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**Contact**
„Alexandru Ioan Cuza" University of Iasi
Faculty of Economics and Business Administration
Bd. Carol I no. 22, Iaşi - 700505, Romania
Tel.: +40232 201433
Fax: +40232 217000
Email: saaic@uaic.ro
Website: http://saaic.feaa.uaic.ro

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# INNOVATION, INNOVATIVENESS AND GENDER - APPROACHING INNOVATIVE GENDER

**Ewa OKOŃ-HORODYŃSKA***
**Anna ZACHOROWSKA-MAZURKIEWICZ****

**Abstract**

*This paper deals with the attempt to search for the sources of creativity in the broad sense in solving problems. These creative solutions become innovations. The ability to develop innovation depends on the multi-dimensional predispositions to solve problems – those found in people, inspired by the market, organised or spontaneous, as well as facilitated or hampered by the state. Yet, the aforementioned factors should be supplemented with one more – gender. In the chapter attention is paid to the multi-dimensional differences stemming from gender, which should be perceived as a positive element, because they are the source of synergy resulting from collaboration among research or business teams in the process of innovation. The chapter introduces the concept of 'innovative gender' and its institutional framework. The methodological inspiration is the model known in the literature as the Innovation Genome, the conceptualization of which constitutes a major part of the study.*

**Keywords:** institutions, creativity, innovation, innovativeness, innovative gender, innovative genome, integrated gender innovation genome

**JEL classification:** B52, B54, O31

## 1. INTRODUCTION

Despite the diagnosis that the European Union is experiencing a triple crisis: of substance, of trust, and of power, resulting in institutional weakening of its position as an innovator on the global scene, the growing predominance of procedure-based thinking, the expansion of all-encompassing controls limiting freedom of choice, member states keep creating subsequent programmes and strategies for an intensification in research and innovation development. This paper deals with the search for the sources of creativity in the broad sense in solving various problems, wherever traditional approaches have proved ineffective. These creative solutions – unconventional and practical in application – became

*Institute of Economics, Finance and Management, Jagiellonian University in Krakow, Poland;e-mail: *ewa.okon-horodynska@uj.edu.pl.*

**Institute of Economics, Finance and Management, Jagiellonian University in Krakow, Poland;e-mail: *anna. zachorowska@uj.edu.pl.*

innovations. The ability to develop innovation depends on the multi-dimensional predispositions to solve problems – those found in people, inspired by the market, organised or spontaneous, as well as facilitated or hampered by state policy in individual countries or regions. Yet, it might be expected that the aforementioned factors should be supplemented with one more – gender.

Social systems are dynamic, ever-developing entities, in which the boundaries for human behaviour are set by the institutional framework. The economy, like society, represents a complex of institutions, ranging from the smallest, such as the family, to the largest and most comprehensive, namely the state. People behave in the way they are expected to, and this is very visible in the gender relations. This behaviour may cause significant limitations, leading to disadvantages for individuals, as well as societies and economies. Transformations introduced by the state in the economy may cause desired transformations in society, called institutional changes. Institutional change is understood as the adaptation of habits of thought to changing circumstances. Institutional change may promote creative and innovative behaviour from women and men, leading to economic progress.

Attention is paid here to the multi-dimensional differences stemming from gender, which should be perceived as a wholly positive element, because they are the source of synergy resulting from collaboration among research or business teams in the process of innovation. So, this chapter introduces the concept of 'innovative gender' and its institutional framework. The methodological inspiration is the model known in the literature as the Innovation Genome, the conceptualization of which constitutes a major part of the study. Thus ‘innovative gender’ is presented on the ‘innovation genome’, in which we elaborate five matrices filled with gender-sensitive information. The innovative genome allows us to highlight the gender dimensions of innovativeness and creativity[1].

## 2. GENDER – INSTITUTIONAL APPROACH

### 2.1. Institutions and institutionalism

Economic activity takes place within an institutional framework, and the economic system is a part of the greater social system in which it is embedded (Gruchy, 1987). Social systems are dynamic, ever-developing entities, and all social activities occur in both historical time and an environment of uncertainty regarding the future. According to Wilber and Harrison (1978, p. 71): ‘social reality is seen as more than a specified set of relations; it is the process of change inherent in a set of social institutions which we call an economic system’.

The rules that define economic activity may be referred to as institutions. Institutions are rules and ways of behaviour known to each member of the society because of their everyday use; collective actions that control individual’s activities; widely recognised standard social norms; and ways of thinking. According to Hamilton (1932) the institution is a cluster of social usages, designating a way of thought or action of some prevalence and permanence, which is embedded in the habit of a group or people’s customs. Institutions are both ‘subjective’ ideas in the heads of agents and ‘objective’ structures faced by them (Hodgson, 1998, p. 181). Tony Lawson wrote: ‘Individuals are born into society and exist and develop through it in a way such that their very capacities and personalities, including psychological and other dispositions, are to an extent moulded, shaped, formed and continually transformed by the societal conditions’ (2003, pp. 204-205). In this sense,

institutions are not only boundaries, but they function to shape the very essence of social life (Hodgson, 1988). It is the diversity of institutional situations that is the principal source of differences in individual behaviour (Chavance, 2009, p. 17) but also differences in the conditions describing the position of particular countries and economies.

Culture represents the aggregation of diverse institutions, each of which fixes a type of behaviour and outlines a tolerance zone for an activity or complementary activities (Chavance, 2009, p. 18). An institution is made up of people performing activities according to a set of rules that are justified by a set of values, beliefs and meanings. As people perform their activities according to the rules, they internalize values, beliefs, and meanings that justify the rules (Dugger, 1996, p. 25). Powers and constraints associated with institutional structures can encourage changes in thought and behaviour (Hodgson, 2003, p. 166).

### 2.2. The state and institutional change

The state holds a key position among institutions since state actions are based on normative representations of the 'common good' for given societies - '[t]he state is formally assigned the role of creating the conditions that maximize the possibility of attaining a general common good' (Storper, 2000, p. 89). The influence of the state on society, as well as the national economy, shapes institutions that systematically and constantly regulate the behaviour of individuals and social groups in formal and informal ways (Wilkin, 1999). The ability of the state to influence or even create institutions has a dominant meaning in contemporary societies, because it is the state that creates the basic frames for the institutional functioning of markets. The state may play an active role in the economy by helping to expand individual liberty and shape community preferences and social institutions.

Institutional economists favour activist government using the tools of macroeconomic policy for this purpose. Such activity involves more than a simple acceptance of the need for government interventions to correct the failures of market capitalism (Peterson, 1994). The state cannot be neutral, because its pretended neutrality allows existing forms of inequality to remain legitimate (Dugger, 1994, p. 17). Nevertheless, institutionalists stress that state action can both restrain and expand individual liberty; and recognise that more government activity does not ensure an improved economy (Whalen, 1996).

Changes introduced by the state in the economy may influence social relations and lead to the transformations of other institutions. However, the process of social changes not purely mechanical. Rather it is a product of human action, which is shaped and limited by the society in which it has its roots (Wilber and Harrison, 1978, p. 71). Transformations, including those introduced by the state, may lead to institutional changes. Institutional change means that the community, in its economic dealings with the environment, undergoes a process of adaptation to new conditions. According to Rutherford (1998, p. 468) this is an adaptation of habits of thought to changing circumstances. Therefore changes in the material environment lead to changes in habits of thought and institutions (Kologlugil, 2012, p. 847). Thus institutional change refers to some changes in the underlying rules that structure social interactions (McMaster, 2008, p. 897). It necessitates some intervening phenomena which interfere with what would otherwise be institutional continuity (Dolfsma and Verburg, 2008, p. 1037).

### 2.3. Gender and gender inequality

Institutional economics offers a broad perspective, which enables gender to be brought forward while analysing economic relations. The institutionalist conception of society is holistic in nature; in other words social reality is viewed as a unified whole. *'Institutionalism's holistic theories are rooted in the belief that the social whole is not only greater than the sum of its parts but that the parts are so related that their functioning is conditioned by their interrelations'* (Wilber and Harrison, 1978, p. 73). Therefore institutional analysis cannot begin with the world neatly divided into 'economic' and 'noneconomic' realms. Gender is a fundamental organising principle of institutions (Jacobsen, 2007, p. 92), and it has to be taken into account while researching economic questions. *Gender* is a cultural superstructure on biological sex, a complex of attributes and behaviours expected of women and men perceived as useful in their social functioning, which includes everything that is variable and socially determined. The particularly important aspects of the concept of gender that require emphasis are:

- *gender* is the social meanings attributed to biological differences between the sexes;
- social roles assigned to women and men vary over time;
- gender is a phenomenon deeply rooted in social institutions and social mentality, often unconsciously, and is thus not subject to any reflection;
- gender differences contain a hierarchy, because gender is a relational term, referring to the interaction of male and female roles, studying one sex entails the need to also study the other;
- gender determines the direction of education and socialization, sets social standards, and contributes to the strengthening of stereotypes and prejudices leading to discrimination;
- to some extent gender determines the life choices regarding education, occupation, and interests, which may impede or prevent the realization of the individual's potential.

The study adopts the following definition: *Gender* is *a time-variable social phenomenon, constituting the superstructure of biological sex, which is reduced to a set of traits, behaviours, attitudes, roles and attributes assigned by the wider culture to one sex and expected by society, respectively from a woman or a man, as well as the closely related relationships between them, which includes a hierarchy.*

In modern societies the existing gender order assigns different roles to men and women leading to inequality between them. Women are understood in the light of the experiences of men, not of their own (Sherman, 1996, p. 48). Men are the centre of existence and women are pushed out onto the margin, which makes women almost invisible in the world of men (Dugger, 1994, p. 8). As de Beauvoir (1989, c1952, pp. xxii-xxiii) puts it, men are subjects, the absolute, and women are the others. The state also influences the position of women in society and the economy. As Walby (1997, p. 118) suggests that gender relations are not only shaped by interactions between individuals, or individuals and the market. She points to the significance of political and policy issues in the determination of gender relations. Economic policies are often perceived as gender-neutral; nevertheless, they always have an impact on gender. It is no different in the case of efforts to support innovative activity. If gender is not sufficiently exploited in the context of innovativeness it may hamper gender equality, but also limit social and economic progress.

## 3. INNOVATION, CREATIVITY, INNOVATIVENESS

### 3.1. Innovation, innovativeness - the driving force of development

The literature offers many varied definitions of innovation as well as a large number of models developed over the last three decades of the 20th century, and yet the focus is on the search for changes in the economy and society which constitute innovation where gender may be of particular importance. The definitions of innovation postulated by many researchers emphasise that 'innovation is a process expressed by the transformation of existing possibilities into new ideas and finding practical applications for them'. It is – to put it succinctly – 'the introduction into general use of new products, processes, and ways of doing things' (Allen, 1966, p. 7). According to this group of definitions, 'Industrial innovation includes the technical design, manufacturing, management and commercial activities involved in the marketing of a new (or improved) product or process' (Freeman, 1982), or 'Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service' (Drucker, 1985). 'Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things' (Porter, 1990). 'Innovation is carrying new ideas out into practice (Fagerberg, 2006); it is the 'conversion of an idea into an outcome' (Satchell, 1998, pp. 33-34). And there is an indication that '[...] innovation does not necessarily imply the commercialisation of only a major advance in the technological state of the art (a radical innovation) but it includes also the utilisation of even small scale changes in technological know-how (an improvement or incremental innovation) [...]' (Rotwell and Gardiner, 1985, p. 168), since, in practice, not all innovations are based on inventions. For L. Soete 'innovation is about creating value out of ideas, concepts' (Soete, 2006), when the ideas are brought to the market in the form of new products, better designs, better manufacture or distribution, and when it all takes place within the institutional environment of the 'national innovation system'. In this context, as is the case with Freeman (Freeman and Soete, 1997), who decided to incorporate the concept of a national innovation system into the theory of economics, the scale of elements describing the concept of innovation is considerably broadened to include qualitative changes in the development of innovation, such as changes in the system of education, science, technique and technology, intensity of collaboration among the participants of the process of innovation, or searching for the reasons for these changes which in various ways activate humans (men and women) or have a detrimental effect on their behaviours. 'Innovation is at the centre of practically all the phenomena, difficulties and problems of economic life in capitalist society, as its essence is "building a new function of production"' (Schumpeter, 1939, p. 87).

This special role in economic development assigned by J. Schumpeter to innovation activity of entrepreneurs has served for years as the basis for many researchers in their attempts to formulate a definition or a model based on his concept. It has also triggered a discussion on the importance of innovation in economic development, which is particularly emphasized in current EU policy (Europe 2020), both in its positive sense – as ensuring a leap in management efficiency growth – and negative – as a phenomenon capable of causing economic crises. A broad approach to innovation enables us to capture the areas where the importance of gender could be determined. Particularly important here is the sphere of entrepreneurship, with substantial output as regards the assessment of gender-specific

predispositions (Mazowia, 2013). The fact that innovation is often perceived as equivalent to something new or something modified is reflected in modern institutional definitions of the term (OECD, 2005). In the broad understanding, a reference to being 'new' as a basic feature of innovation is not always treated with objectivism. For instance, there is a view that '[...] an innovation refers to any good, service or idea that is perceived by someone as new' (Kotler, 1978, p. 224), or, just the opposite – 'the invention applied for the first time is called innovation' (Mansfield, 1968, p. 99). There is an ongoing dispute as to whether the feature of 'novelty' should be attributed to an entity, enterprise, economy, or a global market, or to manufacturers or consumers. There is a clash between radical definitions perceiving innovation as novelty from the perspective of the whole economy (Schmookler, 1966), and softer definitions where innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations (OECD, 2005, pp. 46-47), abandoning the requirement that innovation must be something absolutely new and introduced for the first time on the global market. This approach, however, is far from common practice. In real life, these are the leaders of innovation that count in the world, and the rest are just 'followers'.

It seems that one of the more useful approaches to innovation – from the perspective of seeking sources for Innovative Gender – is that where there are two different scales of novelty – the one a consumer and of a producer (Hirsz and Peters, 1978, p. 9). Even general observation shows that women, to a considerably greater degree, base their choice of consumption patterns on taste, satisfaction, social benefits, or fashion; while men pay more attention to technical usefulness. The growing complexity of the production cycle leaves less and less room for *ad hoc* innovations emerging as sudden "miraculous" solutions. Therefore, nowadays, the essence of innovation should be sought rather in their permanent, systematic and consistent nature. A philosophy defining innovation by means of continuity and regularity of innovation activity should naturally be associated with providing enterprises and economies with unique resources generating not only innovations, but also competitive advantage. In this concept, falling within the scope of a resource-based approach to innovation, it is assumed that an enterprise is a set of inimitable and irreplaceable rare tangible (production and technology) resources and non-tangible resources (managerial knowledge, intellectual property rights, organisational culture) that affect an enterprise's results. However, in a very specific way, thanks to their resources, enterprises have a dynamic capability to integrate and re-configure internal and external competences in fast-changing environments, which enables them to create and implement innovations (Teece, 2007). Although the resource-based approach has its critics, the interesting conclusions from research on the impact of experience, competences, collaboration skills, and knowledge of employees on R&D activities as one of the measures of innovation activity remain valid. Innovation in an enterprise and an economy, as one of the most progressive factors of social and economic development, including the local perspective, depends on the condition, originality, and availability of resources. For innovation means creativity, establishing new social relations and motivating economic entities to engage in innovation activities expressed as the continuous search for new findings and outcomes of scientific research, R&D work, ideas, concepts, inventions, business models, and the skills and capabilities of people. It also means introducing new methods and techniques in organisation and management, upgrading and developing infrastructure and knowledge, preparing and launching the manufacture of new or improved materials, products, equipment, services,

processes, or methods intended to be marketed or to satisfy various social needs necessary in practice. This aspect also contains a research field useful in assessing the role of gender as a characteristic feature of one of resources deployed to achieve dynamic capability to engage in innovation activity in an enterprise, economy, and society.

### 3.2. The dualism of innovation: creativity versus commerce as a source of the search for the importance of gender

Although innovation may be of various natures, ranges, or scopes, from minor adaptations to breakthroughs, and although they make our lives both easier and more difficult as they transform our surroundings into something more and more complex, they may also significantly affect the system of values, institutions, and decision-making processes. Hence, every element of this driving force, including gender, needs to be adequately studied and utilised. In this context, the optimum definition is the one saying that 'innovation is hard, purposeful work making very great demands on diligence, on persistence, and on commitment; that it requires that innovators build on their own strengths and, that is an effect in the economy and society, because it changes the behaviours of entrepreneurs and consumers' (Drucker, 1985, pp. 152-153). There is no doubt that the term 'innovation' is used in its double meaning:

1) on the one hand, it describes a process encompassing research, design, and development works, creating new relationships among people (men and women), and organisation of the process of manufacture of a new product, process, or system, where human ***creativity*** is the basis;

2) on the other, it describes the first application of a new product, process, or system, through ***commercialisation*.**

The creative aspect denotes both the potential of knowledge and skills to create something new. Although it is a cognitive process, it leads to new, original ideas, concepts, associations, and new ways to practical problem solving. But it is also a process that cannot be captured by means of any simple pattern. Something new can be created both as a result of laborious research and by accident – triggered by intuition and imagination, unconventionally, which was often emphasised by Einstein. Intuition and imagination usually draw on knowledge and detailed reflection, predispositions to acquire knowledge, and capabilities to utilise it. The exceptionality of creativity lies in the fact that it is virtually inexhaustible: 'You cannot use up creativity. The more you use, the more you have' (Angelou, 2010). This thesis is exemplified in an interesting set of quotations defining creativity, found on the internet portal known as: *The Head of Innovation* (Idea Champions, 2010). Here are a few of them:

- The things we fear most in organisations -- fluctuations, disturbances, imbalances - are the primary sources of creativity' – *Alfred North Whitehead*
- 'The chief enemy of creativity is "good" sense' – *Pablo Picasso*
- 'Creativity is thinking up new things. Innovation is doing new things' – *Theodore Levitt*
- 'If you have nothing at all to create, then perhaps you create yourself' – *Carl Jung*
- 'I can't understand why people are frightened of new ideas. I'm frightened of the old ones' – *John Cage*

Creativity often escapes rationality which, in commercial terms, is of key importance, and at first sight looks absurd, although it can lead to inventing something new thanks to unconventional imagination. It is very difficult to define creativity precisely, to identify or measure it. This is so, for instance, because the element of novelty is understood in many different ways or is sometimes even ignored. For creativity can make social and economic life better, but – when manipulated by the few – it can also make it worse. A spectacular example of this feature was the latest global crisis with its origins, most importantly, in "creating" extraordinary financial instruments, including fraudulent financial pyramids, toxic derivatives, and other financial pseudo-innovations. Another example – unfavourable to consumers and the natural environment (but generating profits for manufacturers) – is the tendency to manufacture short-living products, creating additional demand for complementary services and products (e.g. chargers compatible with only one type of device, such as a computer, a mobile phone, etc.). It is by no means a coincidence that more and more researchers point to the emergence of a social phenomenon of tiredness with progress, translating, in practice, into the diminishing final usability of progress. Difficulty in assessing and measuring creativity is also related to deficiencies of statistics and its meanders, various social stereotypes and prejudices to a large extent connected with gender issues. Therefore, a research field important for assessment of the role of gender in creative activities may be the sphere of creative thinking and analysis of the elements which mark the borderlines of this sphere. The scale of the openness of women and men to individual qualities of creative thinking does provide a true opportunity to assess the role of gender in individual stages of the innovation process or development of culture of innovation. Creative thinking is made up of many structured and mutually interconnected elements shaping it (Cempel, 2012), such as:

- Flexibility;
- Risk;
- Excellence;
- Self-discipline;
- Difference;
- Divergent thinking;
- Converging thinking;
- Ambiguity;
- Diligence;
- Redefinition;
- Cleverness;
- Sensitivity;
- Originality;
- Liquidity.

Given the fact that natural creativity reaches its peak at pre-school age and gradually diminishes, the only way to reduce the pace with which it diminishes is to regularly use various methods for sustaining it. And so, for instance, through education or gaining and accumulating knowledge, creative capability can be improved; however, if this knowledge is not expanded and the capability is not deployed in education, life, and work, it will also diminish. Creativity techniques and the purposeful expansion of knowledge are a pre-condition for expanding the scale of qualities of creative thinking, such as excellence, self-discipline, openness to risk, distinctiveness, etc. The development of these qualities, due to

their nature, is determined by individual psychological, social, and cultural predispositions, including gender. The level of their utilisation affects the quality of thinking and the degree of losses in creativity. As J. Chafee (2001) shows, only 3% of thinking is used to solve problems in an unconventional or breakthrough (intuitive) way, and only 7% allows intuition to be translated into creative action. No wonder that creativity perceived as equivalent to the ability to see a broader picture, being brave enough to address challenges and capable of coping with any situation, is among the most desirable qualities on the present labour market. For some, creativity is an innate quality; others say that creativity can be developed and that it is worth working on it (through education and creativity techniques), because it is released mainly through (Tracy, 2010):

- clearly defined objectives,
- acute problems,
- specific questions.

In this context, creativity is a basis for research and development work (basic research, applied research, and experimental development work) expressed by persistent creative work undertaken with a view to enhancing knowledge resources (including the knowledge about human beings, culture and society) and finding new applications for them. According to official statistics, women much more rarely than men are represented in the area of creativity, innovations, inventions, and scientific achievements. This is reflected, for instance, in the statistics concerning female Nobel Prize laureates. Women account for less than 5% of the total number of those awarded. Yet, when assessing the actual creativity of women, one cannot rely only on numerical data. As Einstein appropriately put it: 'Not everything that can be counted counts, and not everything that counts can be counted' (Izquotes, 2014). And yet, attempts to measure creativity are very common (Table 1), although they do not account for gender issues.

**Table no. 1 – How to measure creativity**

| Indicator | Scope | Source of Information |
|---|---|---|
| European Creativity Index | Human capital, technologies, institutional environment, openness and diversity, social environment | The contribution of culture to creativity, KEA, 2009 |
| Hong Kong Index | A set of interdependent variables which together form the creative environment | Home Affairs Bureau of the Hong Kong Special Administrative Region Government, A study on a Hong Kong Creativity Index,2004 |
| Euro-Creativity Index | Set of features attracting the "creative class" - technology, tolerance, talent | Europe in the creative age, Florida R., 2004 |
| Flemish Index | Technological innovations, entrepreneurship, openness of the society. Used to make interregional comparisons | A Composite index of the Creative Economy, the Catholic University of Leuven, 2006 |
| UNCTAD Global Data Base on the Creative Economy | International trade in creative-sector goods and services (export/import) | Creative Economy Reports 2008 and 2010, UNDP, UNESCO, UN |

| **Indicator pertaining to innovations** | | |
|---|---|---|
| EIS, IUS | Technological innovations. It is used to make comparisons among countries, a version of ERIS with a smaller number of variables also used to make inter-regional comparisons. | The European Innovation Scoreboard, The Innovation Union Scoreboard, European Commission |

*Source: own elaboration*

Although the examples of indicators used to measure creativity form a basis for performing an institutional assessment of the level of creativity in general, the actual inventiveness and creativity of women in solving difficult every-day problems, and also in social and economic areas, including education, design, fashion, medicine, media, tourism, social communication or culture (creative industries) cannot be overestimated. In this sense, women are great but quiet creators and the Polish saying 'Where the devil does not manage, it sends a woman' illustrates the enormous creative potential of women. Surely, better unitisation of women's potential will be facilitated by the development of information society segments where there are more and more jobs offered to women. Due to the utilisation of their potential, favourable conditions are being created for the development of 'social futurism' postulated, *inter alia*, by Alvin Toffler, first of all through establishing centres focused on interdisciplinary 'brain activation' at every level of social and economic life with a view to selecting the social consultants of the future. Social futurism may become a remedy for narrow economic technocracy and the short-sighted approach to economics represented mainly by men, particularly because progress and dynamics of changes render traditional business objectives irrelevant (Toffler, 2000), and foresight research forms a basis for building multi-dimensional development strategies at various levels of the economy and society (Okoń-Horodyńska, 2011).

