block of every business process with an indication of participants (including liability), the timing and form of information transmitted within each business process are all carried out.

4. Recommendations for optimizing the organizational structure of the customer company are made, taking into account the optimized management system (optimized business processes).

The result of optimization is the models of business processes "as it should be", subject to their optimization and service pack (newly designed), internal normative documents (regulations about departments, job descriptions, regulations of the execution process).

5. Documenting business processes

All actions and changes in the management of business processes need to be reflected in the documentation. Business process models created in the form of declarations is a diagram on paper and electronic media. All this together is a repository of business processes. Any changes required

are reflected in the models of the enterprise so that it could always keep the latest version of the complex business processes. Similarly, we can plan future processes and save them as versions that are analysed, tested and debugged, and only then become working [2]. Planning organizational change includes analytical and forecasting activities, the development of measures and selection of an appropriate strategy. Different levels of intervention into the old structure (individual, group, department, organization as a whole) should be taken into account, as well as numerous institutional settings, including the following [17]:

i)   the structure and processes (in recent years they have increased in the direction of "smoothing" the hierarchy and a strict focus on the process of creating wealth in the "horizontal organization");

ii) production and information technologies (e.g. the introduction of the minimized production of resources);

iii) organizational culture as a model of fundamental values and principles shared by members of the organization (a fundamental change in them is extremely difficult);

iv) human resources, for example, selection, staff development, incentive and motivation (with the "transformation" of behaviour and attitudes) by the HR management.

It is crucial to distinguish between partial and radical change. The first is based on the existing systems of values, structures and processes. The partial transformation is dominated by the practical usefulness of the project, rather than absolute achievement of the ideal (conceptual) state. Radical changes are necessary due to the rapid development of the surrounding market environment after a long phase of stability and long-term neglect of necessary adaptation steps. So "revolutionary" change process in order to achieve the advantages relative to competitors may be strategically desirable, but meet strong resistance from staff [17].

Consequently, we can say reengineering is the methods used in specific periods of development of an organization, when you need to make a qualitative change in the organization in a radical way and with sharp abrupt transition into a new state, missing up to this point of development. The need to adjust the management system may be due to:

1) feedback, i.e. the influence of results of the control object (in particular, the discrepancy between normative and actual parameters of the object);

2) the need to revise the objectives, practices and processes implemented by management system;

3) the development of software and technological tools as well as innovative management techniques [18].

Conclusion

According to the literature analysis, it is possible to point out that singularity of business process reengineering management lies in the following statements.

1. Reengineering helps to transfer management of the organization with the functional principle to the principles of process organization, which are characterized by a process of management structure, process teams, focused task-specific business process.

2. Reengineering approach frees up additional resources (financial, human, technical, etc.) and invest them in the main proceedings.

3. Reengineering approach focuses on the growth of investment activity and creates the prerequisites for the growth of innovation activity. The orientation of the process determines singularity of reengineering: the creation of new technologies, technical means of production and, consequently, encouraging innovation, technological progress.

Applying re-engineering of business processes will improve the consistency of procedures, techniques and tool support for management, its adaptation to minimize the cost and time. In other words, controlling the process, we will organize an effective interaction both internally and externally - with the outside world. Accordingly, it reduces transaction costs (the costs of poor interaction) - both internal (employees and divisions among themselves) and external (the company with customers, suppliers, investors, etc.).

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