Creativity is a concept which has already left the area of theoretical discussions (Florida, 2002) and become firmly rooted in the economy, serving as a basis for defining creative industries, first – as an experiment – in the UK (Department for Culture Media and Sports, 1998), and subsequently triggering pursuit in the creative economy in many other countries. Creative industries can be described as originating from individual creativity, capabilities, and talents, showing potential for creating wealth and jobs through generating and deploying intellectual property. Those industries originally categorised as creative were: advertising, trade in antiques, architecture, handicraft, design, fashion, film, computer and video games (entertainment applications), music, performing arts, publishing, computer software, TV, and radio; today this catalogue is gradually expanding (Creative Economy, 2013, p. 22). A vehicle for transition from intellectual deliberations on creativity towards its materialisation may be the statement that:

*Creativity is the entire process by which ideas are generated, developed and transformed into value. It encompasses what people commonly mean by innovation and entrepreneurship [...] it connotes both the art of giving birth to new ideas and the discipline of shaping and developing those ideas to the stage of realized value. The crucial variable in the process of turning knowledge into value is creativity* (Kao, 1997, p. 17).

Perhaps it should be added that what is meant here is the transfer of knowledge into exchangeable value, which makes it a transition from a creative process taking place in laboratories, often ending with an innovation, to commercialisation of the products and services created in this process, which takes place on the market. In this context, definitions

explicitly focusing on the commercial aspect of innovation become objects of particular interest. For instance:

- 'A commercial innovation is the result of the application of technical, market, or business-model ingenuity to create a new or improved product, process, or service that is successfully introduced into the market' (Alic *et al.*, 1992, p. 43);
- 'The innovation journey is a collective achievement that requires numerous entrepreneurs in both the public and private sectors' (Van de Ven *et al.*, 1999, p. 149);
- 'Innovation change means creating and launching new goods or technologies, accompanied by restructuring of the systems of an organisation' (Janasz, 2004, p. 29).

A combination of creative and commercial approaches to innovation is found in the following statement: 'Invention is the first occurrence of an idea [...], while innovation is the first attempt to carry it out into practice' (Fagerberg *et al.*, 2006, p. 4). Both the creative and commercial dimensions of innovation demand specific skills, where gender may be an advantage or disadvantage. As a result of developments in science and technology and of changes in the eco-sphere, the concept of innovation and its relationship with creativity is evolving, while the process of globalisation and development of IT technologies in the area of information flow results in the growing practical importance of creativity and generating ideas. The need for continuous, permanent (Morris, 2006) development in innovation in a company and society necessitates the continuous search for ideas. Since creativity generates ideas and ideas, in turn, are the source of innovations, continuous acquisition of ideas becomes an important issue. Given the growing complexity of innovative products, the problem of excellent collaboration among specialists (men and women) in various areas of science and technology as well as companies, universities and R&D centres, and non-profit organisations gains prime importance. To look at the economy as an environment where innovations are developed and implemented and where various branches of knowledge are utilised by better cooperation between women and men means focusing on creativity which is a catalyst for development of science, technology, skills and capabilities.

## 4. INNOVATIVE GENDER – AN APPROACH TO INTEGRATED GENOME OF INNOVATIVE GENDER

### 4.1. Why innovative gender

Innovation has been given a prominent role in the new Europe 2020 Strategy and in one of its "flagship initiatives", the Innovation Union. Recruiting and retaining women in scientific and technical fields is seen as a key to success for the 2020 Strategy. A number of studies and reports have stressed the acute problem of women's under-representation in science in the business enterprise sector. Whilst women represent over 35% of all researchers in the higher education and government sectors of most European countries, this is not the case for the corporate sector. The percentage of female researchers in the business enterprise sector is less than 25% in most countries (Europe 2020). Yet another flagship initiative under the 2020 Strategy, the New Skills and Jobs Agenda, focuses on the need to modernise labour markets, increase labour participation and match labour markets and skills. Studies show that the European labour shortage is likely to have more effect on female or male dominated occupations than on less divided sectors (European Commission, 2009). Occupations in healthcare and ICT are already affected by the shortage of

professionals in Europe. For example, the rapidly growing demand for ICT specialists was one of the motivators behind the European Code of Best Practices for Women and ICT launched by the European Commission (Danilda and Thorslund, 2011, p. 20). Organisations that have signed the Code include global corporations like Google, Cisco and Microsoft, and research institutes like the Research Council of Norway. There is considerable interest in the design of new measures to get more women involved in technology as well as innovation processes in the business enterprise sector. This will tackle the demographic challenge and achieve innovation results. A European dialogue is underway, linked to the innovation case for gender diversity. This dialogue is reflected in the policy, practices and various programmes providing funding for cluster initiatives. Equal participation of men and women is essential for Europe to exploit the full potential of innovative strengths – not only for demographic reasons, but also in the case of innovation processes and results. There is a need to clarify which (new) cluster-policy related measures can support the process to get more women involved in the innovation process of business and research. Observation of many innovation exercises shows that optimal innovation occurs when there is an equal mix of men and women using a systemic process (SIT, 2011). When a predominately male group tries to innovate, the results are less impressive. And when a predominately female group tries to innovate, the results are also less impressive. But put them together and the results are amazing. Research in this area may provide some suggestions as to why (Millward and Freeman, 2002). The essence of the research is that, while men and women are equally innovative, their gender role within the context of an organisation can affect how they are perceived and how they behave when innovating and sharing ideas. Men are perceived as more innovative and risk-taking, and women are perceived as more adaptive and risk-adverse. Thus, gender roles may interact with the role of the manager to inhibit (in the case of women) or facilitate (in the case of men) the likelihood of innovative behaviour. The results of the research suggest that innovative solutions were attributed more often to a male than a female manager, whereas adaptive solutions were attributed more often to a female than a male manager. Perhaps men are expected to take more risks when innovating and sharing ideas. Failure is less damaging to men because that is what is expected of them. Women are expected to be less risky, and this appears to limit or constrain both their degree of innovation and their willingness to share it. Failure is more damaging for women so they behave more adaptively in innovation exercises. There is both a negative and a positive side to this. On the one hand, innovation workshops need a process to assure that women feel they can innovate and share those ideas with the group. If, as the research suggests, women are more likely to hold back, then the facilitation approach has to break through this. Otherwise, we lose the inherent value of the (equal) innovation talent they bring to the table. On the positive side, these differences can be beneficial. This more adaptive behaviour in women and more risk-taking behaviour in men provides a certain balance or harmony during innovation, is a complementary effect that seems to yield better results. It means that each partner holds the other accountable for ideas that are, at the same time, novel but adoptable. Working in pairs, men and women also do a better job of expressing jointly-developed new ideas that may help overcome the risks that women may be feeling. Workshop processes that pair men and women up to take advantage of this are going to be more fruitful and differential role expectations have had no impact on the production of actual solutions. These findings are discussed for their potential to complement existing research on role expectations and innovation as well as their implications for the development of a new research agenda (Millward and Freeman, 2002).

To become *an innovative man or woman* (in a given place and time) means that each human being must make use of all the opportunities to develop her/his skills and capability to contribute best to the country's devolvement and better quality of life/wellbeing for an individual/family through: participation/cooperation, new ideas, solid knowledge. So, combining the *gender issue and innovativeness* should bring new findings to the foundations of smart growth and future-oriented development

### 4.2. The innovation genome model as a background for innovative gender methodology

On the basis of the characteristics of the aforementioned changes in the perception of innovation as well as inferences from the many variants of the process of innovation, research has adopted the concept of the innovation genome (Degraff and Quinn, 2007), as the process of their formation. Its uniqueness lies in its strengthening of the criterion of creativity, its multi-dimensionality, the need for cooperation and balance, as well as capturing the transition from closed to open innovation, which decided on its usefulness in the sense that it can provide a map of areas of research on the importance of gender in the innovation process. It is possible from this model to extrapolate and connect the two main economic categories the form the subject of the studies undertaken, namely the *innovation process*, based on creativity and its determinants, and the *gender* issue from the perspective of the diverse and complex relationship between men and women and the importance of their participation in the different phases of the innovation process. The original innovation genome (Figure 1) is made up of four squares representing areas of the innovation system:

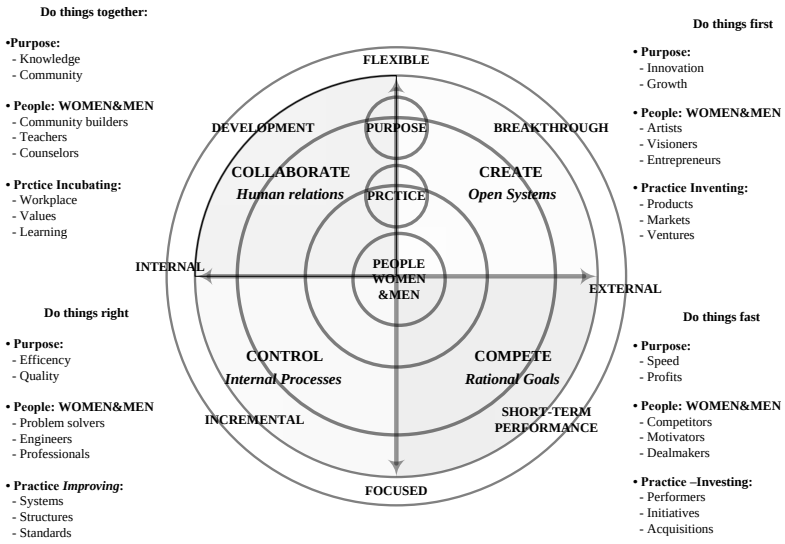
- collaborate;
- create;
- compete;
- control.

For each square, practical methods for creating various forms of value have been described. The strengths and weaknesses of each area as well as interactions among them determine an organisation's ability to create innovation in specific economic, social, and political conditions. Each of the four areas has relevant measures defined to assess the effects achieved, its individual environment, practices recognised within an organisation, and teams or delegated leaders. The central point of the innovation genome is the creation of value by people in all possible areas simultaneously, based on the following formula (Degraff and Quinn, 2007, pp. 11-12):

**PEOPLE + PRACTICE = PURPOSE**

where:

- purpose – the outcomes people want to achieve,
- practice – any activity and value perceived as important by the people involved in pursuing the purpose,
- people – all people involved in activities aimed at achieving the purpose. And in this model block, the first substantial methodical modification key for research has taken place – considering the "people" resource in the distribution of women and men (Figure 1), taking into account their specific characteristics and roles in the innovation process.




*Source: Based on Degraff and Quinn (2007, p. 12)*

**Figure no. 1 – Innovation Genome Model as a map of areas for Innovative Gender**

Subsequent modifications of the innovation genome model are oriented by the connection between the aforementioned categories, and so the *innovation and gender process* and their location in the institutional environment to a large extent determining the relationships between men and women, as well as the social and economic utilisation of their creativity and the importance of their participation in the innovation process. As a result, there arises the need to build an integrated model of the innovation genome, which is known as the *Integrated Genome of Innovative Gender – IGIG*.

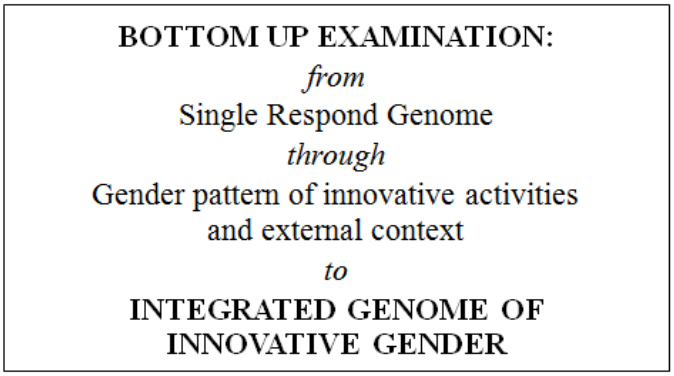
### 4.3. Integrated Genome of Innovative Gender – IGIG

It is assumed that the issue of equality of the sexes in general, manifested as equal accessibility to education, equal rights, equal pay, equal access to the labour market, equal access to vocational training, equal promotion opportunities in employment, equal social benefits and rights, equality in the performance of social and political roles, equality as regards employment security, equal right to maternity leave and unpaid extended post-maternity leave in a given social and economic system is already maintained; any gaps in this respect may only be neutralised institutionally. There is one more issue to discuss – an evaluation of the deployment of 'gender resources' in the process of innovation, and its impact on the outcomes. In the research project, the equal role of gender in the innovation process is called Innovative Gender, which is more about process changes which are created, implemented, and disseminated by various teams made up of collaborating men and women from various social groups, engaged in a team as professionals (scientists, researchers, engineers, etc.) or quasi-professionals – process participants who are community workers creating changes and disseminating their outcomes, or politicians providing institutional support for such processes. The concept of Innovative Gender grants to men and women equality of measures, opportunities, and situations, falling within the scope of the innovation genome model.

Although the multi-dimensional character and wide scope of the areas encompassed by the innovation genome shows that the process of innovation involves all members of an organisation and selected specialists from cooperating organisations, the issue of gender is not accounted for, yet. It can be expanded to include certain elements and the innovation genome, serving as the basis for Innovative Gender, may then represent a model of the innovation process, accounting for all aspects falling within this broad scope, including the importance of gender. Based on the innovation genome model, a starting point for Innovative Gender research is the construction of dedicated matrices (up to now in the case of innovative gender research there are five), containing information (variables) describing a given area through a gender perspective. For the time being, a *pathway to innovation* has been presented, made up of six stages:

- Stage 1 – the generation of ideas,
- Stage 2 – the gathering of ideas,
- Stage 3 – selection of ideas to be implemented in the formal process of innovation[2],
- Stage 4 – the development of ideas[3],
- Stage 5 – the project[4],
- Stage 6 – the implementation and diffusion of innovation.

At every stage of the innovation process, although to varying degrees, men and women are involved. They perform different work, represent different levels of creativity, have different inspirations, drawing both from their own skills and experience, as well as acquiring other bundles of new knowledge and information from the environment. Focusing on the differences, usually in studies taken as the basis for claims arising out of the various dimensions of gender discrimination, is not under consideration here. In the Innovative Gender approach, it is more about process changes, in which the creation, implementation and dissemination involve various teams of cooperating men and women belonging to different social groups, whose participation in the team can be either professional (scientists, researchers, engineers, etc.) or quasi-professional, where participants in this process are social workers, creating changes and disseminating their results, or politicians securing such processes institutionally. It is therefore important to examine and evaluate the role (contribution), and the usefulness of the participation of women and men at every stage of the innovation process, defining the specific requirements for promoters. Based on the above assumption, the research process can be described by the following schema (Figure 2).




*Source: own elaboration*

**Figure no. 2 – Diagram of the research methodology**

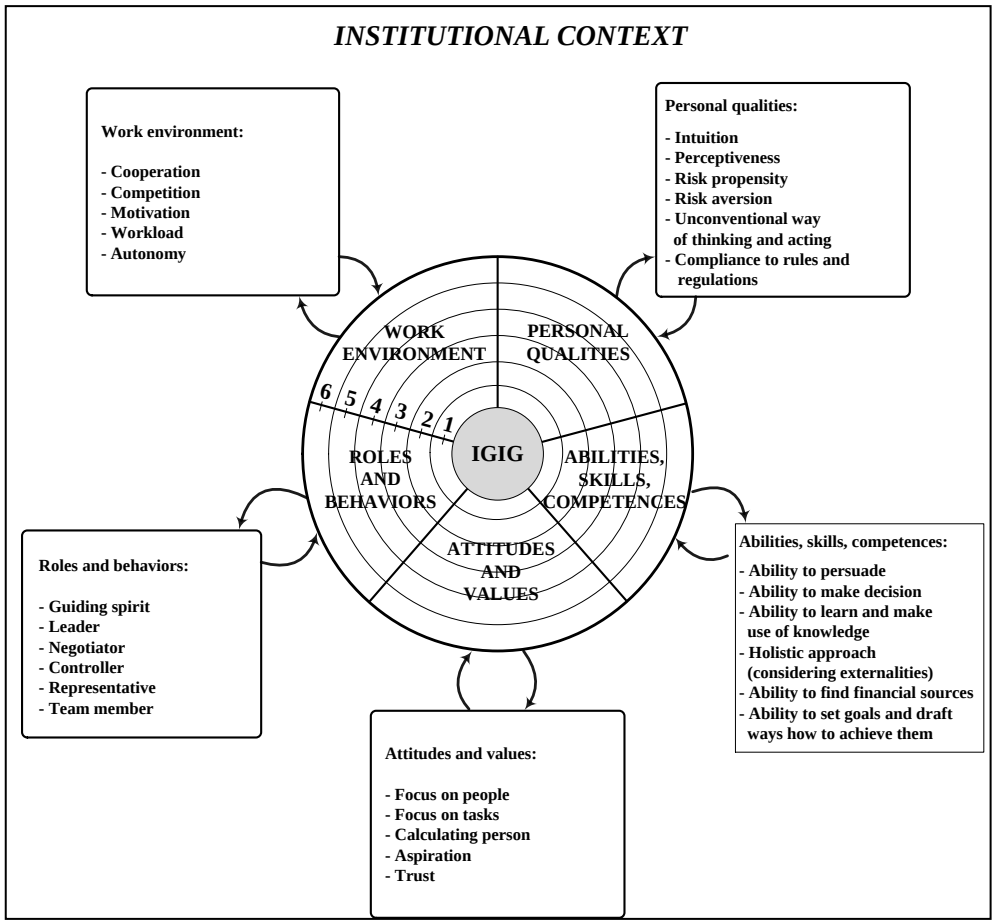
Conducting research using the bottom-up logic, it is planned to build a single respond genome and then placing conditions on it resulting from gender (gender pattern of innovative activities) to create an integrated genome, encompassing the characteristic determinants of gender in the innovation process. The starting point is the analysis of the matrix of relationships between the characteristics of the participation of women and men in the innovation process (vertical axis), specifying the requirements of execution at each of its stages (horizontal axis) (Table 2).

**Table no. 2 – Integrated Genome of Innovative Gender Matrix**

| **Indicator** | **Stage 1 Generating ideas** | **Stage 2 Managing ideas** | **Stage 3 Selection/ prioritisation** | **Stage 4 Developing ideas** | **Stage 5 Project management** | **Stage6 Implementation & diffusion** |
|---|---|---|---|---|---|---|
| Work environment: cooperation, competition, motivation, workload, autonomy | | | | | | |
| Personal qualities: intuition, perceptiveness, risk propensity, risk aversion, unconventional way of thinking and acting, compliance to rules and regulations | | | | | | |
| Abilities, Skills, Competences: ability to persuade, ability to make decisions, ability to learn and make use of knowledge, holistic approach (considering externalities), ability to find financial sources, ability to set goals and draft ways how to achieve them | | | | | | |
| Attitudes and values: focus on people, focus on tasks, calculating person, aspirations, trust | | | | | | |
| Roles and behaviours: guiding spirit, leader, negotiator, controller, representative, team member | | | | | | |

*Source: own elaboration*

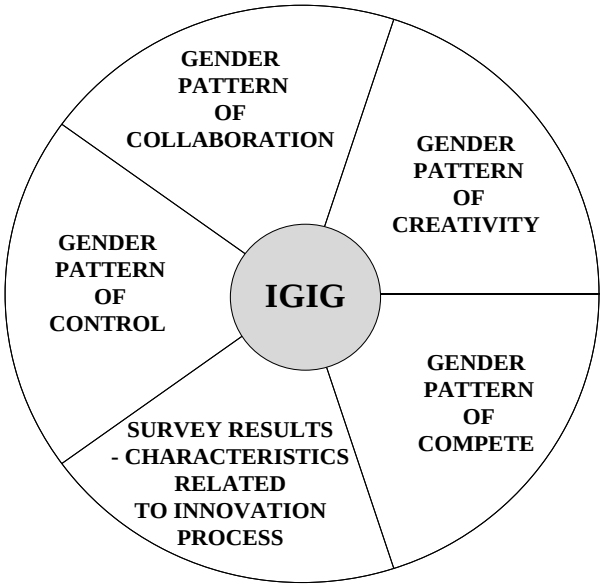
Individual matrices contain a description of the characteristics of the participation of women and men at all stages of the innovation process, depending on the gender pattern of innovative activities (e.g. gender pattern of creativity, gender pattern of competition). On the basis of the collected research material those characteristics will be extracted which are perceived by men and women as most important at the various stages of the innovation process from the perspective of practice. The individual characteristics of the participation of women and men in the innovation process taking into account all the paths of innovation activity make up the matrix of the integrated genome of innovative gender.




*Source: own elaboration*

**Figure no. 3 – Integrated Genome of Innovative Gender**

The research material will be obtained using the method of survey, in-depth interviews and also expert research, and the respondents will be men and women involved in different ways in the innovation process. The final results will be included in the IGIG model (Figure 3), which will demonstrate a differentiated approach to the innovation process depending on gender. On the basis of the results specific patterns will be developed constituting a fundamental modification, using aspects of gender, of the innovation process proposed in the Degraff model (Figure 4).




*Source: own elaboration*

**Figure no. 4 – Gender patterns in the process of innovation**

The resulting matrix is thus integrated as it combines in a whole the individual characteristics, giving a coherent picture of the participation of women and men in the innovation process, taking into account the requirements of each of its stages, the types of patterns of innovation activity among men and women functioning in a specific institutional environment.

### 4.4. Innovative gender and institutional change

The expectations regarding IGIG are such that this model will enable us to observe differences in the approach to creativity and innovation between men and women. If the approaches prove to be different, it may mean that previously used definitions of innovation, innovation process and the policy to support innovative activities have not recognised the diversity arising from gender. And so there is a possibility that public policies supporting innovativeness are gender-biased. If such policies promote male-type innovative behaviour, treating innovativeness and creativity as gender-neutral, specific female innovativeness may be unnoticed and not supported, making innovativeness more difficult for women than men. Introduction of the innovative gender concept will indicate what incentives are needed in order to promote gender equality in the areas of innovativeness and creativity. Support for a specifically female dimension of innovativeness will add to economic and social progress and create new comparative advantages, as well as promote gender equality.

The changes introduced to the policy of promoting creativity and innovation taking into account gender relations may lead to more serious institutional changes, thanks to which the use made of the abilities and creativity of women in the innovation process will be more complete in terms of both quantity and quality. Changes in the institutional setting for Innovative Gender may mean the marking out of a new source of progress. On the basis

of the experience, it can be demonstrated that the key to creating value in the model of the innovation genome is one of its elements, namely cooperation. In the practice of economic, political and social life, the essence of cooperation between the sexes in the idea of the team has been lost, while subordination based on dependence dominates. The introduction of quotas or quotas will not solve the problem, it can only structure the workers, political, or social groups; however, a group is not identical to a team. In a group, even with an equal number of women and men, functional subordination may still apply, while in a heterogeneous team the optimal potential accumulates, providing economies of scale and synergies at the same time. And so it may be fruitful to involve women and men together in the research team, and not only women, or only men. Attention should be paid here to the multi-dimensional differences stemming from gender, which should be perceived as a totally positive element, because they are the source of synergy resulting from the collaboration of research or business teams in the process of innovation.

## 5. CONCLUSIONS

Concentrating attention in the proposed report has been focused on proposals for a methodology of an integrated genome of innovative gender (IGIG), the essence of which is to prepare to continue research on a tool for measuring gender in the innovation process, enabling the assessment of the two levels of activity in an innovative economy. The first is the result of the operation of enterprises in the form of the scale and structure of the innovations generated through effective use of the existing potentials in the economy; the second is to develop features of the economy that are determined by innovation denoting the ability of businesses and the economy to generate ideas, and create and implement innovations, as well as their absorption. The process of innovation in the studies undertaken, however, is to be observed through the prism of the importance of the concept of gender located in it. Thus, for the forthcoming research methodology, the most important stages of the innovation process were selected, which in this case are treated on the one hand as research areas designated in the research project *Innovative Gender as a New Source of Progress*, while on the other as the distinctive participation of women and men in various stages of this process. From this point of view, the area of research determines the need for a thorough assessment of the progress and results of the innovation process including a comprehensive catalogue of the attitudes, roles, behaviours, and characteristics of the participants in this process (women and men). Thus, as the starting point for the preparation of the IGIG methodology it was necessary to recognise such areas as:

- the essence of gender in the institutional context
- creativity, innovation, models of the innovation process and innovativity, and
- identification of the attitudes, behaviours, roles and characteristics of the people involved in the different phases of the innovation process.

As a result of the preparatory work, it is determined to put the results in matrix formulae, the common area of the indicated partial areas which is the necessary starting material for the construction of a significant new tool for measuring the role of women and men in the innovation process. At the core of the construction of this methodology is an attempt to move away from the stereotypical character logical description of men and women based on assumed *a priori* groups of specific behaviours, roles, attitudes and characteristics. The attempt to develop this measurement tool, based primarily on the qualitative determinants, free from such assumptions, aims to explore the phenomenon as it

is in reality, without the prior characterological polarisation. Thus the InnoGend concept in searching for specific roles and actions by women and men in innovative activities may bring some new research and practical effects, like:

- new approach to identification of commonalities and differences of gender related innovation activities, (barriers, gaps, opportunities, effects)
- new methodology in research on gender related activities
- marking the range of rational equality entries in strategic documents on which the state's innovation policy is based
- changes in the institutional environment supporting conditions for the development of men's and women's innovation activity geared towards achieving success.

The considerations in this study are not yet a completed methodical concept, but an outline and material prepared for verification, as the principal has assured a 3-year study period. Dissemination of this research approach in the initial phase, however, provides a chance for reliable review and improvement.

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[2]In line with the priorities arising from the strategy of the company, region or country.
[3]This applies to all research, development, knowledge and technology transfer, cooperation and competition necessary to process the idea in innovation and determination of the cost of these activities.
[4] This refers to the implementation of all activities managed in accordance with the adopted methodology, aimed at achieving innovation suitable to for commercialization.This step includes such issues as:fashion, design, continuation of market research, preparation of a strategy of innovation diffusion, marketing, creation of spin-offs, and cooperation.

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# ROLES AND SATISFACTION DURING INTERNSHIP PROGRAM IN ESTONIAN UNIVERSITIES

**Merike KASEORG***
**Lee PUKKONEN****

**Abstract**

*This study investigates an intern as someone who is a student in training, who may be paid, but in company is a temporary employee (Tovey, 2001); internship as a supplement or complement to academic instruction in environmental science. This article reviews roles during internship and satisfaction with the internship program from two perspectives: interns from five Estonian universities and site supervisors from various companies. The data from site supervisors and interns were collected through a web-based questionnaire. Surveys were carried out during 2012-2013. The sample consists of 418 interns and 194 institutions providing internship. The study gives and overview of the situation of the internship in Estonia. The data has been discussed in the context of the related literature.*

**Keywords:** internship, knowledge exchange, roles, satisfaction, university-industry collaborations

**JEL classification:** I21, L00, L20

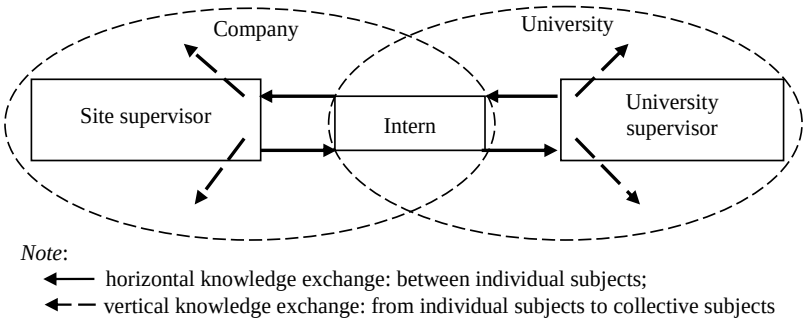
## 1. THEORETICAL BACKGROUND

### 1.1. Individual and collective subjects in internship process

Articles in academic journals reflect a lot about different forms of university and industry collaborations. Mostly they talk about knowledge transfer or exchange and innovation. Knowledge transfer is as an interactive process involving the interchange of knowledge between knowledge users and knowledge producers (Mitton *et al.*, 2007). The same is translate into internship, but with a little difference. In internship, the knowledge transfer should be replaced with the term knowledge exchange because it is bilateral. In this case the result is learning from the process to all of the participants.

Collaboration between universities and industries includes many different challenges and of them, one is internship. During internship, individual subjects (such as site supervisor/ employee, intern/student, and university supervisor) are closely intertwined and at the same time they all represent collective subjects (such as university or company) (Figure 1).

* Faculty of Economics and Business Administration, University of Tartu, Estonia; e-mail: *merike.kaseorg@ut.ee*.
** Faculty of Economics and Business Administration, University of Tartu, Estonia; e-mail: *lee.pukkonen@ut.ee*.




*Source: compiled by authors*

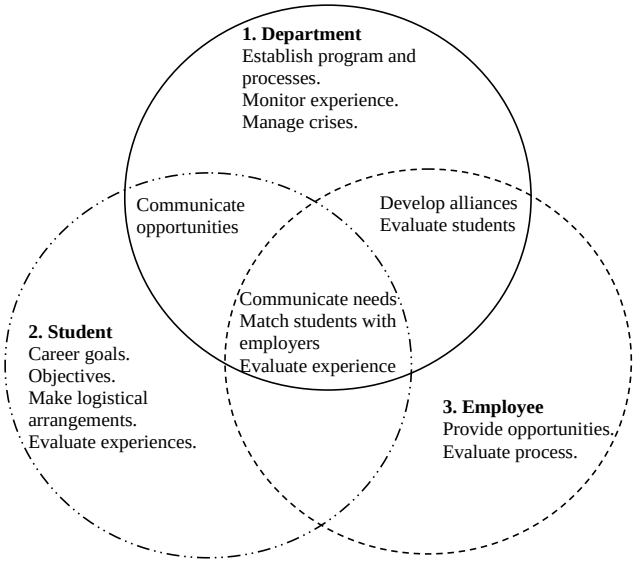
**Figure no. 1 – Individual and collective subjects in internship process**

Therefore we can talk about two different knowledge exchange types: horizontal (between three individual subjects during the internship) and also vertical (how much information and knowledge they will share with bigger group where they belong to, so that knowledge will become from tacit to explicit in organisational level.

Narayanan *et al.* (2010) propose that the outcomes from the internship may be of three types. They argue that outcomes of interest include (1) organizational benefits from the completion of the internship project, (2) enhanced capabilities of the company and the university, and, at the student level, (3) skill development, and career enhancement. For the employing firm, the important immediate benefits may include project completion, efficiency due to using cheaper labour, potential screening of and recruitment of the intern and, perhaps, an inflow of ideas (e.g. best practices) from the university to the company. Longer-term benefits may include a stronger tie with the university, thereby encouraging students to apply for future internships, as well as a continued inflow of ideas. For the university, completion of the project will likely result in student satisfaction and possibly student placement. Longer term, one might expect to see the university enhance its capabilities by having greater knowledge about the challenges companies address as well as a reputation for placing students in good internship positions. For the student, the outcomes will mostly focus on skill development and career opportunities. Longer-term outcomes will be better career decisions and career prospects. Therefore, the roles of site supervisor and university supervisor are not important only for student/intern learning process, but also for organizational learning.

### 1.2. The main roles of internship subjects

The university department or faculty normally initiates the internship program and sets the processes that are needed for maintaining successful exchange and for improving with the program. Students need to consider an internship with respect to their long-term goals and objectives, such as identifying a career in their field of interest. Students are in charge and have the responsibility of arranging different aspects of the internship such as housing and transportation. Employees provide to students meaningful work experiences that augment the students' classroom learning and work with the department when there are special issues that need resolution (Divine *et al.*, 2008). The main roles that internship subjects carry in order to make an internship as a positive experience to all of the participants are shown on Figure 2.



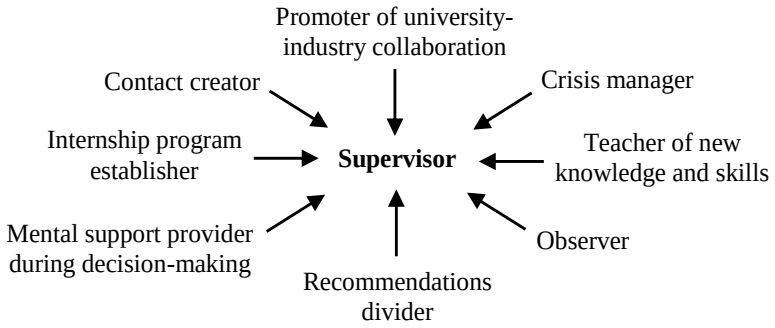

*Source: Divine et al. (2008)*

**Figure no. 2 – University/department, student, and employee roles in internship program**

Accordingly, more and more interactions between university and industry are becoming subjects of measurement and management, leading to more formal, contractual exchanges based on codified rules and regulations. Communication and interaction between universities and different industries has a fundamental role. That is why the lack of research on this subject is a serious hindrance to the design of an effective policy (Bruneel *et al.*, 2010). University-industry links help firms to increase awareness of opportunities for commercial exploitation of publicly funded research, and facilitate the transmission of knowledge between academic and industrial scientists, thus contributing to strengthen a country's innovative performance (D'Este, 2008).

Mihail (2006) considered internship as an opportunity to close the gap between theory and practical reality. Cheng *et al.* (2004) brought out that internship programs provide students with needed tools and educate them to take responsibility in their future work life. Industry professionals also think that students who have internship experiences are more marketable. In analysing university internships, the general assumption is that the modern knowledge economy requires a leap in graduates' skills and educational institutions try to implement innovative reforms to provide their students with skills needed by "high performance" firms. Mihail (2006) Internships form a vital part of any student's education, giving the student a chance to hone his or her skills, interact with more experienced professionals, and practice in different areas of the field (Beebe *et al.*, 2009).

Depending on the situation and definer of the roles, supervisors attach so many roles like head, observer, helper etc. Yaman (2013) defined supervisors' main roles as guider, bigwig, and collaboration promoter. Roles like teacher of new knowledge and skills, recommendations driver, evaluator, handled also by Vahtramäe *et al.* (2011). Supervisors' roles handled in current study are shown on Figure 3.




*Source: authors modify from Divine et al. (2008), Yaman (2013), Vahtramäe et al. (2011)*

**Figure no. 3 – Site and university supervisors' roles during internship**

Supervision by industry professionals could help students to learn from mistakes, learning through networking, learning from the unsystematic process of trial and error, or learning from a series of interpersonal experiences (Marsick and Watkins, 2001). In addition, the programs should provide students with needed skills, and educate them to take responsibility in the future work life, thus bridging the gap (Collins, 2002). Establishing good training programs for interns, giving interns meaningful tasks, and empowering them to manage the tasks in a more creative way could be solutions to improve future internship programs (Cheng *et al.*, 2004).

### 1.3. Knowledge exchange in internship process

Successful internship means that all parts (individual subjects and collective subjects) learn from the process and everyone will get some new knowledge through sheering. In literature, there are two different knowledge types. Organizational knowledge is classified into explicit knowledge and tacit knowledge (Nonaka, 1997; Nahapiet and Ghosal, 1998). Explicit knowledge can be easily stored, retrieved, shared, and disseminated within organizations. Some of the examples of explicit knowledge are found in commercial publications, e-mail, internet, online learning platforms (Hutzschenreuter and Horstkotte, 2010), GroupWare, intranets, database, organisational business records and self-study material (Srikantaiah and Koenig, 2000). Tacit knowledge is the exact opposite of explicit knowledge (Wong and Radcliffe, 2000; Nonaka and Takeuchi, 1991). Tacit knowledge is an experience that is embedded in an individual, such as perspective and inferential knowledge. It includes insights, hunches, intuitions, and skills that are highly personal and difficult to formalize, and as a result are hard to communicate or share with others (Srikantaiah and Koenig, 2000).

In all organizations, we have knowledge, but the questions are how we can share it and how the leaders can manage knowledge. Learning occurs when people share their data, information, and explicit and tacit knowledge. The obvious transfer agent of knowledge – and of tacit knowledge in particular – is the person who has the knowledge. These knowledge experts convey their tacit knowledge by expressing their beliefs and perceptions, and by describing and demonstrating their skills and experience. Kumar and Ganesh (2009) define knowledge transfer as an event through which one entity learns from the experience

of another, suggesting thereby that the effect of one unit on another is in terms of the learning that the second unit experiences.

During the internship process, it is important that learning will be two-sided and two-dimensional. Two-sided means that in internship there is no such thing as one is only giver and another is receiver. It can be so with knowledge transfer when talking about some product or patent that has only one-way impact. Internship is two-sided knowledge sharing and in some situations the recipient of knowledge (as intern) can and should be the source of knowledge. Two-dimensional means that the knowledge exchange should also reach to collective level (team, unit, organization, and cluster) and individual subjects should share their experience with their organization. It is the conveyance of knowledge from one place, person, or ownership to another. Successful knowledge transfer means that transfer results in the receiving unit accumulating or assimilating new knowledge. When organisations or employees within an organisation identify knowledge that is critical to them, they can use knowledge transfer mechanisms to acquire the knowledge. They can then constantly improve it and make it available in the most effective manner for others who need it. They also can exploit it creatively or innovatively to add value as a normal part of their work (Liyanage *et al*., 2009).

New knowledge is a crucial input factor for innovation. Therefore, not only the knowledge-producer but also other organizations such as private and public businesses, research institutions, or universities can also apply and commercialize the newly generated knowledge (Mueller, 2006). One way theorists discuss this problem is by raising the question of transfer of learning: How and under what conditions does knowledge from one context carries over into the other? However, there are factors constraining the efficacy of school-based practices for enhancing experiential learning. For one thing, students often resist it: they tend to care more about doing the work than about reflecting on it; and they often see the internship as a mode of career exploration, as a foot in the door, and not primarily as learning experience. Typical student spends some time in an organized, recognized, sometimes accredited out-of-classroom but school-sponsored learning activity: working in a business or a medical centre; performing some kind of community service; participating in an Alternative Spring Break project; engaging in field-based research to fulfil the requirements of a course. If these experiences are structured effectively and processed rigorously, they can add a great deal of value to students' learning and to the educational strength of the university. In fact, they have the potential to transform higher education, to broaden and deepen the nature of knowledge and learning that goes on in the college, and to alter the relationship between student and teacher and between university and community. However, these transformative effects depend on careful planning and execution, on avoiding the tendency to fall back on the adage that "every experience is educational," on pushing students – and faculty – to think rigorously and extensively about the intersections between theory and practice (Moore, 2010).

## 2. METHOD

### 2.1. Characteristics of the sample

Participants were from two groups: students as interns and site supervisors from various companies. Students that participated in the survey were from five Estonian universities: 47% of respondents from University of Tartu (UT), 18% from University of

Tallinn (UTLN), 16% from Estonian University of Life Science (EULS), 16% from Tallinn University of Technology (TUT) and 3% from Estonian Business School (EBS). All 418 students/interns responded to the survey, participated in full-time study. All the participated students had been interns within two years. Most of respondents 276 (66%) were female and 142 (34%) were men. By respondents age 225 were 19-23 years old (54%) and over 23 years old were 193 respondents (46%).

Companies (and site supervisors from there) were found through the university supervisors and their contacts with companies and total 194 site supervisors responded to the survey. Differentiation through the size of the company: 33% were large (more than 250 workers); 31% were medium (50-249 workers); 25% were small (10-49 workers); 11% were micro (less than 10 workers). Most of respondents were female 138 (71%) and 56 (29%) were male. 52% of all respondents were over 40 years old and 43% of all respondents had worked in company over 10 years. Positions divided: 35% were employees or civil servants, 24% were senior specialists, 24% were middle managers, and 17% of respondents were owner/senior manager/executive worker.

### 2.2. Research methods

Research methods were selected on the bases to involve the largest possible number of respondents. Therefore the data from site supervisors and interns was collected through a web-based questionnaire (qualitative analyse). Basis for the questionnaire were topics and keywords from the field of theoretical literature about internship and university and industry collaboration. The aim was to find previous studies that help to create informative questions. It turned out that internship has previously been studied mostly through process descriptions. Less surveys review knowledge exchange that appears when internship is well organized.

The questionnaire consists of three parts: the first part consists of general questions about assessments, attitudes, and process; the second part deals with the experience of intern; third part contains of specifying questions about site supervisor, company, or intern. Test items in questionnaire were similar in both groups because one aim was to compare those results. The first questionnaire was directed to site supervisors who actually supervised internships. The other questionnaire was designed to interns, who were full-time students. Site supervisors' questionnaire consisted of 27 questions and interns' questionnaire of 26 questions. Respondents had to answer to some questions on Likert 5-point scale, where five meant total agreement and one total un-agreement. In case of some questions was opportunity to choose between several answer options. In the end of the questionnaire was an opportunity to comment and give proposals in the field of internship programs. Many people used the opportunity to comment the topic through open questions. Respondents also had an opportunity to get feedback if they were interested.

### 2.3. Procedure and analysis

The pilot study was conducted during the period of 01-10 March 2013. The aim of this preliminary analyse was to test comprehensiveness and relativity of questionnaire. Pilot study was carried out with authors' personal acquaintances and colleagues. This followed by preparation of cover letters and taking contact with university supervisors. The questionnaire was web-based in Google docs and data collected during the period of 18 March-30 April 2013. Respondents were interns and site supervisors who had participated in

internship program during 2011-2013. In the beginning of the study, some of the respondents gave feedback and because of that, questionnaires were adjusted.

Authors analysed universities and faculties homepages and selected programs that differ enough. Assumption was that programs have to be full-time. E-mails were sent to all those different university supervisors and in some cases for the head of the faculty. University supervisors were asked to send those letters to interns and to companies they have connections with through internship. Some of university supervisors told that they do not want to participate in the survey because they have already done it for another survey. Researches also had to send many reminder messages. Altogether 1360 e-mails were sent.

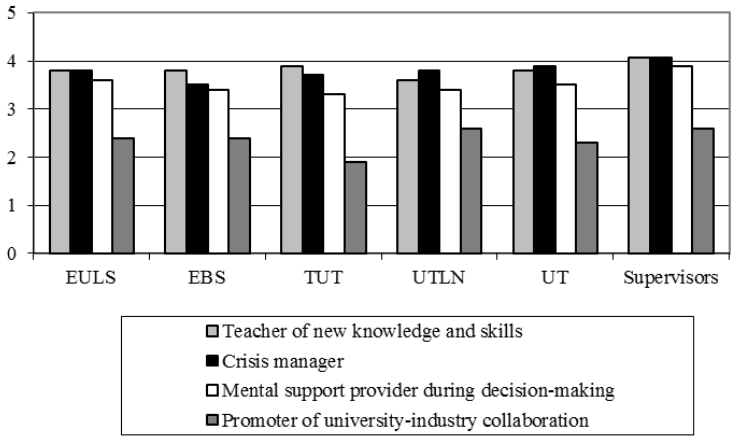
University supervisors were asked to share their contacts with companies to get in contact with the site supervisors. Through homepages and different hints, researchers also wrote to some random companies that offer internships. Prerequisite was that company have participated in internship process during last two years (2011-2013) because earlier thing are hard to remember.

Analysis of data was performed in SPSS 18.0 and in Microsoft Excel 2010. The analysis used the following statistical techniques: descriptive statistics, Spearman's nonparametric correlation analysis to identify whether, and what kind relationships are between the questions.

## 3. RESULTS

### 3.1. Roles of internship subjects

Research looked roles of all internship subjects (intern, site supervisor, and university supervisor) during internship. Based on the results we can say that site supervisors and interns see the role they carry similarly but critical point is university supervisor. First, you can see the roles of site supervisors (see Figure 4). Site supervisors found the most that they carry teachers' role (151 answers) which connected to the interns' wish to learn new things from internship experience.




*Source: compiled by authors*

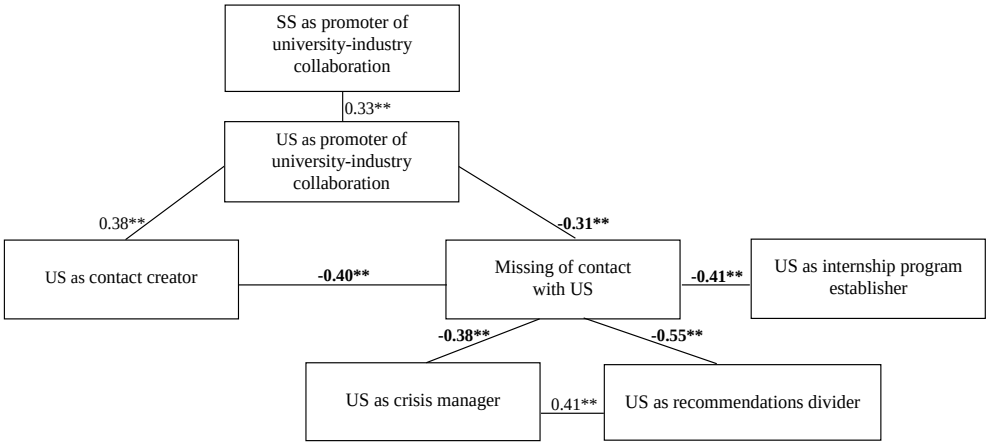
**Figure no. 4 – Roles of site supervisors from interns and site supervisors' questionnaires (means over 2.5)**

To look the size of the companies, then only those site supervisors who work in bigger companies answered that they were the teachers. Site supervisors from smaller companies answered that they carry the role of helper who evaluates the problem during internships. However, site supervisors thought about internship as important cooperation channel between universities and industries regardless one in five respondents answered that she/he did not contribute that role.

Interns' answers showed that they see the role of the site supervisor as helper to evaluate the problem. Interns also gave high ratings to the role as teacher of new knowledge and skills. Interns evaluated from different site supervisors' roles the lowest the role of the helper of university-industry collaboration.

Secondly were reviewed the roles of university supervisors where critical results came to the fore. Almost half (46%) of site supervisors answered that they have not had any contact with university supervisor. This was followed by site supervisors' role as internship program-establisher (30%) and contact creator in the beginning and in the end of the internship (24%). None of substantial cooperative roles (recommendation divider, helper to evaluate the problem, and promoter of university-industry collaboration) did not reveal in the same extent. Critical is that missing of contact (61%) also occurred during long time (more than two months) lasting internships. Missing of contact with site supervisor is negatively related to all of the other roles except the role of plan compiler. This result shows that university supervisors carry only the role of plan compilers.

Interns mentioned the most that university supervisors are recommendation dividers (39%) who help interns successfully finish the internship. Almost the same amount of interns mentioned that there was no contact with university supervisor (35%). In addition, they chose the role of internship program-establisher (29%). Similarly, to site supervisors' answers correlations showed that university supervisors carry program-establisher role if they carry any of the roles at all.




*Note*: US – university supervisor; SS – site supervisor; ** p<0.01

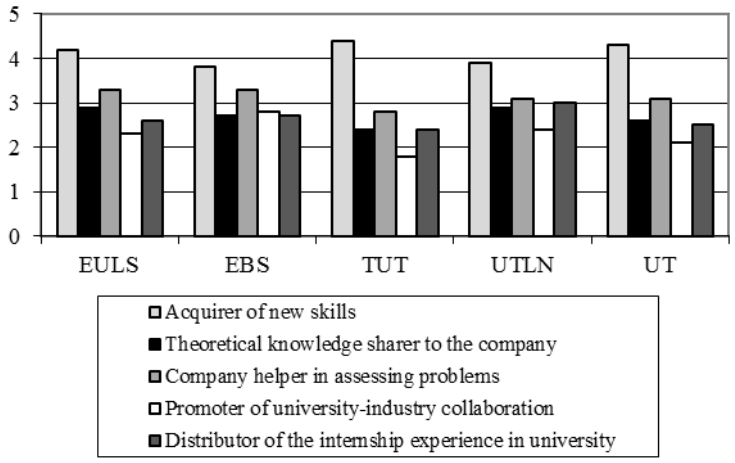
*Source: compiled by authors*

**Figure no. 5 – Correlation tree (r>0.30) about the roles of university supervisor**

Differently from site supervisors questioner appeared from interns' ones that missing of contact with interns is negatively related to internship program-establisher role (see

Figure 5). From those correlations, one could see that if there is no contact between university supervisors and students or site supervisor then they carry no role. Also cannot assume that they promote university-industry collaboration. Growing dissatisfaction with the university supervisor and faculty support shows that missing of contact is a problem and interns would like to see more the contribution from the university supervisors in internship process.

From open answers, become evident that interns had an opportunity to get advice and assistance from university supervisors, but in most cases there were no problems and help was not necessary. Thirdly was examined interns evaluation about the fulfilment of their own roles (see Figure 6) during internship.




*Source: compiled by authors*

**Figure no. 6 – Roles of interns (means from interns' Questionnaire)**

Interns evaluated themselves the highest in role of the acquirer of new skills and the lowest in role of promoter of the university-industry collaborator. EBS differed from other universities because their interns evaluated higher their role as company helper in assessing problems and promoter of university-industry collaboration. Interns from UTLN evaluated themselves higher in the distributor of the internship experience in university role.

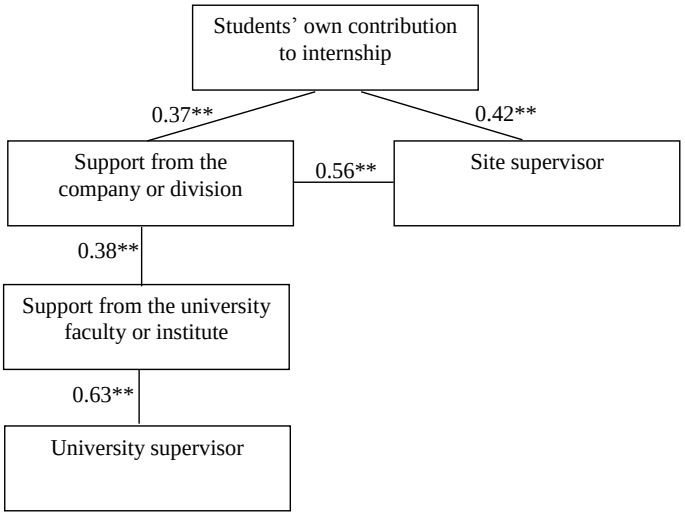
### 3.2. Satisfaction with internship

Good result was that site supervisors were very satisfied with interns (155 positive answers). Site supervisors also evaluated higher the support of their company (137 answers), but very few of them (70 answers) were satisfied with university supervisors. The results also shows that the bigger the company from where the site supervisor is, the lower the satisfaction with university supervisor. Satisfaction was higher for those who took part in internship report defence in universities and the lowest for those we were not informed about internship report defending time. Critical is that 40% of site supervisors answered that no one informed them about defence. This problem was especially likely to bigger companies.

From correlation analyses appeared acute problem that missing of contact with university supervisor has negative relation to all the other roles. Therefore, we can say that if university supervisor has no contact with company, she/he is not carrying any other role either.

Similarly to site supervisors also interns were satisfied with site supervisors, but unsatisfied with university supervisors. Most of the interns were also satisfied with their own contribution in internship program.

Interns evaluated the lowest satisfaction with the university department. Similar was also the dissatisfaction with university supervisor. Correlation analyses showed positive relations between all of satisfaction indicators (see Figure 7). Therefore, if the intern was satisfied with his/her own contribution, then she/he was also satisfied with site supervisor and university supervisor. Quite strong relation (r=0.63) was between faculty support and university supervisor.




*Note*: ** p<0.01

*Source: compiled by authors*

**Figure no. 7 – Correlation tree (r>0.30) about satisfaction of different internship subjects**

For example, the site supervisors who work in bigger companies find it very important to get feedback about their supervision and to connect with universities. Survey shows that there is lack of connection between university supervisors and other subjects. In addition, site supervisors and interns evaluate low the satisfaction with university supervisor.

## 3. DISCUSSION

Everything that occurred during internship reviewed through different roles that interns, site supervisors, and university supervisors carry through evaluation of satisfaction. Evaluation of those clearly defined roles is important because it helps to see if individual subjects (as interns, site supervisors and university supervisors) can make knowledge exchange possible. Knowledge exchange is one of the most important stages in knowledge management, but is considered to be laborious and time consuming to achieve effectively (Duan *et al.*, 2010). As Liyanage *et al.* (2009) noted, successful knowledge exchange means that exchange results in the receiving unit accumulating or assimilating new knowledge and from that will win intern, university, and company.

Interns and site supervisors both evaluated the role of site supervisor during internship. Study revealed that site supervisors and interns were satisfied with each other and evaluated the roles highly. Tovey (2001) also found that site supervisors evaluate themselves the highest in role as teacher of new knowledge and skills. Interns evaluated themselves the highest in role of new skills acquirer. From this bases can be told that site supervisors' and interns' roles and expectations to each other match. Therefore we can hope that student`s-learning outcomes will be maximized because of coaching, careful monitoring, and sufficient thought regarding professional development (Ellis, 2000). Such practical experiences as meeting deadlines, managing projects, working in teams with others, and negotiating through the maze of conflicts and reviews in the workplace are quite different from those experiences we attempt to replicate in the classroom (Tovey, 2001). Therefore, it is important that site supervisors carry the role of teachers.

Interns and site supervisors both evaluated that site supervisors do not carry the role of promoter of university-industry collaboration even though they all evaluated this collaboration very important. It is critical finding because it shows that there is lack of co-work between university and site supervisor. Co-work between supervisors is important in order to raise the amount of co-work projects between universities and industries. Co-work between individual subjects is important to create knowledge exchange. The key words of communication flow are transparency, openness, constructive feedback and free access to information (Ahonen and Kaseorg, 2008). Lack of contact was also problem with internships that last more than two months. It is critical because from these kinds of internships feedback should be the highest to get information and case studies. Usually when students stay long in some company they will also start to work there. It is opportunity for universities to create long-term relationships with the company.

None of the meaningful roles of university supervisor (recommendation divider, problem solver, and promoter of university-industry collaboration) did not reveal in serious amount. From site supervisor and from intern's questionnaire came out that university supervisors do not carry any role during internship and there is lack of contact with them. They carry the most plan compiler's role that can be described as procedural role. In this role, university supervisors do not deal with knowledge exchange. This kind of problem can be specific to Estonian universities because there is no such occupation as university supervisor for the internship. Most of university supervisors carry this role alongside with their daily work (in some cases as professors). Therefore, it is understandable that they do not have time to deal with everything, but only with documentation.

University supervisor's co-work with interns and site supervisors is very important for three-sided exchange of knowledge. For example, the feedback is very important for smaller companies. Woods and Dennis (2009) have also found that in case of university-industry collaboration it is necessary to act differently with smaller and bigger companies. Smaller companies do co-work immediately when it is useful for them (free labour for example). For bigger companies is important to shape the image of the company and to get feedback. In Estonia, most of companies are smaller ones. In that case, it is necessary to give feedback to site supervisors and create links between university and company.

Research showed that satisfaction between site supervisors and students was high. Both of them were not satisfied with university supervisors. Dissatisfaction with university supervisors showed that students want more intervention from them. This is critical aspect if we want knowledge exchange to work. When comparing the results regarding the size of the company, one can notice that bigger companies were less satisfied. It might be so because

they wait long-term relationships, different projects, and good feedback. While student interns are trained in job skills and have learned how to negotiate the workplace environment, they can also bring new ideas into the workplace. Faculty members, who participate in faculty's internship, have the opportunity to learn about the jobs their students compete for, bring new concepts into the workplace, and do research (Bosley, 1995, Hart and Glick-Smith, 1994, as cited in Tovey, 2001; Hayhoe, 1998, as cited in Tovey, 2001). However, this partnership depends on educators, students, and workers listening to each other. Then intern can make a transition from student to professional. Company can get new ideas and in some cases a good future employee. University can get good cases and knowledge from practical work ground. In case of our research the lack of co-work comes through university supervisors and dissatisfaction with them.

## 4. CONCLUSIONS

The study gives an overview of the internship's current situation in Estonia. The study was limited because of the small number of participants. It was almost impossible to control weather university supervisors sent the participation request to companies or to site supervisors they are working with. Another limitation of this study is that the results are based on supervisor perceptions. It is quite possible that site supervisors would view the supervisors' approach or the supervisory working alliance differently. The results are critical towards university supervisors who did not participate in this survey and had no opportunity to share their vision. Interviews with the university supervisors were carried out during winter 2014.

The contribution of this study is an overview of the situation as much as recommendations for development in this field. Lack of university supervisor's role in internship process gives a hint that something needs to change if the goal is university and industry collaboration. Thus the study also invests in the policy making process and points out the fact that there is a need for full-time worker in the position of university supervisor.

**Acknowledgements**

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# DETERMINANTS OF A FAST-GROWING FIRM'S PROFITS: EMPIRICAL EVIDENCE FOR SLOVENIA

**Dijana MOČNIK***
**Karin ŠIREC****

**Abstract**

*This paper seeks to explain the relationship between a firm's profitability and firm size, leverage ratio and labour costs – using a sample of 782 Slovenian fast-growing firms from the years 2008 and 2009. We determined that profitability is negatively related to the firm size and leverage ratio, but positively to the labour costs. These results illustrate that, with increasing firm size, a fast-growing firm becomes less profitable. The negative coefficient for the leverage ratio indicates that the higher the extent to which debts were used as the source of financing, the lower the profits. One explanation for this is that profitable, fast-growing firms rely on their equity capital. Alternatively, higher-leveraged firms bear greater risks of bankruptcy; consequently, creditors are reluctant to approve credit for such clients. The positive association between labour costs and profitability implies that the higher the labour cost, the higher the profitability of fast-growing firms.*

**Keywords:** fast-growing firms, entrepreneurship, profitability, firm size, leverage ratio, labour costs

**JEL classification:** L21, L25

## 1. INTRODUCTION

The purpose of this paper is to specify and test the relationship between profitability, firm size, leverage ratio, labour costs and other structural variables using a data set covering 782 fast-growing firms for the years 2008 and 2009[1]. The primary objective of this paper is to identify which factors are relevant in determining the profitability of a fast-growing firm.

As only profitable firms are important for economic development and the creation of wealth and employment in the long run, we decided to empirically study whether some generally accepted factors hypothesized to impact profitability can also be regarded as critical factors for the profitability of Slovenian fast-growing firms. To date, research has focused predominantly only on partial factors (i.e., firm size only or leverage only) that are relevant for profitability and in addition only for large and public firms or smaller public or

* Faculty of Electrical Engineering and Computer Science, University of Maribor, Slovenia; e-mail: *dijana.mocnik@um.si*.

** Faculty of Economics and Business, University of Maribor, Slovenia; e-mail: *karin.sirec@uni-mb.si*.

private firms in general, but none of them on fast-growing firms. Thus, we assessed simultaneous relationships between the profitability of fast-growing firms from manufacturing with mining and agriculture, construction, trade and services and several possibly relevant additional factors. We adopted this approach for two reasons. First, to date empirical conclusions of observed factors that might relate to profitability are very heterogeneous and done on very different samples so that results are hard to compare. Second, we focus on profits' determinants of fast-growing firms because profits are essential for firms' sustainable existence and development as well as society's progress. Through such an investigative focus, we sought to stress the importance of fast-growing firms' profits in addition to their growing revenues or number of employees or assets.

This paper's fundamental research question is as follows: Is variability in the profitability of the fast-growing firm explained by companies' size, leverage ratio, labour costs, industry, liability legal form, governance structure, firm location and gender of a firm's owner? Liability legal form, governance structure, firm location and gender are control variables added to the model to assure its robustness. Thus, our sample provides a good forum for analysing the impact that a number of firm-level factors have on a fast-growing firm's profitability. To our knowledge, this is the only paper that investigates such simultaneous impacts on firm profitability of small and micro-sized fast-growing enterprises from a variety of industries.

The study reveals that firm size and leverage ratio have a negative and large impact on firm profitability whereas labour costs are positively, although to a smaller extent, related to profitability. We also found that even more detrimental for profitability is a firm's leverage ratio in the services industries, although it is much less for firms with unlimited liability legal form.

In the following sections, we developed the conceptual framework and state the hypotheses to be tested, describe the data and estimating model(s), and present the empirical results. The concluding section discusses our findings.

## 2. PREVIOUS RESEARCH AND HYPOTHESES

Interest in small and medium-sized enterprises (SMEs) has increased significantly over the last two decades. Many researchers have presented evidence in which scarce financial resources are described as a primary cause of SMEs' failure (Jones, 1979; Wucinich, 1979; Gaskill and Van Auken, 1993; Van Auken and Neeley, 1996; Welsch and White, 1981; Coleman, 2000; Smolarski and Kut, 2011). Small businesses' capital structures usually diverge from those of larger companies. Being dependent primarily on private markets, small businesses face limitations in terms of the types of financing they can receive. At the same time, SMEs initially utilise internal sources of capital. Thus, such a combination creates a unique situation in which capital structure decisions are made. It is well known that small firms express different optimal capital structures. The financial sources can be also very diverse at different stages of the company's life-cycle (Berger and Udell, 1995). Scholars from different domains, such as strategic management, accounting, industrial economics, marketing, and finance, have sought to identify the sources of variation of firm-level profitability. Industrial economics argues that any momentary divergence in a firm's profit rate from the market average soon attracts the potential or actual entry and exit or other competitive forces. Consequently, above-average profit cannot be sustained over longer periods of time (Jonsson, 2007; Dogan, 2013). Larger companies possess more

competitive power than SMEs. Because of their bigger market share, they also have more profitable opportunities. Given their richer resource base, they can seize the opportunity in fields requiring high capital rates (Dogan, 2013). Different stakeholders, particularly owners and managers, try to grow their business as successfully as possible within a given industry. The reason lies in the premise that large firms possess many advantages over their smaller competitors. They might benefit from economies of scale and scope as well as from specialization. At the same time, their bargaining power is stronger. Thus, it can be concluded that larger companies must be more profitable than smaller ones. Regarding our hypotheses, we divided further discussion on the theoretical background into three sections, as follows.

### 2.1. Firm size and profitability

Simon (1962) has performed one of the earliest studies investigating the effect of firm size on profitability, but he could not confirm a statistically significant relationship between the investigated variables. Further studies on the relationship between firm size and profitability have returned mixed results. Hall and Weiss (1967), Fiegenbaum and Karnani (1991), Majumdar (1997), Ozgulbas *et al.* (2006), Jonsson (2007), Serrasqueiro and Nunes (2008), Lee (2009), Stierwald (2009) and Saliha and Abdessatar (2011) all found a positive relationship between firm size and profitability whereas others (i.e., Shepherd, 1972; Schneider, 1991; Banchuenvijit, 2012) found a negative relationship between the same two variables, concluding that bigger companies are less profitable. Additional studies have found that firm size does not have an effect on profitability (i.e., Simon, 1962; Whittington, 1980; Becker-Blease *et al.*, 2010). In summary, some studies have found either a weak negative relationship or none at all while others have found a positive association between firm size and profitability. According to these mixed empirical results and the expectation that our investigated firms have strong market growth orientation, meaning that they are oriented towards market growth rather than profits, our first hypothesis is:

*Hypothesis 1:* A fast-growing firm's size and its profitability are negatively related.

### 2.2. Leverage ratio and profitability

Researchers have investigated the role of debt in firms' performance for more than fifty years (e.g., Modigliani and Miller, 1958). However, this role remains a questionable subject which has attracted the attention of many researchers (e.g., Goddard *et al.*, 2005; Berger and Bonaccorsi di Patti, 2006; Rao *et al.*, 2007; Baum *et al.*, 2007a; Weill, 2008; Nunes *et al.*, 2009; Margaritis and Psillaki, 2010; Kebewar and Shah, 2013). Researchers have analysed the leverage ratio (called also debt ratio or debts) to determine whether an optimal leverage ratio exists or not. The optimal leverage ratio is generally defined as the one which minimizes the cost of capital for the company while maximizing the value of the company. In other words, the optimal leverage ratio is the one which maximizes the company's profitability.

Three essential theories highlight the influence of debt on corporate profitability: signalling theory, the agency costs theory and tax theory (Kebewar and Shah, 2013). "First, according to signalling theory, the debt, in the presence of asymmetric information, should be correlated positively to profitability. According to the agency costs theory, debt has two

contradictory effects on profitability: First, it is positive in the case of agency costs of equity between shareholders and managers; second, its effect is negative due to the agency costs of debt between shareholders and lenders. Finally, the influence of taxation is complex and difficult to predict because it depends on the principles of tax deductibility of interest, income tax and non-debt tax shield" (Kebewar and Shah, 2013, p. 2).

In addition, many researchers disagree about the negative relationship between profits and debts. Some authors have assessed debt's negative effect on profitability (e.g., Majumdar and Chhibber, 1999; Eriotis *et al.*, 2002; Goddard *et al.*, 2005; Rao *et al.*, 2007; Zeitun and Tian, 2007; Nunes *et al.*, 2009). On the other hand, Baum *et al.* (2007a), Berger and Bonaccorsi di Patti (2006) and Margaritis and Psillaki (2007) showed a positive influence. In addition, Simerly and LI (2000), Mesquita and Lara (2003) and Weill (2008) found both effects in their studies. Berger and Bonaccorsi di Patti (2006), Margaritis and Psillaki (2007) and Kebewar and Shah (2013) also identified a non-linear effect (inverse U-shaped relationship). Finally, Baum *et al.* (2007b) confirmed an insignificant effect.

These inconsistent results in the empirical studies occur for different reasons. Researchers have investigated the phenomena using different types of samples (i.e., sectors, countries, companies' size as well as periods). Different measures of profitability as a dependent variable (i.e., ROA, ROE, ROI) and various debt ratios as an independent variable (i.e., ratio of total debt to assets, ratio of short-term debt to assets, ratio of long-term debt to assets) have been used. The presented studies also differ in applied methodologies (i.e., OLS, GLS, weighted least squares, fixed effect, random effect model, maximum likelihood, method of simultaneous equations).

We see debt as a risky choice whose consequences on the profitability of firms can be considerable (e.g., the risk of bankruptcy and its consequences for stakeholders as well as lenders' reluctance) and thus propose our second hypothesis:

*Hypothesis 2:* A fast-growing firm's leverage ratio and its profitability are negatively related.

### 2.3. Labour costs and profitability

"Although companies have long been accustomed to using high wages and good working conditions to attract and retain quality professionals, they often overlook incentives for their junior employees. Management's traditional assumption is that employees at the bottom are more readily replaceable or are less valuable to the company's performance, so investing in them is not seen as profitable. However, these often-overlooked workers actually contribute disproportionately to a company's financial and social performance. Investing in them can be an advantage in both good economic times and bad" (Heymann, 2010, p. 4).

The McGill Institute for Health and Social Policy's six-year study, which was published as a book by Heymann (2010), looked at companies in nine countries; these companies ranged in size from 27 to 126,000 employees. The businesses were chosen to represent diversity in terms of geographical location, company size and industrial sector. The study's author went from believing that it was possible for companies to improve working conditions while remaining profitable to realizing that the companies studied had actually increased their profitability by investing in their lower-level employees. The study demonstrated that sustainable high-performing organisations have engaged workforces,

which means that they feel satisfied, love their jobs, work hard and promote the organisation. This impact is largely indirect and occurs by improving retention, customer loyalty, productivity, and safety - all of which impact the healthy firms' bottom line and is reflected in higher investments in workers (labour costs). Taleo Research (2009) revealed that companies with highly engaged employees earned 13% greater total returns for shareholders. The analysis by Harter *et al.* (2002) showed that companies in the top 25% in terms of employee engagement (among those companies studied) produced up to four percentage points more in profitability. In 2009, the authors repeated the study and found that the top 25% increased their profitability by 16% (Harter *et al.*, 2009).

Research by Towers Perrin (2003) indicated that companies with more involved employees are more likely to exceed the industry average in one-year revenue growth. "Specifically, there is a trend showing that highly engaged employees work for organisations that had revenue growth at least one percentage point above the average of their industry, while the organisations of the most disengaged employees work for companies where revenue growth falls one or two percentage points below the average" (Towers Perrin, 2003, p. 20). Yet it needs to be emphasized that different reasons might exist for such an explanation. Namely, better-performing companies often attract more motivated individuals. We decided to include labour costs among profitability determinants of fast-growing firms, using them as an approximation of employees' engagement and consequently intangible assets. Our fast-growing firms have very high revenue growth (such a firm's five-year sales growth rate ranges from 382% to 10,240%). This decision was also based on the study of Scottish high-growth firms which revealed that these firms are characterised by distinct human resource management practices. Their recruitment procedures and subsequent employee empowerment are extensive and reflected in companies' higher performance (Mason and Brown, 2010). This study also revealed that fast-growing firms have quite unique core competences related primarily to the quality of their employees, innovative products and services as well as technical, market and customer knowledge. Therefore, we propose our third hypothesis:

*Hypothesis 3:* A fast-growing firm's labour costs and its profitability are positively related.

### 2.4. Additional profitability factors

As is generally accepted and empirically shown, profitability is a complex phenomenon with numerous determinants (e.g., Hormiga and Bolivar-Cruz, 2014). Thus, we tried to improve the results by incorporating several control variables into our analysis – namely, for industry, liability legal form, governance structure, location and gender of the firm owner.

Industry: Analyses of firm profitability patterns indicate that an industry might have an important effect on firm-growth rates and profitability (Camp *et al.*, 1999; Lumpkin and Dess, 1995; Sexton *et al.*, 2000). Lee and Mahmood (2009, p. 351) studied inter-industry differences in profitability and identified four key factors that jointly influence an industry's price–cost margin: "(i) the intensity of strategic investment (e.g., R&D and advertising), (ii) the skewness of the distribution of market share or market concentration, (iii) the appropriability of strategic investment, and (iv) the extent to which firms' market shares are determined by the intensity of their strategic investment". Meanwhile, Ji and Giannikos

(2010) researched the profitability, seasonality and source of industry momentum. According to Acquaah (2003), industry competition is regarded as a moderator between the effectiveness of corporate management capabilities and the sustainability of a firm's abnormal profitability.

Dawid and Reimann (2005) found that the introduction of a single firm oriented towards market growth rather than profits is sufficient to trigger a severe drop in profits and a transformation towards an industry with strong market growth orientation and a large number of marketed product innovations. Furthermore, they demonstrated that the degree of the horizontal differentiation of product innovations from existing products is of significant importance for the individual incentives to adopt market growth orientation and the effects of such a development on overall industry profits.

Some studies have sought to determine whether a threshold level of concentration exists that separates industries into two regimes in terms of profits (Ratnayake, 1996). The majority of previous studies have found supportive evidence for the hypothesis. Vertical and horizontal integrations can also be an important business strategy among firms, affecting the profitability of the integrated firm. Bhuyan (2002) demonstrated that increased vertical mergers in food industries lower profits. The introduction of a single firm oriented towards market growth rather than profits is sufficient to trigger a severe drop in profits and a transformation towards an industry with strong market growth orientation and a large number of marketed product innovations.

Therefore, based on previous empirical results, we divided our sample into four industry subgroups: (1) manufacturing, mining and agriculture; (2) construction; (3) trade; and (4) services. The construction, trade and services dummy variables were added to the model(s).

Liability legal form: Companies can be active under various legal forms. When investigating productivity and firm size, the most important question remains in terms of whether the legal form offers the owners limited liability or not. Previous studies have shown that firms with limited liability grow faster than firms with unlimited liability based on German (Harhoff *et al.*, 1998) and Swedish data (Davidson *et al.*, 2002). This might lead us to the implication that limited liability firms' owners rather invest in risky ventures that might foster firm growth. Harhoff *et al.* (1998), on the other hand, found that firms with a limited liability are more likely to become insolvent than comparable firms with unlimited liability. In our study, we decided to determine whether firms with the unlimited liability have any significant differences in their profitability compared to the limited ones. Thus, we used a dummy variable for unlimited liability legal form.

Governance structure: Business governance structure has also been suggested to affect firm performance. Joh (2003) argued that independent firms grow faster and have better performance than firms with parent corporate relationships. He associated this argument with the hypothesis that, when governing shareholders' control rights exceed their ownership rights, they have an incentive to expropriate firm resources as their private benefits exceed their costs. He also suggested that expropriation is more likely to occur when the discrepancy between control and ownership is large and when their position is secure. Firms with a greater expropriation of resources more often express under-performance. Joh (2003) also investigated whether these effects are stronger in business groups. Controlling shareholders in business groups can maintain their control with the help of indirect pyramidal ownership (la Porta *et al.*, 2002; Claessens *et al.*, 2000). "These controlling shareholders therefore have greater incentives and means to expropriate firm

resources than their counterparts in independent firms. In addition, firms affiliated with business groups can suffer more, as their controlling shareholders have more tools to divert firm resources through the transfer of assets from one subsidiary to another" (Joh, 2003, p. 288). Davidson *et al.* (2002) studied firm growth, using dummy variables for parent companies, subsidiaries, and independent firms. In a similar fashion, in our base regression model for independent firms, we included two dummy variables: one for a parent and subsidiary and the other for a subsidiary only.

Location: Researchers have utilised the link between location and different measures of performance, including initial public offering (IPO) (Deeds *et al.*, 1997), foreign direct investment survival (Shaver and Flyer, 2000), new venture survival (Saxenian, 1990), innovation (Porter and Stern, 2001; Schoonhoven and Eisenhardt, 1990), new venture growth and profitability (Anitra-Gilbert, 2002; Murphy *et al.*, 1996), the assumption of superior performance achieved by cluster firms and/or network governance (Pouder and St. John, 1996; Jones *et al.*, 1997; Porter, 2000; Shaver and Flyer, 2000), and the geographic sources of innovation (Feldman and Florida, 1994; Porter and Stern, 2001). For the purposes of our study, we divided Slovenia into two regions: the more developed western region and the less developed eastern region. We used the dummy variable for the western region as opposed to the eastern region of the base regression.

Firm owner's gender: Social feminist theory defines the difference between women and men based on their early and on-going socialization (Robb and Watson, 2012). It further emphasises that this does not mean women are inferior to men. Moreover, women and men might develop different but equally effective traits. Previous entrepreneurship studies comparing men and women in terms of socialized traits and values are consistent with a social feminist perspective. They have revealed few consistent gender differences and have suggested that those differences that do exist might have little impact on business performance. "Although women's businesses do not perform as well as men's in terms of measures of size, they show fewer differences in other, arguably more critical business effectiveness measures - namely, growth and productivity - and no differences in returns" (Fischer *et al.*, 1993, p. 153).

Mainstream literature usually concludes that female-owned businesses underperform relative to male-owned businesses (Robb and Watson, 2012). Many previous studies have investigated gender differences in firm performance using different types of metrics, such as sales, firm closure rates, and profits (see, for example, Bosma *et al.*, 2004; Fairlie and Robb, 2009; Fasci and Valdez, 1998; Honig, 1998; Loscocco *et al.*, 1991; Robb, 2002; Rosa *et al.*, 1996). Based on their review of this literature, Klapper and Parker (2011, p. 243) concluded that "women entrepreneurs tend to underperform relative to their male counterparts".

Hsu *et al.* (2013), using data from 1992-2008 small public accounting practices in Taiwan, examined the association between gender variables and firms' profit performance. The findings revealed a significant difference in profit performance between male-owned and female-owned firms included in the sample. The current study aims to clarify the effects of owners' gender on financial performance of businesses, explaining that female owners adopt different management strategies than male owners. Many other studies have compared firms' profit performance according to the firms' owners (i.e., Carter and Cannon, 1992; Loscocco and Leicht, 1993; Chaganti and Parasuraman, 1996; Rosa *et al.*, 1996; Rishe, 1999; Coleman, 2000; Hitt *et al.*, 2001; Watson, 2002; Collins-Dodd *et al.*, 2004; Carter *et al.*, 2007; Inmyxai and Takahashi, 2010). Thus, in our regression model, we included one dummy variable for the female owner of the firm.

## 3. DATA AND MODELS

### 3.1. Data

The empirical study was performed on Slovenia's fastest-growing companies. The dataset of fast-growing companies from around the nation was provided by the newspaper company Dnevnik and collected primarily by the company Bisnode Ltd. More precisely, the newspaper Dnevnik publishes a list of the 500 fastest-growing companies in Slovenia, where firms are ranked by sales growth over a 5-year period in all Standard Industry Classification (SIC) categories. The selected companies must match the following criteria: generating a profit in the balance of last year, with at least 220,500 euros in revenues from sales in the base year; operating all 12 months in both index years; and having a profit in the last year. The dataset is checked and verified by certified public accountants. Unlike small-scale, regional, or survey-based studies, the sample is not only large enough to be representative, but also provides a 5-year longitudinal perspective on companies from around the country.

The statistical population identified for this study (fast-growing gazelle firms in Slovenia) consists of two firms cohorts: firms on The 500 fastest growing gazelles list 2008 (sales growth difference from 2003 to 2007) and firms of the 500 fastest growing gazelles list 2009 (sales growth difference from 2004 to 2008). We used the polled dataset for 2008 and 2009; N = 782. To avoid repeated measures, data was retained only for the last year a firm appeared on the list. Table 1 presents the sample description.

**Table no. 1 – Sample description**

| Variable | Description | Frequency | Percentage |
|---|---|---|---|
| Industry | Manufacturing, mining and agriculture | 165 | 21.1 |
| | Construction | 129 | 16.5 |
| | Trade | 238 | 30.4 |
| | Services | 250 | 32.0 |
| | *Total* | *782* | *100.0* |
| Liability legal form | Limited | 681 | 87.1 |
| | Unlimited | 101 | 12.9 |
| | *Total* | *782* | *100.0* |
| Governance structure | Independent | 695 | 88.9 |
| | Subsidiary | 78 | 10.0 |
| | Parent and subsidiary | 9 | 1.2 |
| | *Total* | *782* | *100.0* |
| Size class regarding number of employees | Micro | 526 | 67.3 |
| | Small | 175 | 22.4 |
| | Medium | 48 | 6.1 |
| | Large | 33 | 4.2 |
| | *Total* | *782* | *100.0* |

*Source: Newspaper company Dnevnik and the company Bisnode Ltd.*

Table 1 shows that more than 60% of firms operate in trade and services and more than one-fifth in manufacturing, mining and agriculture, but only 16.5% in construction. In terms of the legal form, 87% of firms operate as limited liability firms whereas 13% operate as unlimited liability firms. The majority of firms, 89%, are independent entities; in addition,

10% represent subsidiary entities, and 1.2% are both parent and subsidiary entities simultaneously. Furthermore, 67% of fast-growing firms were considered micro in terms of the number of employees, slightly more than one-fifth were small, 6% were medium, and 4% were large.

In 2010, Slovenia had 126,965 firms, of which less than 1% were in agriculture, nearly 14% were in manufacturing (including mining, electricity, and water), 19% were in trade, almost 15% were in construction, and 51% were in other services. Of the total 78 billion euros in revenues generated in 2010, the service sector (trade included) created more than 55%, broad manufacturing 37%, construction almost 8%, and agriculture only 1%. The service sector with trade employed nearly 50% of all employees whereas broad manufacturing employed 38%, construction nearly 12%, and agriculture less than 1%. In 2010, Slovenia's economy employed almost 513,000 people (Rebernik *et al.*, 2012).

### 3.2. The models

We first estimated the relationship between the three independent variables and the dependent variable using model (1):

$$\text{Profitability}_i = a + b_1\,\text{Firm size}_i + b_2\,\text{Leverage ratio}_i + b_3\,\text{Labour costs}_i + e_i \quad (1)$$

where:

profitability is the ratio of the net income to assets;
*a* is a regression constant;
$b_j$ is regression coefficients ($j$ = 1, 2, 3);
firm size is calculated as the logarithm of squared assets;
leverage ratio measures total debts to assets;
labour costs is the ratio of labour costs to employees;
*e* is an error term of the regression*;*
and *i* is the index for the number of cases.

After obtaining the results from model (1), for which $R^2$ was 0.215, we extended the model by incorporating dummy variables for industry: construction, trade and services (with manufacturing, mining and agriculture to be the base regression), unlimited legal form (with limited to be the base regression), parent and subsidiary as well as subsidiary only governance structures (with independent to be the base regression), western region (with eastern region as the base regression), and female owner (with the male owner to be the base regression) to determine whether we could improve the model. All dummy variables amount to 1 if the case (a firm) belongs to a group and 0 otherwise. Only the services and unlimited legal form dummy variables proved to significantly increase the $R^2$, which amounts to 0.314.[2] Thus, in the next step, the model includes three main independent variables, dummies for services and unlimited legal form and interactions between the dummies and main independent variables. Model (2) for estimation reads:

$$\begin{aligned}\text{Profitability}_i = {} & a + b_1\,\text{Firm size}_i + b_2\,\text{Leverage ratio}_i + b_3\,\text{Labour costs}_i + s\,\text{Services}_i + \\ & + u\,\text{Unlimited}_i + sb_1\,\text{Services}_i \times \text{Firm size}_i + sb_2\,\text{Services}_i \times \text{Leverage ratio}_i + \\ & + sb_3\,\text{Services}_i \times \text{Labour costs}_i + ub_1\,\text{Unlimited}_i \times \text{Firm size}_i + ub_2\,\text{Unlimited}_i \times \\ & \times \text{Leverage ratio}_i + ub_3\,\text{Unlimited}_i \times \text{Labour costs}_i + e_i\end{aligned} \quad (2)$$

where:

the description of variables is the same as in model (1)[3];

*s* and *u* are the regression coefficients of the services and unlimited dummies;

and $sb_j$ and $ub_j$ are the regression coefficients of interaction terms between the services and unlimited dummies and centred main independent variables.

## 4. RESULTS

In this section, we analyse the results from model (2).

### 4.1. Descriptive statistics

Table 2 shows descriptive statistics for the key variables. The average profitability in 2008 and 2009 was 7.8%, which means that on average a firm creates €7.8 with its €100 assets. The average value of a firm size in 2008 and 2009 amounted to slightly more than 2 million euros (the value 29.1079 in Table 2 is represented as the natural logarithm of squared assets). We can also see that, on average, leverage ratio (represented by the ratio of the sum of short- and long-term debts to assets) amounts to 71%, which is fairly high indebtedness. The mean value of labour costs amounts to €23,555, which means that in 2008 and 2009 on average, an employee caused such an amount of labour costs. Dummy variables and interaction terms are excluded from Table 2. The calculations were made based on 774 cases (firms).

**Table no. 2 – Descriptive statistics of Slovenian fast-growing firms**

| Variable | Mean | Std. Deviation | N |
|---|---|---|---|
| Profitability | 7.7622 | 9.73209 | 774 |
| Firm size | 29.1079 | 2.44984 | 774 |
| Leverage ratio | 0.7130 | 0.20951 | 774 |
| Labour costs | 23,555 | 12,359 | 774 |

### 4.2. Regression results

The estimation of regression coefficients was conducted using a stepwise OLS with SPSS 19.0. Table 3 presents the results of the regression analysis. As Table 3 indicates, three main independent variables and two interaction terms are significantly related to firm profitability after the five steps of the stepwise regression and explain 32.8% of the variability of the dependent variable. In the model, no problem of collinearity exists as Table 3 indicates that all VIF factors are much smaller than 10 (Gujarati, 2004) and the condition index is 2.200[4]. In addition, no problem of autocorrelation emerges, as shown by the Durbin-Watson (DW) statistic in Table 3. For the robustness of the model we also verified if the chosen model might suffer from an endogeneity problem or specification error, such as the omission of an essential variable or an inappropriate functional form. The examination was conducted in three ways. First, we visually tested the model's residuals plot (Gujarati, 2004)and determined that the residuals did not exhibit any observable patterns. Second, we used the DW test to detect any specification error. The estimated DW test was not significant, which means that we can reject the hypothesis of incorrect specification of the model (Gujarati, 2004)[5]. Third, we calculated Ramsey's test, which is a general test of specification

error, referred to as a regression specification error test (RESET) (Gujarati, 2004, p. 521). This test also confirmed the absence of specification error.

We found a statistically significant and negative coefficient for firm size ($b_1$ = -0.447; $p$ = 0.000) and a negative coefficient for leverage ratio ($b_2$ = -21.873; $p$ = 0.000). The coefficient for labour costs is positive ($b_3$ = 5.481E-5; $p$ = 0.026). The coefficient of the interaction between the services dummy and leverage ratio is statistically negative ($sb_2$ = -13.343; $p$ = 0.000), and the interaction between the unlimited dummy and leverage ratio is significantly positive ($ub_2$ = 16.087, $p$ = 0.000). Most (27.9%) of the variability in profitability is explained by the leverage ratio (for firms in services or unlimited firms, this figure amounts to 29.9%), whereas firm size explains only 0.9% of the variability and labour costs 0.4% (see Table 3, $R^2$ change). To be able to see the relative importance of independent variables, we must look at standardized partial regression coefficients (beta coefficients). The greatest impact on profitability stemmed from the leverage ratio. The beta coefficient of $b_2$ is –0.471, which means that the increase of the centred leverage ratio for one standard deviation (=0.20951) decreases the profitability by 0.471 of a standard deviation of profitability (=9.73209). The second greatest impact is from the interaction between the services dummy and leverage ratio ($sb_2$ beta = -0.164). Next in terms of impact is the interaction between unlimited dummy and leverage ratio ($ub_2$ beta = 0.142), followed by the firm size ($b_1$ beta = -0.112) and labour costs ($b_3$ beta = 0.070).

We confirmed our first research hypothesis (H1), which states that a fast-growing firm's size is negatively related to its profitability. Our result concurs with the findings of a negative association between firm size and the profitability of some previous research (i.e., Shepherd, 1972; Becker-Blease *et al.*, 2010; Banchuenvijit, 2012). Our negative association between profitability and firm size can be explained based on Markman and Gartner (2002) assumption that the growth of a firm is a measure of firm performance that is generally based on the belief that growth is a precursor to the attainment of sustainable competitive advantages and profitability. Thus, Slovene fast-growing firms have not yet arrived to the point where their businesses become profitable. The negative and significant parameter estimate for firm size illustrates that Slovene smaller fast-growing firms are less profitable than larger firms. This finding can be an indicator that smaller firms, unlike larger ones, do not exploit scale economies and benefit from economies of scope. An alternative interpretation is that smaller firms can access capital at higher costs than larger firms, which aggravates their investment and, consequently, their size.

The negative relationship between profitability and firm size also concurs with the structure–conduct–performance model, which postulates that the degree of concentration in an industry determines firm behaviour and profitability. A higher concentration enables collusion between firms, which can lead to higher profits. As our sample consists mostly of SMEs and collusion is hardly possible, differences in firms' profitability might be assigned to the efficiency level, organizational structure, and quality of management (Stierwald, 2009), which can be implied with the firm size variable.

We confirmed our second research hypothesis (H2), which states that a fast-growing firm's leverage ratio is negatively related to its profitability. The coefficient for leverage ratio is significantly below zero. The value of this coefficient for services firms should be decreased for another -13.343 (this is the value of the $sb_2$ regression coefficient in Table 3) and unexpectedly increased by 16.087 for all unlimited firms ($ub_2$ coefficient in Table 3). This might mean that, the higher the debts as the source of financing, the lower the profits. Another explanation can be that profitable fast-growing firms rely less on debt because they

have not had easy access to debt financing. Alternatively, higher leveraged firms bear greater risks of bankruptcy; consequently, creditors are reluctant to approve credit for such clients (Stierwald, 2009). The positive coefficient of the unlimited dummy reveals that the services of fast-growing firms, for which the repayments of debts are secured by the personal assets of the principal parties, have somewhat easier access to borrowed money than limited ones. We expected a negative association with profitability based on the results of Almus and Nerlinger (1999) study, which showed that firms with limited liability grow faster than those with unlimited liability. However, the positive coefficient of the unlimited dummy concurs with the result of Harhoff *et al.* (1998) study, which found that firms with a limited liability are more likely to become insolvent (i.e., encounter more difficulty in borrowing money to solve their liquidity) than comparable firms with full (unlimited) liability. Generally, our result is in accordance with the previous results that also found a negative relationship between leverage ratio and profitability (i.e., Majumdar and Chhibber, 1999; Eriotis *et al.*, 2002; Goddard *et al.*, 2005; Rao *et al.*, 2007; Zeitun and Tian, 2007; Nunes *et al.*, 2009).

Finally, we confirmed our third research hypothesis (H3), which argues that a fast-growing firm's labour costs are positively related to its profitability. Our result showing a positive relationship between worker engagement (i.e. labour costs) and profitability is in accordance with the results of Harter *et al.* (2002) studies as well as with Gberevbie (2012) who estimated a strong relationship between human resource development and firm performance.

**Table no. 3 – Multiple least square dummy variable regression**

*Dependent variable: Profitability (Net income to assets in %); Method of estimation: Stepwise OLS*

| | **Step 1** | **Step 2** | **Step 3** | **Step 4** | **Step 5** |
|---|---|---|---|---|---|
| a | 7.748** | 7.700** | 7.774** | 7.777** | 7.777** |
| Constant | (26.063) | (26.246) | (26.824) | (26.992) | (27.061) |
| $b_2$ | -24.526** | -19.894** | -22.857** | -22.360** | -21.873** |
| Leverage ratio[a] | (-17.274) | (-11.657) | (-12.729) | (-12.476) | (-12.145) |
| VIF | 1.000 | 1.485 | 1.690 | 1.703 | 1.729 |
| $sb_2$ | | -14.191** | -14.138** | -14.019** | -13.343** |
| Services × Leverage ratio[a] | | (-4.749) | (-4.797) | (-4.783) | (-4.540) |
| VIF | | 1.485 | 1.485 | 1.485 | 1.501 |
| $ub_2$ | | | 17.534** | 16.998** | 16.087** |
| Unlimited × Leverage ratio[a] | | | (4.739) | (4.616) | (4.353) |
| VIF | | | 1.202 | 1.205 | 1.220 |
| $b_1$ | | | | -0.372** | -0.447** |
| Firm size[b] | | | | (-3.151) | (-3.647) |
| VIF | | | | 1.013 | 1.094 |
| $b_3$ | | | | | 5.481E-5* |
| Labour costs[c] | | | | | (2.227) |
| VIF | | | | | 1.123 |
| $R^2$ | 0.279 | 0.299 | 0.319 | 0.328 | 0.332 |
| $R^2$ Change | 0.279** | 0.020** | 0.020** | 0.009** | 0.004* |
| $R^2$ Adjusted | 0.278 | 0.297 | 0.316 | 0.324 | 0.328 |
| Number of cases | 774 | 774 | 774 | 774 | 774 |
| F | 298.40** | 164.64** | 120.30** | 93.76** | 76.38** |
| DW[d] | | | | | 2.038 |

*Note*: Main independent variables are centred: [a] the share of debts to assets minus mean (mean=-0.0006); [b] value of natural logarithm of assets squared minus mean (mean=0.0142); [c] value of labour costs per employee minus mean (mean=0.0000); [d] *DW*–Durbin Watson; we can accept the hypothesis of no positive or negative autocorrelation in the model. In parentheses are *t*-values. * significant at the 0.05 level; ** significant at the 0.01 level. As no *VIF* factor is higher than 1.729 and Condition Index amounts to 2.200, we can accept the proposition of no multicollinearity in the model.

## 5. CONCLUSIONS

In the paper, we presented the results of our empirical research in which we tested the relationships among the profitability of Slovenian fast-growing businesses. The estimation was made using a stepwise regression on the pooled sample of 782 firms from Slovenia in the years 2008 and 2009. We assessed simultaneous relationships among the profitability of fast-growing businesses. Our main research question was: Can profitability of fast-growing businesses be explained by businesses' size according to their asset value, their leverage ratio and labour costs? We were also interested in determining whether the estimated relationships of the stated determinants change when other possibly relevant factors are added to the model. We added industry (manufacturing with mining and agriculture, construction, trade and services), the business's liability legal form (limited or unlimited liability of the firm), its governance structure (parent company, subsidiary or independent unit), firm location (more developed western or less developed eastern part of Slovenia) and gender (male or female) of the firm's owner. With the inclusion of these control variables, we ensured the robustness of the regression model.

The results showed a negative association between a firm's size and its leverage ratio and profitability. The impact of labour costs on profitability proved to be positive.

We confirmed our first research hypothesis (H1), which states that a fast-growing firm's size is negatively related to its profitability. Our assumption was that the growth of a firm can be considered as one of the firm's performance measures. It is generally assumed that, to become an established large company with a sustained and profitable business, a firm should be growing steadily. Thus, fast-growing Slovene firms have not yet arrived at this point of profitable business. The negative and significant parameter estimate for firm size indicates that smaller fast-growing Slovene firms are less profitable than larger firms.

The results showed that the greatest impact on profitability is the leverage ratio. The coefficient for the leverage ratio is negative and significant, which confirms our second research hypothesis (H2) regarding the negative relationship between profitability and the leverage ratio. The leverage ratio's coefficient for service firms has an even larger negative value. This might mean that, the higher the indebtedness of a firm, the lower the profits. Another explanation can be that profitable fast-growing firms rely less on debt and use their own finances. Alternatively, higher leveraged firms use fewer debts for financing because creditors are reluctant to approve credit for clients considered to be riskier (Stierwald, 2009). The positive coefficient of the interaction term between the unlimited dummy and leverage ratio reveals that fast-growing businesses that secure their repayments of debts using personal assets borrow money somewhat easier than businesses with the limited liability legal form.

Finally, we confirmed our third research hypothesis (H3), which argues that a fast-growing firm's labour costs are positively related to its profitability which might exhibit that the better payment of labour affects leads to motivated and satisfied employees and might also be related to more educated employees.

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[1] In the sample, 282 firms were examined for 2008 and 500 firms for 2009.

[2] The increase of $R^2$ is significant. *F restricted* (df num = 8, df denum = 762) amounts to 30.03, whereas *F tabulated* (8, 500) at $p = 0.01$ is 2.55 and at (8, 1000) is 2.53.

[3] Because of the interaction terms we centred (deducting the variable mean from the variable value) main independent variables to avoid multicollinearity.

[4] The condition index is not included in tables but can be provided by the authors, upon request.

[5] DW statistic amounts to 0.014649, whereas $d_L = 1.85031$ and $d_U = 1.90982$ (n = 750, k=12, p=0.05). At the 1% significance level, $d_L=1.80085$ and $d_U=1.86022$.

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# GENERATING INVESTMENT STRATEGIES USING MULTIOBJECTIVE GENETIC PROGRAMMING AND INTERNET TERM POPULARITY DATA

**Martin JAKUBÉCI***

**Abstract**

*Searching for stock picking strategies can be modelled as a multiobjective optimization problem. The objectives are mostly the profit and risk. Because of the conflicting nature of these objectives, we have to find Pareto optimal solutions. Multiobjective genetic programming (MOGP) can be used to find tree based solutions, using evolutionary operators. The advantage is that this algorithm can combine any number of inputs and generate complex models. Recent research shows, that the popularity of different terms on the internet can be used to enhance the models. This paper deals with a SPEA2 MOGP implementation, which uses Google trends and Wikipedia popularity to find stock investment strategies.*

**Keywords:** genetic programming, Google trends, stock

**JEL classification:** G11

## 1. INTRODUCTION

Financial markets are complex systems, which consist of many interacting entities. That's why they are hard to predict. Investors are trying to create portfolios of assets to achieve high profit and minimize the risk. Low prices of hardware and data availability caused high interest in computer modelling in the area of investing. Popular group of algorithms, that are used for modelling are the evolutionary algorithms. One of them is genetic programming, which uses operators inspired by the evolution theory to generate tree programs. These programs can represent stock picking strategies.

## 2. RELATED RESEARCH

There is a lot of research in the area of stock picking using multiobjective genetic programming, for example (Allen and Karjalainen, 1999, p. 21; Lohpetch and Corne, 2011; Skolpadungket *et al.*, 2007; Bradshaw *et al.*, 2009; Hassan, 2010 and Chen *et al.*, 2014). But there is no consensus on whether the algorithm is able to outperform the market and secure high revenues (Chen and Navet, 2007, p. 1; Potvin *et al.*, 2004, p. 14).

* Department of Information Systems, Faculty of Management, Comenius University in Bratislava, Slovak Republic; e-mail: *martin.jakubeci@gmail.com.*

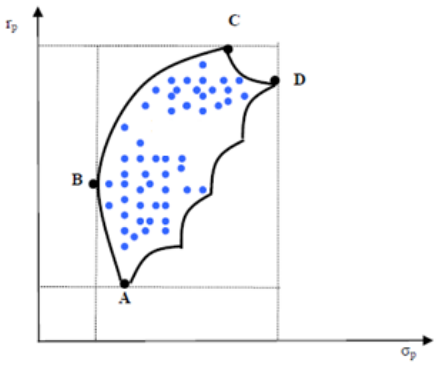
Internet term popularity in the financial area is researched only recently. Most of the research always concentrated on historical prices and different technical and fundamental indicators. Big interest was caused by the article dealing with market index changes caused by Google trends changes of different terms (Preis *et al.*, 2013). Similar research was done with page views on Wikipedia (Moat *et al.*, 2013), terms in Facebook statuses (Karabulut, 2013) and Twitter posts (Ruiz *et al.*, 2012). None of this research used evolutionary algorithms.

## 3. FINANCIAL MARKETS

There are multiple models and strategies. Efficient market hypothesis believes, that financial markets are effective and every information is immediately absorbed. The price of the asset reflects all information and is equal to the real value (Beechey *et al.*, 2000, p. 2). Changes in price are random fluctuations around this value and can be described as a random walk (Alexander, 2008, p. 134).

When investing, there is always some risk. Modern investment strategies are based on diversification, investing in multiple assets (Bohdalová and Greguš, 2011, p. 2). This was formalized by Harry Markowitz as multiobjective problem, where the objectives are revenue maximization and risk minimization. Investment strategy is a rule, which specifies investor's position on every asset in time *t*. The position is chosen based on the available information, without the knowledge of the future (Bohdalová and Greguš, 2012, p. 21).

Risk and revenue values are assigned to every portfolio, this can be seen on Figure 1. Blue dots are the available portfolios and portfolios on the line between B and C are the optimal strategies, or Pareto optimal solutions. This means that value of none of the objectives can be increased without sacrificing value of a different objective. That means, that they are Pareto dominant over other solutions and build the Pareto front (Hassan, 2010, p. 10).




*Source: Toman (2008, p. 18)*

**Figure no. 1 – Portfolio revenue and risk**

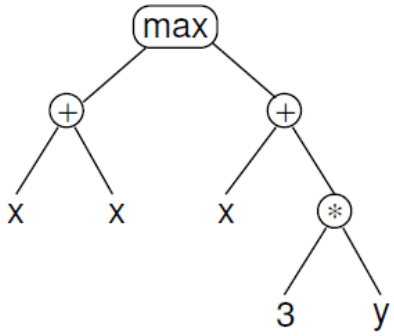
Investors opposing the efficient market hypothesis believe, that the market can be outperformed and high returns can be achieved. Many strategies are based on the fundamental analysis. Its main idea is that real value of a stock and its price on the market can differ and it should be invested into undervalued companies. Finding the real value is not an easy task, it requires analysis of financial and other data (Thomsett, 2006, p. 2).

Other group of strategies is based on the technical analysis. The future prices are predicted from the historical prices. It is based on three principles. The first one is that the price reflects everything, the second one is that prices move in trends and the last one is that history repeats (Chovancová, 2006, p. 315).

## 4. GENETIC PROGRAMMING

Genetic programming is an evolutionary optimization algorithm, which is searching for problem solutions. Solution is a program represented by a tree structure. First generation of solutions is created randomly. Every next generation is created by stochastic transformation of the previous generation. Transformation is done by applying operators, which are inspired by the evolution theory. These operators are mostly selection, mutation and crossover. Every next generation is expected to be better, the quality of the solutions is evaluated by the fitness function (Poli *et al.*, 2008, p. 2).

The most frequently used representation of a solution is a syntactic tree. The solution is in fact a program, which can be split into commands, organized as a tree. Example of such tree can be seen on Figure 2. Programs can be represented also in the prefix form, which is known from the functional programming. max(x+x,x+3*y) is written as (max (+ x x) (+ x (* 3 y))). The relation between commands and subcommands is more obvious in the prefix form.




*Source: Poli et al. (2008, p. 10)*

**Figure no.2 – Tree based representation of a max(x+x,x+3*y) program**

The tree based solutions are formed from 2 different sets of vertices. The first group are terminal symbols, for example inputs, contents or any method calls, which do not accept any parameters. Those are leafs of the tree structure. The second set are nonterminals, or methods, that accept parameters. For example arithmetic operators, logical operators, conditions etc. They are expected to be type and run safe, so that the solutions can be executed to transform inputs to outputs. The first vertex in the tree is called root and the depth of every vertex is defined as the distance from the root.

First step during the run of the genetic programming is the initialization of the population (the set of the solutions). This done by creating random solutions. Two common methods are the full method, where every leaf has the same depth, equal to the maximum depth specified for the solutions. The other method is the rising method, where terminals and nonterminals are applied randomly and the depths are different, but never more than the

maximum depth. Maximum depth is important to avoid very large trees, which are too time consuming.

The other generations are created by applying genetic operators. Part of the new generation is created by copying best solutions from the previous generation. The other operator is the mutation, where a random subtree or leaf is replaced by a random subtree or leaf. Crossover is similar, but two solutions exchange their random subtrees or leafs (Poli *et al.*, 2008, pp. 9-27).

As already mentioned, the quality of the solution is evaluated by the fitness function. Solution is filled with inputs, executed and the output is evaluated. When dealing with multiobjective optimization, there are multiple fitness functions required, one for every objective. There are many algorithms to handle multiple objectives in evolutionary algorithms. SPEA2 was chosen, because it overcomes some issues in other algorithms. It's based on elitism, Pareto dominant solutions are kept in a separate archive with fixed size (Hassan, 2010, p. 20). The algorithm works this way (Zitzler *et al.*, 2001, p. 5):

Input: *N (population size)*
*M(archive size)*
*T (maximum number of generations)*
Output: ***A*** *(non-dominated set)*

Step 1: ***Initialization****: Generate an initial population and create the empty archive (external set);. Set t* = 0.
Step 2: ***Fitness assignment****: Calculate fitness values of individuals in population and archive.*
Step 3: ***Environmental selection****: Copy all non-dominated individuals in population and archive to the new archive. If size of the new archive exceeds M then reduce new archive by means of the truncation operator, otherwise if size of new archive is less than N then fill new archive with dominated individuals in population and archive.*
Step 4: ***Termination****: If t >=T or another stopping criterion is satisfied then set* ***A*** *to the set of decision vectors represented by the non-dominated individuals in the archive. Stop.*
Step 5: ***Mating selection****: Perform binary tournament selection with replacement on the new archive in order to fill the mating pool.*
Step 6: ***Variation****: Apply recombination and mutation operators to the mating pool and set new population to the resulting population. Increment generation counter (t =t + 1) and go to Step 2.*

## 5. GOAL

Goal of this research is to implement a multi-objective genetic programming algorithm, which uses internet term popularity data to find investment strategies. These strategies are then compared with the buy and hold strategy.

## 6. METHODS

The algorithm is searching for portfolio creating strategies, which return a stock ranking based on the inputs. The strategy is evaluated every day for the specified training period. When the ranking is in the bottom third and the stock is in portfolio, it is sold. If it is in the upper third, it is bought. The average yearly revenue percentage and standard deviation of revenues is evaluated in the training data. These two values are calculated by the two fitness methods. Training was done on data in the years 2010-2013. Starting capital is 100000 USD and the stocks in the portfolio are chosen every day in training period. Maximum tree depth was set to 10. Google popularity was used for the name of the company and Wikipedia popularity of the article about the company that is represented by the evaluated stock.

Data for the 30 Dow Jones Industrial Index companies was used. During evaluation, this data is available for the strategy:

- the list of opening, closing, lowest and highest daily price in the last 50 days,
- opening, closing, lowest and highest daily price on the last day,
- Google popularity of company name in the last 50 days,
- Google popularity of company name on the last day,
- Wikipedia company page popularity in the last 50 days,
- Wikipedia company page popularity on the last day.

Historical prices were downloaded from Yahoo Finance, Google term popularity from Google Trends and Wikipedia article popularity from Wikipedia article traffic statistics. These functions (non-terminals) were used:

- arithmetic operations: addition, subtraction, multiplication, division, negation and exponentiation,
- logical operations: conjunction, disjunction, negation,
- equality: higher, lower, equal, or any combination
- trigonometric operations: sine, cosine,
- condition,
- list operations: lag, moving average.

Implementation was done in the C# language using expression trees. They allow working with an algorithm as a data structure, so modifications of the solutions and application of the evolutionary operators is possible. The Metalinq (2014) library was used, to simplify these modifications.

We used rate of return to compare genetic programming, which is calculated as the difference between the portfolio value at end and portfolio value at the beginning, divided by the portfolio value at the beginning.

## 7. RESULTS

Distribution of the strategies can be seen on Figure 3, revenue is on the y axis and standard deviation on the x axis. The Pareto front can be seen in the upper left area.

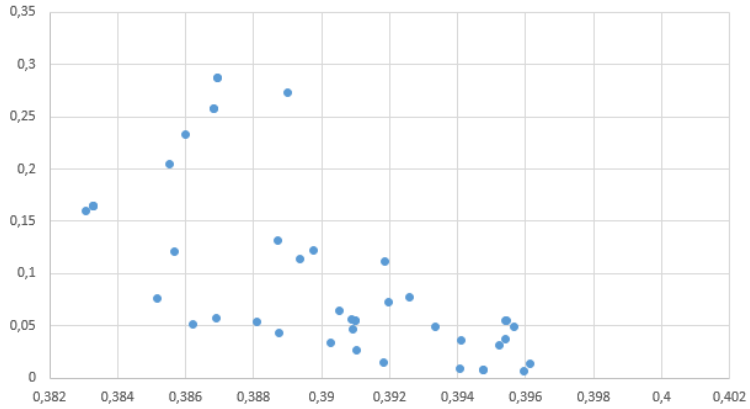



**Figure no.3 – Portfolio revenue and deviation**

Sample investment strategy looks like this:

```
((lastOpen + -Invoke((l, c) =>l.Skip(c).FirstOrDefault(), open, 5)) * (((IIF((lastWiki>= lastOpen), (Invoke((l, c) =>l.Skip(c).FirstOrDefault(), close, 1) / lastGoogle), Invoke((l, c) =>l.Skip(c).FirstOrDefault(), wiki, 42)) / Invoke((l, c) =>l.Skip(c).FirstOrDefault(), high, 22)) + (Invoke((l, c) =>l.Skip(c).FirstOrDefault(), Invoke((list, period) =>list.Skip((period - 1)).Select((item, index) => (list.Skip(index).Take(period).Sum() / Convert(period))).ToList(), Invoke((list, period) =>list.Skip((period - 1)).Select((item, index) => (list.Skip(index).Take(period).Sum() / Convert(period))).ToList(), google, 5), 5), 5) ^ Invoke((l, c) =>l.Skip(c).FirstOrDefault(), open, 46))) ^ (Invoke((l, c) =>l.Skip(c).FirstOrDefault(), high, 22) / IIF(((lastClose<lastVolume) And (lastOpen>= 0,16)), Invoke((l, c) =>l.Skip(c).FirstOrDefault(), Invoke((list, period) =>list.Skip((period - 1)).Select((item, index) => (list.Skip(index).Take(period).Sum() / Convert(period))).ToList(), Invoke((list, period) =>list.Skip((period - 1)).Select((item, index) => (list.Skip(index).Take(period).Sum() / Convert(period))).ToList(), google, 40), 13), 39), (Invoke((l, c) =>l.Skip(c).FirstOrDefault(), open, 1) * Invoke(l => Cos(l), lastClose))))))
```

The method *(list, period) =>list.Skip(period - 1).Select((item, index) =>list.Skip(index).Take(period).Sum() / period).ToList()* is a moving average on the *list* with the time window of size *period*. The method (l, c) =>l. Skip(c).First Or Default() is the lag of the list*l*of size *c*.

It can be seen that the strategy is quite complicated and it represents a nonlinear model with many variables and functions. Google and Wikipedia data is present on multiple places.

Revenues from this strategy are compared to the market index on Figure 4 (training set 2010-2013) and on Figure 5 (evaluation set 2014).

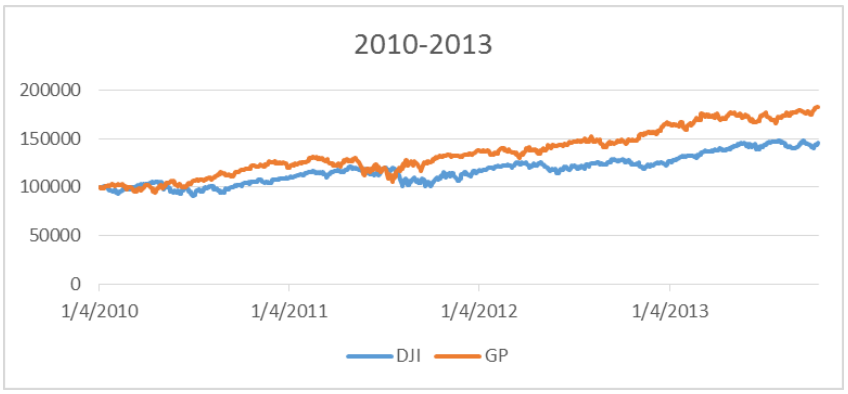



**Figure no.4 – Value of the portfolios on the training data**

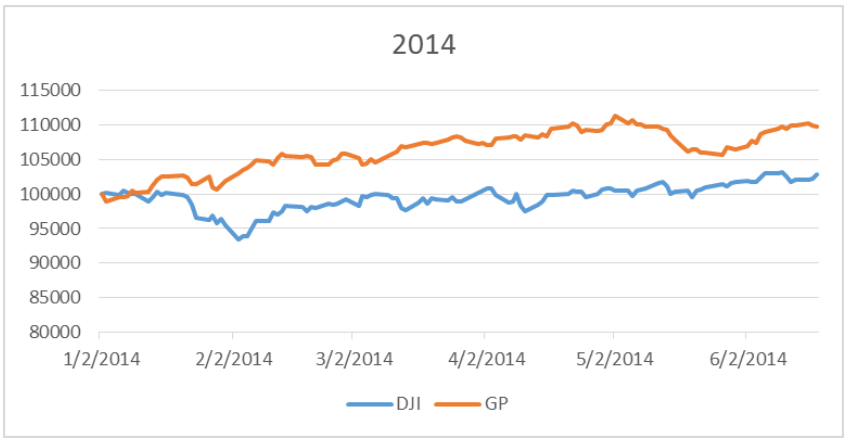



**Figure no. 5 – Value of the portfolios outside of the training data**

It can be seen, that the genetic programming trained strategy outperforms the market. Genetic programming is better in almost whole period, with some small temporary exceptions.

## 8. CONCLUSION

This paper dealt with generating investment strategies using genetic programming. Data about historical prices and internet term popularity data from Google and Wikipedia was used as input. The implementation was compared with the buy and hold strategy on the DJI index.

It was shown that the implementation is able to outperform the market index, even outside of the training data. To compare the performance, rate of return was used. This has proven the usability of this implementation and further research should be done.

In future, this implementation should be compared with other investment strategies and also on more periods.

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# INNOVATION SPACE OF THE BUSINESS MODELS

**Richard BEDNAR***
**Štefan SLÁVIK****

**Abstract**

*The business model is a conceptual image of the operational part of the company. Methods of visualization are used for its formal description. The actual models are arranged into a typological concept that creates the prerequisites for the evaluation and examination of their potential for innovation. The innovation space of the business models has been studied based on an extensive sample of enterprises. The nature of the innovations of the business models, the limits of their innovation space and the tendencies of the development of the innovation space has been identified.*

**Keywords:** business model, the visualization of the business model, the typology of the business models, innovation space of business models

**JEL classification:** M10, M21

## 1. INTRODUCTION

The business model is a conceptual and economical idea of the operations of the business and how it makes money. It is a simplified, but still a reasonable image of the company that describes the resources and processes, their transformation into the customer value and the methods of acquiring a part of the created value. According to Joan Magretta (2002) the business model is a story in its deepest essence that explains how the business works. A good business model according to his vision answers the age-old questions of the entrepreneur: Who is the customer? What does the customer consider to be valuable and useful? How is money in that business made? What is the economic logic that explains how to bring value (benefits) to customers at a reasonable cost? John Mullins and Randy Komisar (2010, p. 19) approach this subject explicitly from the position of the corporate economy and the idea of achieving earnings, who under the expression of business model see a certain structure of economic activity – cash flowing in and out of the business for various purposes, which sets whether the money is lost or made and the ability to offer attractive returns to investors. In brief, the business model is an economical underpinning of the company in all its aspects. Mark Johnson, Clayton Christensen and Henning Kagerman

* Faculty of Business Management, University of Economics in Bratislava, Slovakia; e-mail: *richardpapa@gmail.com.*
** Faculty of Business Management, University of Economics in Bratislava, Slovakia; e-mail: *stefan.slavik@euba.sk.*

(2008) do not try to define the business model explicitly, but they opinion is, that every successful business operates according to an effective business model. If the main parts of it are systematically identified than the top managers can understand how the model solves the satisfaction of the needs on the profit base while the key resources and key processes are used. With this understanding, they can assess whether the original model can be used to satisfy a radically different set of needs and what would they need to build a new model in order to make money on new opportunities.

Drivers of the growing interest in business models were mainly composed of the emergence of the knowledge economy, the expansion of internet and electronic commerce, outsourcing and offshoring of many business activities and the global restructuring of financial services. The way companies make money nowadays is different than the one used in the industrial era, where the main importance lay on the volume of production and the creation of the value was relatively simple. The company simply put their technology and their intellectual property into the product that was later sold as a single item or as a part of a whole complex. The main contributors to the evolution of this idea are driving forces such as globalization, deregulation and technological progress that profoundly interfere with the rules and practices of competition. Companies that grow the quickest in the rapidly changing environment are those that used their structural changes for the innovation of their business models, so they can compete in different ways.

Innovation of business models is usually enforced by the impact of the external changes, when the company is unable to offer the right value for the customer and so it can not make money, or the different offer of value for the customer is sufficiently attractive, but the expensive or less functional set of resources and processes does not allow the company to achieve a sufficient portion of the produced value. Proactive and anticipatory approach to the improvement of the functionality of the business model creates a strategic importance, as the model itself can become a source of the competitive advantage of the company. Recognizing the methods of business model development and its innovational opportunities for its improvement is an important contribution not only for the academic knowledge, but it also contains strong practical implications for a successful business.

## 2. DESCRIPTION OF THE BUSINESS MODELS

A functional and visual view of the business model is a good tool for a better understanding of how the business goes it can also be used as a tool to define its main purpose and the conditions for its existence. It is a transparent scheme, which can show the essential parts of the enterprise on a small space. Business models also allow for the enterprises to understand their weak areas, those with poor efficiency and economy while allowing to look for the exceptional elements and links. Visualization can be used for innovation, experimentation, stimulation of creativity and creation of hypothesis and variants of the business models.

From the conceptual point of view we can distinguish roughly three types of models. The first types are models that describe mostly the economical side of the business. They examine how and where profit is made, the most know representative of this type is the model by Mullins and Komisar (2010, p. 19). Business economy in a broader approach with overlap into business processes is the main idea of the second type of models by Afuah (2004, p. 2) (more processes) and Watson (2005, pp. 2-74) (less processes). Models of the second type are giving their priority towards the customer and they are represented by

Johnson, Christensen and Kagermann (2008) as well as Demil and Lecqo (2010), Zott and Amit (2010), Yunus, Moingeon and Lehmann-Ortega (2010), not forgetting the concept by Magretta (2002). The value-based part of the business is joined by the economy of the businesses and the business processes. The model by Osterwalder and Pigneur (2009, pp. 15-44) has a separate status, which combines the economy-value-process based view to a considerable extent. The value-based view cannot be omitted, or its position weakened, otherwise it cannot be understood how the customers buy the product, what are their motives and what do they appreciate about the product.

Alexander Osterwalder and Yves Pigneur (2009, pp. 15-44) together with other colleagues created a more complex concept of business model (pic. 1) called Canvas. The core of this type of business model are the customers, offered value, infrastructure and financial viability. This is the most complex model (Slávik, 2011) from the mentioned above. This model captures the economical view of the business through the streams of income and expenditure, records the areas where costs are created and revenues made. It also describes the value the business creates for the customer. However, the model does not only serve the purpose of describing the business but is also an instrument for its innovation. The method used allows effectively exploring specific businesses, defining specific business models and can be the base for the more general typologies for real business models. The main parts of the model are shown in Table 1.

**Table no. 1 – Business model Canvas**

<table>
<tr><td rowspan="2">Key partners</td><td>Key activities</td><td rowspan="2">Value propositions</td><td>Customer relationships</td><td rowspan="2">Customer segments</td></tr>
<tr><td>Key resources</td><td>Channels</td></tr>
<tr><td colspan="3">Cost structure</td><td colspan="2">Revenue streams</td></tr>
</table>

1. **Customer segments** identify the most important customers, to make it clear whom the value is created. Customers are distinguished by their position of the market, either mass or segmented or specialized, or they are on diversified and multilateral markets.

2. **Value propositions** defines the customers needs and problems, the degree of their satisfaction, it takes the form of products and services for the different segments of customers.

3. **Channels** define how the business communicates with the segments and how it creates added value. It also evaluates their functionality, costs, and mutual integration with the customer.

4. **Customer relationships** show when compared to channels, the direct relationship between the business and the customer, that occurs in the sales process, e.g. personal assistance or self-service, e.g. in co-creation of the product by using the user community.

5. **Revenue streams** describe what value the customers are ready to buy, what they really pay for, how they pay for it and how each stream contributes to total sales.

6. **Key resources** are the most important resources that the model couldn't work without. Resources allow the business to create and offer value, infiltrate the market, maintain relationships and generate revenue.

7. **Key activities** are activities that transform the key resources in to value for the customer. For Microsoft and Apple it is development of software, for Dell its supply chain management and for McKinsey consulting it is problem solving.

8. **Key partners** are mostly the main suppliers or a network of suppliers. This part of the model defines the key resources and activities delivered by the partners.

9. **Cost structure** records the most important and biggest costs in the business model. It identifies the most costly key resources and key activities.

Osterwalder and Pigneur offer a visualization concept that is sufficiently practical with broad, but not limitless range of business activities which is quite often a proven tool for business analysis and analysis of business models. It will be used in this article primarily as a conceptual and analytical tool, so in the economical-process-value view of the business it will focus mainly on the processes and values.

## 3. REAL BUSINESS MODELS TYPOLOGY

Imagining methods and real models are not identical. Imagining methods display the same models in different ways. Imagining methods are generic, they do not replace a real model, as this is specific and thereby it can be unique and original. Typology of real business models allows for clear grouping of a large number of different models into smaller sets based on specific characteristics that are dominant for them. This typology will clarify and organize similar and different models and thus provide orientation in the complex set of models, it will generalize the perception of models and explain their different functionality in different groups. Classification of business models into groups and subgroups can also be the starting point for their innovation or formation of entirely new models.

A multilevel typology describes the business models that reflect the essence of the business and enterprise from its primary product (raw material) to the delivery of the final product or personal service to the end customer. This typology follows the line of the vertical integration with relatively closed models in different sectors of mining and quarry of raw materials, production, trade, and services.

The structure of the model will be determined by the extent of the vertical integration, which is restricted by the partial integration and full integration. The essence of the model aimed at mining and quarry of raw materials is to find the right way to extract the raw material, adjust it to the required purity, concentration and shape. The business model in production is aimed at the decision making whether to buy or produce the relevant part of the product, resp. decision on the extent of outsourcing or insourcing. In the sector of sales the business model deals with method of sales and delivery of the final product with the possibility of modifying its size, weight and packaging for the next retailer or end user. The models of wholesale and retail fill the space between the finished product and the end user. Business models of services represent a way to compile and provide added value in the form of standardized (postal services, mobile voice services), customized (software warranty, personal trainer at fitness center) and unique (legal actions, surgery) solution for the needs of the customer.

Cluster typology classifies real models based on the captured clusters that are typical for the models, as well as dominant and are different from other models (Slávik, 2012). Sets of five groups (clusters) of models were created. The base of the study were real business models described in the literature or identified in the own research observations. These clusters were subsequently aligned with the Canvas method:

A. Products and/versus solutions. Equivalent of this in the Canvas method is the proposed value for the customer. At the center of the business model are the products that act more as a way of solving customer problems rather than their material potential, or are composed of several related products, that can meet the needs of the customer only when in

synergy, or were previously unavailable, e.g. they were too expensive and in small quantities and they become available only in restricted range and large quantities.

B. Resources and processes. They are equivalent of key activities in the Canvas method. At the center of the business model are resources and processes, which are for the purpose of their better functioning, creation and realization of value outsourced, insourced, exchanged with other businesses, used more quickly when compared with other businesses, combined in different sequences and different qualities in the structure of the chain of value or are scattered or transferred to another businesses.

C. Retail. Equivalent of this in the Canvas method are the customer relationships, distribution channels. At the center of the business model lay the intermediate platforms and networks mainly based on informational and communicational technologies and internet, variants of unpaid sales and the simplification and diversification of sales of sold goods.

D. Communities. Equivalent of this in the Canvas method are key partners, customer segments. At the center we can find communities of customers, shareholders, contributors and users who by their participation in the community receive a benefit otherwise unavailable.

E. Prices and payments. Equivalent of this in the Canvas method are revenue streams, cost structure. At the center of the business model there are inconsistencies between the time of the sale of the product and the usage of the product and payment of the product, payment of the partial fees, movement of prices, linked prices of several products, modifications and substitution of sources of income.

The outlined typology is trying to present a coherent and consistent understanding of the real and operating business models. It explains under what principle these models work, what are their main characteristics and for what phase of the business they bring the most value and are more suitable. The outlined typology helps the innovation of the business models, because the classes of the models are at the center of the innovation process, from which they can spread easier or harder variants and innovations based on the principle of the operation of the different classes of models. With the support of the visualization schemes the identified typology can become a platform for the construction of new models or just models that are consistent with the terms of the business.

## 4. DEVELOPMENT OF BUSINESS MODELS

Finding a way to create value from innovation is the key element of the draft of a business model. The development of each new product should be associated with the development of a new business model that defines, how to enter the market and execute its value, so how to deliver the value to the customer and earn money from it at the same time. There are two extreme models of how an innovator can pursue value creation, resp. appropriate a part of the value from the innovation (Teece, 2010):

1. Integrated business model, in which the business controls the entire chain of values from design up to distribution.
2. Sale of licenses as opposed to internal commercialization, its success is contingent on strong intellectual property rights.
3. A hybrid solution of the above mentioned options.

As the history shows the inventors and innovators that can not offer significant value to the customer and set up proper business systems, so they can meet the required needs, quality and price, will usually fail, although the innovation is remarkable and will be

accepted by the customer. More is the innovation radical and difficult to organize, larger the changes to the traditional business model will have to be.

The industry life cycle and market development are important factors that influence the metamorphosis of the business model. In different stages of the life cycle the competitive base is changed. At first the businesses compete on the basis of functionality of the product or services. The customers pay for the parameters of the product and its main functions that satisfy their needs. If the customers are reasonably satisfied with the offered solution, they require higher quality and reliability. The product functionality became a necessary but not sufficient condition to encourage the customer to buy the product itself. The focus of innovation shifts from products to processes. The suppliers are improving, as well as production, customer relationships and quality control. After meeting the functionality and reliability standards, the competitive base is moving on and the customers are requiring faster, easier and more accurate satisfaction of their individual needs. The businesses compete on the basis of greater comfort and customization for customers. Finally, when they run out of the three above mentioned steps of innovations, the market evolves into its commodity principle and businesses compete primarily on the basis of the costs. M. W. Johnson states that „when the competitive base moves to increase convenience for customers and reducing costs, further innovations relate to the business model. At this stage the businesses often find themselves on the edge of their current business models and they need to embark on their innovation“ (Johnson, 2010, p. 57). As an example, a furniture maker IKEA, offers fashionable furniture, yet relatively inexpensive furniture especially for young people. This way, durable goods became a not really difficult short term investment. Customer value added is strengthened by the convenience of logistics, which allows the customer to purchase dismantled and well-packaged furniture.

M. W. Johnson identifies this space for the creation of new business models beyond the existing industries and markets. It is created by the „democratization of products and services“ (Johnson, 2010, pp. 74-76) and „democratization of knowledge and understanding“(Johnson, 2010, pp. 81-88). The services and products are made available to large groups of customers who could not afford them before, because they were expensive, complicated and access to them was tedious. E.g. mass available car Nano from the Indian manufacturer Tata allows thousands of poor families to replace their scooters for a more convenient and safer means of transport. Accessing knowledge and understanding means that the value offered to the customer moves on the scale from the solving of an unstructured problem, to understanding the instructions (knowledge came to clear information and instructions of the procedures) up to the routine decision making (support systems, using which similarly thinking customers can exchange products or services, use information together, cooperate, socialize with little intervention). The range of business models is than broken down into solutions of sales, e.g. medical practice, law firms, consulting firms, with value added processes, e.g. retail, production, education, catering and facilitating networks, e.g. retail banking, online auctions, internet bulletin boards, telecommunications.

Decline of the used business models is very often overlooked and underrated, in order to avoid conflict between the old and new models. Gross margins for the emerging technologies are initially usually much lower than for the established technologies. There may be different end customers as well as other distribution channels. When the business allocates its capital to the most profitable use, then the established technology will be disproportionally favored and new technology, that disrupts the established model, will be shut down from the resources. According to Christensen (2003), Amit and Zott (2001)

managers are able to recognize the right business model, but its development meets with conflicts with the current model and the basic configuration of the assets, that supports the current business model as well. Research done by Chesbrough (2010) in contrast showed that it is not that clear what should the right business model be. In any case, whether the barrier is caused by confusion, ambiguity or obstruction, the way forward is via experimentation, that takes place as a compilation of schemes of business models, their test run, real run and identification of the real leader responsible for these processes. Mapping is the compilation of graphic diagrams or schemes of business models, e.g. visualization using the Canvas business model or other models (Slávik, 2011). Trial operation tries to experiment with the model under small but real conditions that are sufficiently representative of the larger market. For this kind of experimentation are important concessive testing, testing costs and expenses of eventual failure. An alternative to experimentation is discovery-driven approach (McGrath, 2010). The business model is described to the extent that it and be compared with other business models and the potential market demand. The whole concept moves forward based on the checkpoints, at which the model is tested out and when necessary revaluated. At each checkpoint it is revaluated whether to stop the project, redirect it or change it. The business model is developed conceptually and ideologically before the investment itself. Effectuation is based on the assumption that only action brings forward new information and reveals hidden opportunities. Active behavior precedes analysis, the market is being more created than analyzed. Although there are strong prejudices against the proceeding without analysis and data, new data can only be found by experimentation. Last but not least, the business model influences the selection of the main person responsible for the innovation and development. It should be a general manager at the top level of management, who perceives the role cross-sectional without any preference of any business function, but the result of the experiment can jeopardize their stabilized position in the business.

An incentive for the innovation of the business model and a warning before its obsolescence are also critical meetings or debates (McGrath, 2010). The first discussion is conducted with the leading technology based persons in the business. Their job is to think about the future without excessive links to current state of the business, they should be the first to notice the present model when its being compromised and replaced. The second discussion should focus on secondary competitors, so businesses that are not in direct competition in the same industry, e.g. a indirect competitors for cinemas is home video. Business model can be jeopardized by innovation out of the established bounds. The third discussion may bring to surface customers that are not current at the moment that may become the customers in future, e.g. too poor, geographically distant, or the business failed to notice them thus far.

The business model includes and develops the “profound truth” about the basic needs of the customers and about how the competition is able or not able to satisfy their needs, as well as about the technological and organizational possibilities of its improvement. Almost in every case a new business model is successfully implemented after several trials and errors. It can, but doesn’t have to use new technologies, but it must understand the needs of the customers, technological options and the main logic of the business. That means the business model expresses the essence of the business or the sectorial logic of how to infiltrate the market. This logic has to be tested and repeatedly trialed, adapted and tuned as the preliminary assumptions become clearer. The business model should not only be new for

the business, but somehow new to the industry as well. Its originality, functionality and feasibility can be evaluated according to the following questions (Johnson *et al*., 2008):

*Can you nail the job with a focused, compelling customer value proposition?*

*Can you devise a model in which all the elements – the customer value proposition, the profit formula, the key resources, and the key processes - work together to get the job done in the most efficient way possible?*

*Can you create a new business process development unfettered by the often negative influences of your core business?*

*Will the new business model disrupt your competitors?*

Creation of a new business model for new businesses does not necessarily mean that the current model is to be threatened, or it should be changed. The new model usually reinforces and complements the original, core businesses, e.g. still working traditional publishing and sale of newspapers, while at the same time there are free versions of the same issues on the internet. The traditional model probably won't even perish after the expansion of the paid internet versions, e.g. as seen in the Piano system.

Development and innovation of business models is almost exclusively carried out by experimenting and testing of models in the real world, one of the used methods is the method of trial and error. Development of the business models similar to development in laboratories of new technologies and products does not exist in the real world. There are certain possibilities that are offered by means of computer simulations, but even they can not usually work outside their boundaries which are set based on the general knowledge, resp. their limits are set down by the creation of the computer program, whose knowledge and anticipation has its limits as well. A contribution to the experiments with the business models is investigation of the innovation space. If it is not possible to determine a definite business model before its applied in practice, we can at least increase the probability of the right selection within several other variants that are created and appear in the innovation process.

## 5. OBJECTIVES AND RESEARCH METHODS

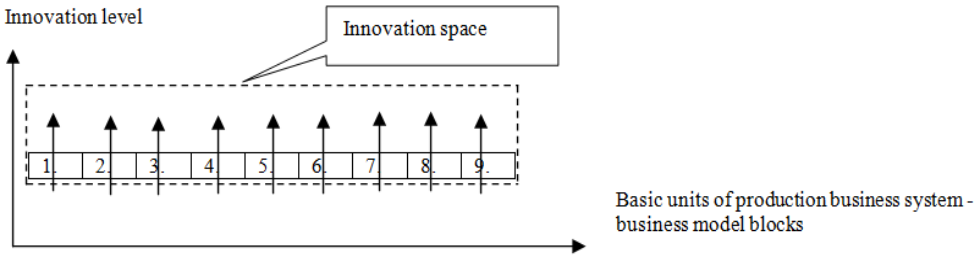
The subject of this research was conducted within 315 enterprises in Slovakia. Due to the base of the sources of the research study there were no restrictions placed on the selection of the enterprises either in size or division of sectors. A questionnaire was used for the collection of the data about the enterprises and their models. After a thorough check of the integrity and credibility of the questionnaire data the number of enterprises was reduced to 208. The results of the questionnaire survey were obtained in a quantitative and qualitative form. The main aim of the qualitative analyze was to identify the innovations of the business models. This means identifying their kind, originality and their complexity, to uncover the potential space for innovation and trying to answer at these questions: Which changes are in business models? What is the range and quality of these changes? What are the trends? Which consequences do these changes bring?

Nine business models were selected, of which the innovations can be considered above average when taking their level of innovation of the whole set into account. The average and benchmark levels for the innovational business models are set by the majority business model (Table 1). Selected business models have three innovative components of their structure, so we analyzed in detail those models, which were innovated in one third of all

blocks. The selection was based on qualitative deviation from majority reality. These deviations are the main object of the analysis. Although the whole group of the companies is not the main object of the analysis, we described the innovation of the whole group. We suppose that the innovation of the whole group is not attractive for a research. Also, R. Sargut and R. McGrath write that „outliers are often more interesting than the average case." (Sargut and McGrath, 2011) Innovations and non-standard practice are generally in a small range of the research sample edge. And the main aim of our research was looking for this sample. R. Grant quotes also such an experience, who asserts: „My guess is that finding truly radical management innovation is difficult because there is so little of it around." (Grant, 2008)

Business model Canvas was used to describe and analyze the business models. Components of the innovational business models (Table 2 to Table 10), that were rated as standard and normal, were not described in the schemes, components slightly different are written in normal font, innovational components of the business models are written in bold. The idea of the innovation space is finalized in Table 11, that show the recorded innovation across all of the surveyed enterprises. Information about the exceptional innovations (Table 2 to Table 10) and information about the average innovations (Table 11) are synthetized within the bounds of the trends and innovation space of the business models.

Innovation space determines possibilities, potential for improving of business model, increase of its utility and effectiveness. Final range and concrete kind of innovation space are not known, but their low level, which is caused by similarity of business models, is impulse and reason for their search. The bigger is the difference from competition and this difference is more effective, the higher is the range of business model innovation. Innovation space come into being by qualitative change of business model blocks and it is a result of managerial creativity. Innovation space in the Figure 1 is described in horizontal direction by business model blocks. The vertical direction describes intensity of block innovations. Innovation space is limited by business model blocks and the range their qualitative change – innovation.




*Source: Molnár and Dupal (2002, p. 90)*

**Figure no. 1 – Complex innovation - innovation space**

## 6. CASE STUDIES OF INNOVATIVE BUSINESS MODELS

**The predominant** (majority) **business model** has certain features that were appearing the most within the surveyed sample. It is shown in the Table 2. These businesses are frequently oriented on the specialized market, on which we can find products or services tailored to the needs of the particular customers. This type of market needs personal assistance, carried out by the retailer, by the physical person ensuring individual sales. The distribution channel is composed of the agent or the store itself. The main area of customer interest is the value that the product creates of which they look at the price, quality and the amount of tailoring to their particular needs and the offered solutions. The main processes are considered to be the sales, marketing and development. Almost all of the sampled enterprises implement outsourcing of the raw materials and materials and logistical input. The most costly resources are composed of the equipment and technology as well as the wages of the executives. The degree of innovation in our sample is showed in the Table 3. It confirms the assumption about the small occurrence of innovations. Innovations with exception are in the block of number two value proposed to the customers. This block is the most visible one and that is why it is adapted to the strong pressure from customers and also competitors. This fact results to the innovations. Boundary occurrence of innovations signalizes also overview of innovative chosen sample of business models in the Table 4. Only nine firms satisfy the condition the minimal number of innovations in the all three blocks.

**Table no. 2 – Predominant (majority) business model**

| Components | Content of components |
|---|---|
| 1. Customer segments | specialized market |
| 2. Value proposed to the customers | 1. price, 2. quality, 3. customer tailoring |
| 3. Distribution channels | 1. salesperson, 2. traditional shop |
| 4. Customer relationships | personal assistance |
| 5. Key resources | know how, innovation |
| 6. Key activities | sales, marketing, development |
| 7. Key partners | Suppliers of tangible resources, outsourcing of raw materials and material and logistics |
| 8. Cost structure | acquisition of resources, maintenance |
| 9. Revenue streams | sale of products and services, payment via bank transfer |

**Table no. 3 – Occurrence of innovations in the whole research sample**

| Blocks | Number of innovations | Share from the whole sample (%) | Number of selected firms |
|---|---|---|---|
| 1. Customer segments | 6 | 3,84 | 1 |
| 2. Value proposed to the customers | 59 | 28,37 | 9 |
| 3. Distribution channels | 17 | 8,17 | 6 |
| 4. Customer relationships | 9 | 5,77 | 4 |
| 5. Key sources | 9 | 4,44 | 7 |
| 6. Key activities | 7 | 5,29 | 4 |
| 7. Key partners | 8 | 3,37 | 2 |
| 8. Cost structure | 6 | 2,89 | 2 |
| 9. Revenue streams | 15 | 7,21 | 2 |

**Table no. 4 – Occurrence of innovations in selected the research sample**

| | Innovative business model blocks | | | | | | | | | Number of innovations |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Solar** | **Milcom** | **Eco** | **Hejhouse** | **Lidl** | **MG&MK** | **ZP** | **Dražby** | **Piano** | |
| 1. Customer segments | | | / | | | | | | | 1 |
| 2. Value proposed to the customer | / | / | / | / | / | / | / | / | / | 9 |
| 3. Distribution channels | / | | / | / | | / | | / | / | 6 |
| 4. Customer relationships | | / | | / | | | / | | / | 4 |
| 5. Key resources | / | / | / | / | / | / | | / | | 7 |
| 6. Key activities | | | / | | / | / | / | | | 4 |
| 7. Key partners | / | | | | / | | | | | 2 |
| 8. Cost structure | / | / | | | | | | | | 2 |
| 9. Revenue streams | | | / | | | | / | | | 2 |
| **Number of innovations** | **5** | **4** | **6** | **4** | **4** | **4** | **4** | **3** | **3** | **37** |

**Solar** enterprise offers a clean source of energy to its customers, who want to be considered as environmentally responsible and at the same time they do no want or do not have enough capital to invest in such type of energy source. Solar will build solar panels on the roof of the customer and then they sell them the electrical energy the customer uses as any other supplier. The price is comparable to the price from conventional sources and its production does not harm the environment. The innovation of a traditional business model of production, supplying and sale of electricity is recorded in the Table 5. **The innovation** of the business model lays in the free provision of the facilities producing the clean energy, ability to acquire installation space for free and in the absence of the distribution channel.

**Table no. 5 – Innovation of business model done by Solar**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | *ecologically aware customers* |
| 2. Value proposed to the customers | ***electricity produces with ecological impact***, *image of social responsibility* |
| 3. Distribution channels | ***no need for public grid*** |
| 4. Customer relationships | - |
| 5. Key resources | ***customers roof space***, *solar panels* |
| 6. Key activities | - |
| 7. Key partners | ***sunlight*** |
| 8. Cost structure | ***free source of solar radiation, free roof space*** |
| 9. Revenue streams | *- the cost of collecting solar radiation*<br>*+ revenue from sale of energy based on consumption* |

**Milcom** enterprise noticed that in stores there is a lack of fresh unpasteurized milk with the addition of varying quality. The solution of this problem was to produce and distribute vending machines, which provide fresh raw milk from dairy farms to the customers. The customers can provide their own bottle, or the vending machine offers a plastic or glass bottle that can be easily reused. The setting up of these vending machines is

supported by the grants from the European Union and the government in the form of tax relief subsidizes the sale of untreated milk. The enterprise **Mliečny expres** offers a modification of the business model, in which the vending machine is mobile. The orders come from the educational, sport or cultural events. **Innovation** of the business model consists of offering new value for customer (unpasteurized milk) through the appropriate spacing of the vending machines (Table 6).

**Table no. 6 – Innovation of business model done by Milcom**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | *customers preferring bio products* |
| 2. Value proposed to the customers | ***unpasteurized milk*** |
| 3. Distribution channels | *choice of right sale point* |
| 4. Customer relationships | ***self-service*** |
| 5. Key resources | ***small space for machine placement****, vending machine, electrical outlet* |
| 6. Key activities | - |
| 7. Key partners | *milk producers, vending machine producers* |
| 8. Cost structure | ***+ lower costs on property rent, smaller personnel costs*** |
| 9. Revenue streams | - |

**Eco produkt** enterprise is engaged in the distribution of ecological products for energy saving. In addition to the sales of these products this company is dedicated to spreading environmental awareness and care of the environment within the Czech and Slovak customers. In addition to the sale to the end customer this company carries out wholesale activities and supplies products to traditional an internet stores. One of the newest additions are the free lectures on ecology for elementary and secondary schools, which are connected with the presentation of Eco bottles, which if interested the customer must buy. **The innovation** of the business model is the discovery of unusual market segments in form of the elementary and secondary schools and sale of ecological products with the support of lectures (Table 7).

**Table no. 7 – Innovation of business model done by Eco product**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | *common customer,* ***students*** |
| 2. Value proposed to the customers | ***propagation of environmental awareness****, sale of ecological products* |
| 3. Distribution channels | *salesperson, online sales,* ***sales at school*** |
| 4. Customer relationships | - |
| 5. Key resources | ***teacher****, knowledge, experience* |
| 6. Key activities | ***lectures*** |
| 7. Key partners | - |
| 8. Cost structure | - |
| 9. Revenue streams | *- free lectures*<br>***+ sale of ecological products*** |

An innovation of some online stores is a parallel rollback and sale in traditional stores. **Hejhouse** enterprise combines the common delivery point with a large traditional shop. The customer can order the product on web page hej.sk and pick it up in Hejhouse, that as

opposed to a traditional pickup point is open the whole week from morning till dawn. This shop consists of several hundreds of items on stock. This item must be ordered still on the internet at home or at the terminals placed throughout the shop, but the customer does not have to wait for it to arrive, they can immediately buy the items. The prices are the same as when bought via internet. A new Drive system known from the fast foods is a new addition. The customer parks in an allocated space next to the shop and doesn't have to leave the car. The shop assistants place ordered and paid for goods into the car. **The innovation** of the business model is the rollback to the traditional stores and its connection with the online shop (Table 8).

**Table no. 8 – Innovation of business model done by Hejhouse**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | *suspicious price sensitive customers* |
| 2. Value proposed to the customers | ***online sale + personal sale*** |
| 3. Distribution channels | ***traditional store + online store*** |
| 4. Customer relationships | ***personal assistance + automated services*** |
| 5. Key resources | ***placement and size of store + IT*** |
| 6. Key activities | - |
| 7. Key partners | - |
| 8. Cost structure | - |
| 9. Revenue streams | - |

The retail chain **Lidl** is another example. Everywhere it enters it emphasizes on low prices and low costs. This can be seen on the appliances in the stores, brands of goods and its simple message. The goods are not usually placed on the racks as they stay on the pallets in the forms of its original transport packaging. The customers do not become free shopping bags. The range of Lidl's own brands dominate the chain, while traditional branded products are rather complementary. Branded producers are falling behind the private brand, but it looses the marketing and propagation costs as well. This product mix makes it that Lidl has lower prices than its competitors in almost all product categories. Among the customers are also people with middle and higher incomes, who are willing to accept a lower price with smaller shopping convenience and sometimes quality. **Innovation** lies in the limited range of private label products and retail wholesale type of operation, where the supermarket model is taken to its extremes (Table 9).

**Table no. 9 – Innovation of business model done by Lidl**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | |
| 2. Value proposed to the customers | ***cheap products with enough quality*** |
| 3. Distribution channels | - |
| 4. Customer relationships | *self-service* |
| 5. Key resources | ***minimalistic store*** |
| 6. Key activities | ***minimal customer contact*** |
| 7. Key partners | ***suppliers of private brands*** |
| 8. Cost structure | *+ lower costs on appliances and store maintenance* |
| 9. Revenue streams | - |

**The Bboyspot Europe - MG&MK** is the European representative of The Bboyspot that has global headquarters in the USA. The business is located in Banska Bystrica and it sells clothing and accessories for the hip-hop community and breakdance dancers. It is the main organizer of hip-hop festival Outbreak Europe and co-organizes dance events at national and international levels. It organizes dance events in cooperation with well-known enterprises such as Kia Motors, Red Bull and the city of Banska Bystrica. The source of revenue is from sales of tickets, sale of clothes at the venue and at the same time the company promotes itself to the public. This company is the first of its kind on the Slovak market; its leadership is dedicated to the hip-hop culture and professional dancing in this style, and therefore perfectly knows the market and ultimately combines quality clothes exclusively supplied from the USA with the performance at events and dance competitions. **The innovation** in this business model can be regarded as the personal and intimate knowledge of the market and combining sales of clothing with dance events and competitions (Table 10).

**Table no. 10 – Innovation of business model done by The Bboyspot Europe - MG&MK**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | *dancers of specific type* |
| 2. Value proposed to the customers | ***exclusive atypical clothing*** |
| 3. Distribution channels | *internet,* ***dance shows, festivals*** |
| 4. Customer relationships | *a well defined community* |
| 5. Key resources | ***leadership uses well sold products, confidential market knowledge*** |
| 6. Key activities | ***connection of dance events and sales*** |
| 7. Key partners | *exclusive supplier of clothing, respected businesses* |
| 8. Cost structure | |
| 9. Revenue streams | *+ retail and wholesale, dance events, sponsors* |

The business models of **discount portals** works by brokering the sale of a product or service to the end customer. The retailer orders a sale and sets the conditions (number of coupons, discount amount, duration). Discounts can be up to 50% off the original price of the product. The discount portal than publishes the specified product on its website or through newsletters or Facebook. The customer pays for the product by credit card or bank transfer. After the transfer of money to the beneficiary (portal), the customer receives an e-mail with a voucher number and password, which is used as the currency. The coupon is transferable and can be given away. The retailer who ordered the sale through the discount portal is generally sent the money within 14 days. The intermediary takes its commission fee ranging from 5 to 50% of the discounted price. Restaurants, beauty salons, wellness and fitness centers and hotels mostly use the sale of coupons at discount portals. Another model has originated as well. It is a portal, www.zozenzlavu.sk, that provides a platform for seekers of earnings who want to become promoters of discounts and are actively seeking orders to sell at a discount and try to enter into contracts with the candidates. Promoters receive free training, written instructions and tips and ideas for suitable targets for the discount. If you sign a contract, you can be entitled to a commission of 3%. Discount portals are an appropriate tool for the sale of older collections of goods, weaker days (hotels) or hours (restaurants), but also can be used as a marketing tool for the launch of a new product or for the purpose of acquiring new customers. **The innovation** of this business model is based on the virtual connection of large groups of sellers and buyers, whose motivation is to make more sales with lower unit margins

and those who want to buy the desired product at a lower price than usual. An incentive to purchase is strengthened by the convenience of internet shopping and consumption of the product at the time the customer desires (Table 11).

**Table no. 11 – Innovation of business model executed by discount portals**

| Components | Content of components |
|---|---|
| 1. Customer segments | - |
| 2. Value proposed to the customers | ***products and services with discounts, convenient purchase, usage of product at desired time*** |
| 3. Distribution channels | *website, newsletter, Facebook* |
| 4. Customer relationships | *automated service* |
| 5. Key resources | *online platform* |
| 6. Key activities | ***sales promotion of harder marketable products*** |
| 7. Key partners | *portal www.zozenzlavu.sk* |
| 8. Cost structure | - |
| 9. Revenue streams | *+ provision*<br>***+ payment before sale of product,*** *sometimes the sale is not concluded* |

Another enterprise **Dražby-preprav.eu** carries out auctions, in which customers are through an electronic platform connected with freight forwarders, who offer the desired services meeting their requirements. Customers and carriers must be registered on the portal. Each party pays a small monthly fee for the entry into the auction system. The customer provides the transport parameters (size, quantity, time and place of loading and unloading) and the starting price. If the customer does not know or does not want to specify the price, they enter the mandatory amount of 5 €. The carriers than submit their own price. The customer is than informed by the offers via e-mail, from which he then chooses. **The innovation** of this business model is similar to discount portals, but the customer has a choice of a larger number of suppliers and can negotiate the final price. Automated platform allows that and also the whole buy and sell. It helps also to compare price and quality of suppliers and buyers thanks to references (Table 12).

**Table no. 12 – Innovation of business model done by Dražby-preprav.eu**

| Components | Content of components |
|---|---|
| 1. Customer segments | - |
| 2. Value proposed to the customers | ***negotiation of lowest price without impact on the quality of the transport*** |
| 3. Distribution channels | *webpage* |
| 4. Customer relationships | ***automatic platform*** |
| 5. Key resources | ***webpage auction*** |
| 6. Key activities | - |
| 7. Key partners | - |
| 8. Cost structure | - |
| 9. Revenue streams | *+ monthly registration fee* |

Revenue from the sale of newspapers and magazines are falling and internet versions can not earn enough money from advertising to subsidize the printed formats and even earn for its own operation. **Piano Media** is a payment system that brings together the different internet

portals of newspapers and magazines in Slovakia and allows an easy charging method for their content. Customers provide a single payment for access to mainstream and premium content and services of selected newspapers and magazines without any ads. Every news media employs this model in a slightly different way. Journal .týždeň (week) offers all the text on the site three days after the printed version in addition with video recordings, television station JOJ provides a complete version of its news portal and daily newspaper SME shows the paying visitors on the web the content one day before the paper version and on the morning of the printed version it sends a pdf version of the newspaper for the Kindle reader.

Customers of the Piano service order it via the portal www.pianomedia.sk on which they fill out a simple form. Immediately after their payment they receive credentials and the system may be used. A flat fee is introduced according to the length of the subscription (weekly, monthly and year). You can choose between several payment options. Proceedings from the sales are split between the medium that the customer prefers (40 %), other media, the reader visits (30 % share is divided by the time spent with the chosen medium) and the Piano (30 %) which operates the system. The money is divided among the media that the customer prefers and this creates the encouragement for them to make more money.

The business model of Piano Media is so versatile that the company wants to expand to the whole world. The current objective is to obtain a single country significantly greater than Slovakia and one in Western Europe. Then the model will be verified whether it will work in the next 30 to 50 countries. The model is currently being operated in Slovakia (5.5 million people, 3 million internet users, covering 5 % of media content), Slovenia (2 million inhabitants, 1.3 million internet users, 10 % of media content) and Poland (38 million people, 19.5 million internet users, 15 % of media content). Poland is strikingly the country, which would undertake the decisive test to see the viability of the system. **The innovation** of this model is the introduction of paid services with higher quality and range without annoying ads. Previously, the service was free, but in lower quality and scope, and accompanied by disrupting advertising (Table 13).

**Table no. 13 – Innovation of business model done by Piano Media**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | *Slovakia, Slovenia, Poland* |
| 2. Value proposed to the customers | ***platform for payments of common subscription for internet versions of newspapers, magazines and TV news, access premium content and selected services*** |
| 3. Distribution channels | ***internet*** |
| 4. Customer relationships | ***automated services*** |
| 5. Key resources | *IT* |
| 6. Key activities | *platform development, market expansion, marketing* |
| 7. Key partners | *newspaper, magazines, TV stations* |
| 8. Cost structure | *costs for key activities* |
| 9. Revenue streams | *30 % provision of payments* |

The innovation of business models involves changing some of its segments or parts as reflected in higher utility or less cost. Successful business models are most commonly produced using the available resources and technologies that are combined into a new, unusual combination that is unique. The enterprise Apple, in the mobile phone industry combined telephony, internet, listening to music, watching movies, playing video games.

The iTunes library promotes music and movies and it allows you to customize your phone by installing additional applications. Available technologies were combined into one product. Other companies have changed only some parts of the business model. IBM has ceased to pay attention to households and focused on business customers, rather than products it is more devoted to the provision of services. McDonald incredibly accelerated their processes of food preparation and customer service. Milcom offered a return to the traditional product in combination with a new form of sales, and thus created new value, which is precisely the connection of unpasteurized milk and convenient purchase they offer. Auction house eBay concentrated an extremely diverse supply and demand on one platform and it achieves a balance between them by the idea of an auction. The innovation is usually not isolated by itself, but it occurs in a group of smaller innovations. Low prices at the retail chain Lidl are achieved not only by selling private label foods that are produced by high-quality partners, but also doing a low cost way of warehouse retail.

## 7. DISCUSSION

The purpose of the identification of the innovation space is to identify types of innovation and their potential for further development. The extent and quality of the innovation space gives us an idea of what is the potential frequency, functionality and originality of the innovation of the business model and their resistance to imitation. The identification of the innovation space is based on the description and analysis of selected innovative above average models (Table 5 to Table 13), the innovation potential derived from the whole set of models examined (Table 14) and the deviations from the majority model (Table 1). Letters A to E that are the references to the cluster typology of business models mark the outbreaks of innovative business models.

Solar business model is from the category of models that are dominated by resources and processes (B). Its innovation lies in the free acquisition of some resources. No payment is an important part and becomes often an important characteristic of business models. This model is a closed and a fully integrated chain of production and consumption of electricity. The primary customer value, which is the electrical energy, is accompanied by a secondary value (A), which is the feeling of socially responsible use of environmentally clean energy source. The innovative space of the business model is thus extended to free resources that also meet the criteria of social responsibility.

**Milcom** business model is a model based on a combination of a new product (A) and a new way of marketing (B). The innovation is to offer a product that is a raw material itself. The durability of it compared to the modified product is substantially lower, and thus requires being in smaller quantities and needs shorter delivery intervals. This is offered by vending machines, which store this product to form separate sales network in close proximity to residential homes. The innovation area in this case is not only aimed at the product and its distribution, but also at the appropriate combination of the two.

Business model of **Eco produkt** bundles an unconventional product (A) and non-traditional market segment (C, D) together. It uses organic fashion trends and penetration of environmental awareness within the society, to change a simple product that is offered to the low-yield segment of students of primary and secondary schools. This business promotes the product via a teaching style on school grounds. The innovative space of this model is extended by combining the product with attractive social trends and reaching out to a few

not enough discovered and monetized market segments, which are typical by their interest in other priorities, e.g. fashion clothing, entertainment, sport and so on.

**Hejhouse** business model is again a combination of, in this case two components, but only one category of business models (C). Two different forms of sales are compiled into one complementary total. Hejhouse is a very good example of how the old model can at least temporarily coexist with the new model. It's also a return to the old model, which will be operational until it is able to bring value to the customers. Value proposition is not just the value of the product itself, but also the choice of the form of purchase (A). This model mimics at the same time the selling ideas of fast food restaurants where customers place orders out of the car and that's where they are served as well. The combinations of different versions of the old and the new model, which is complemented by other parts of the business models, complete the innovative space in this model.

Business model of the **Lidl** retail chain produces minimal source and process conditions (B) to maximize the value offered to the customer (A). Maximizing customer value lies in increasing the ratio of usefulness offered mainly by the food products and their price. Product quality is generally set on an average level, prices are the lowest when compared to competitors. The concept of minimization is reinforced by the key partners (D), giving up their brand in this model and delivering products under the private label. The motive is to maximize sales and to maximize capacity utilization. The innovative space of this business model is in the simplification of the borders of the conditions of sale, its effects on the supply and price quality ratio and consumer prices.

The business model of **Bboyspot Europe - MG & MC** is based on a suitable combination of the product (A), sources and processes (B) and distribution (C). Exclusive clothing is sold with an extensive knowledge of the product and market knowledge to exclusive events. This model is based on the fact that neither of the exclusive components can not function properly in conjunction without the other ingredients. A significant difference of this model is the uniqueness and exclusivity of each of its parts. The innovation area extends itself by the escalation of the resources, processes and distribution to extreme positions of the high-quality and uniqueness although the result may be a narrow specialization and can lead to the marginalization of the business.

Business models of **discount portals** are using elemental motivation of consumers to satisfy the need at the lowest price (A). Models of this kind also offer comfortable service and purchase of goods or services that can be consumed at a time of your desire. The motivation is to revitalize vendors that are selling products and services (D), which are sold worse off because they are new and unknown, or vice versa have become obsolete, or are unevenly utilized by the capacity of the services. The development model supports the portal www.zozenzlavu.sk (D), which is a source of new product offerings and services. All sales take place on an electronic basis. Discount portal motivation lies in the commission of a detained cash rebates for the purchase of goods and services during the payment period (E). The innovative space model is in search of new and non-traditional offerings for sale and setting various commissions.

While the previous model was constructed on the online platform, **Dražby-preprav.eu** is based on an auction platform. It is dedicated to the creation of a market place in which it is easy to negotiate on prices for transport. This website mediates the connection between consumers and services providers and is a place to negotiate the lowest price without repercussion on the quality of services (A) and on an electronic base (C). The customer is motivated by the low price, the supplier by the extent of demand and the portal operator by

monthly fee for the registration of participants in the auction. The innovation space is to use the auction platform for other types of products and services and to provide reference checks on suppliers of products and services.

The business model by Piano Media charges for access to previously free content of the online versions of print media that do not cover their costs of advertising revenues. The customer pays for the access a fee to several media, that in addition to the current content offer premium content for the customer, video recordings and allow access to content prior to release or block the access to free users within a short period of time (A). The annual fee for such access, e.g. to ten media is significantly lower than the annual subscription for a single print media. Payments are mostly done electronically. The customer is stimulated by the modest fee and a wide range of special information. Publishers of printed media are in turn attracted to a new kind of revenue and increasing market penetration. The innovation space is to expand the number of media participants, the variations they offer from the information services, charging for free services and searching for the reasons for the transition from free to paid consumption.

Above mentioned and analyzed business models are the source of these incentives for innovation, extending the prior innovation space:

1. The use of free resources in the process-source model, which also meet the criteria of social responsibility. Offers the customer value in form of the product (electricity), which is produced organically (Solar).

2. The product is a raw material, which is sold in appropriately geographically placed machines. The added value for the customer is to preserve flavor and nutritional parameters of materials through an easily accessible point of sale (Milcom).

3. A simple product is participating on the wave of environmental awareness, the point of sale is created during the after school lectures on environmental theme and caters to non-traditional customer, who is a pupil in elementary or secondary education. The added customer value is the product of an ecological image with a simple process of purchase (Eco).

4. The old and the new model work in symbiosis. The value for the customer is the choice of how to shop (Hejhouse).

5. Resources and processes are minimized. The value for the customer is to maximize the relative value of the purchased product (Lidl).

6. This model is mainly constructed by its exclusivity and uniqueness. The value for the customer is the perfection of the product and the individualization of the sales process. (The Bboyspot Europe - MG&MK).

7. Electronic marketplaces can be used to purchase various products and services, commissions and payment periods are variable. The customer value is low cost and choice of time consumption (discount portals).

8. An electronic auction can be used as the place for haggling prices of other products and services or can be converted to an inverse auction. The customer value is the lowest price offer of such a magnitude, they would not be able to aggregate at the same time (Dražby-preprav.eu).

9. A free service is changed into a paid service, a less complex offer becomes more complex but of better quality at the same time. The value offered for the customer is a comfort access to the payment and usage of the service (Piano Media).

A potential space for the innovation of business models (Table 13) was made on the basis of the entire surveyed sample of enterprises, large-scale study of journal articles and literature, including business websites, which are given as examples of the above average

innovation (Table 4 – Table 12). The innovative space that is identified on the basis of the entire surveyed sample (Table 13), is described by the individual blocks of concept of Canvas, is located between two opposites, or its range is expressed by a limited tendency:

1. Customer segments: specialized versus mass market
2. Value propositions: product versus solution
3. Channels: approaching the customer
4. Customer relationships: close relationships up to co-creation versus self-service
5. Key resources: own exclusivity versus supplier dependency
6. Key activities: produce versus buy
7. Key partners: approaching the suppliers
8. Cost structure: cost reduction
9. Revenue streams: sale versus rent and monetization of derivate of primary holder of added value for the customer

Majority model (Table 1) has in the relation to the innovation area (Table 14) the role of the approximate middle value. Components of this model are expressed specifically, and therefore they can be the base for the determination of the baseline of the business model, and from that to develop innovative trends. The identified innovative space mostly differs from the majority model, or is an original and a challenging part in the component of the customer value, which brings the solution as the replacement to the product, in the component of the relationships with customers, which makes the substitute for personal assistance the self-service, in the components of key resources and key processes, where it not only considers their own but also foreign sources and processes and in the component of revenue streams where the revenue from the sale of the main product is multiplied by derived products.

**Table no. 14 – Innovation of business model done on the basis of Canvas**

| **Components** | **Content of components** |
|---|---|
| 1. Customer segments | 1. contrasting type of market in sector, e.g. niche market against mass market<br>2. growth of sales based on previous experience and knowledge<br>3. diversification<br>4. cross-celling |
| 2. Value proposed to the customers | 1. solution versus product<br>2. complementary product<br>3. lower price<br>4. availability and purchase convenience<br>5. unusual parameters<br>6. image of the customer |
| 3.Distribution channels | get the product to the client as close as possible in order to increase comfort and maintain, or reduce distribution costs |
| 4. Customer relationships | 1. tighter relationship with customers, understanding their precise needs and shopping behavior (co-creation, communities, e.g. Linux)<br>2. automated processes and self-service, unless required personal contact (Milcom, Tesco) |
| 5. Key resources | 1. exclusive supplier (MG + MK)<br>2. difficult to imitate source (source code Isis, Coca Cola recipe)<br>3 ownership of industry-standard (Microsoft) |
| 6. Key activities | 1. produce or buy<br>2. focus only creating value, other parts of the model to allocate to its partners (mobile operators) |

| Components | Content of components |
|---|---|
| 7. Key partners | 1. change suppliers to partners<br>2. replacement of significant suppliers by means of own production<br>3 employees to change to partners (employee shares) |
| 8. Cost structure | 1. outsourcing of costly and uneven operations<br>2. reduce costs by producing instead of buying<br>3. reduce labor costs by introducing automated relations |
| 9. Revenue streams | 1. sale versus rent<br>2. complementary products<br>3. using cross-selling brands (Adidas: sports shoes → Sportswear → cosmetics)<br>4. advance payment<br>5. derived (secondary) income zone (Disney: cartoons → theme parks → computer games→ clothing) |

## 8. CONCLUSION

The study of the specific business models brought a several news and valuable knowledge about their innovations. Free purchase and sale of a product or service are typical for particular models, which are dominated by trade. There was a documented occasion of no payment beyond the trade business model (C) in the source and process model (B), which had cases where there was a crucial source obtained free of charge (solar energy). A standard product (electricity) came into becoming of greater customer value (A), because it was made in a socially and environmentally attractive and responsible manner. In a model, which was dominated by product (A), there has been an inversion of the processed product to the raw material (untreated milk). A simple product (bottle) pioneered the organic spirit and became of increased customer value (A) without any product innovation. A simple product was coupled with an interesting story. Combination of old and new forms of sales expanded customer convenience (A), the effect was achieved by combining two previously independently operating sales forms (online and traditional commerce). Customers surrender their shopping convenience and do not mind minimization and simplification (discount stores), if they can maximize their added value. The opposite trend is exclusivity (A) which escalated to an extreme (dance costumes). Electronic marketplaces (C) are awaiting distortion among the stereotypes that they are only appropriate for certain types of products and will be used to trade yet new and unsuspected groups of goods. Free models (C) receive first cracks and their products and services that have long been available for free, become pay based (Piano Media). From exploring the whole set of business models it became apparent that the innovation space is located between the opposites, e.g. to produce or to purchase, the product or the solution, and that this area should be stepped up to the end and filled without residue. One can even go beyond the outer limits, for example approaching the customer, minimizing costs, but crossing the border we would encounter a totally different business model. Research and analysis of business models shows achieved innovation space. Growth and enlarging of innovation space demonstrate objective trends, those directions are impulses for searching and creation of new business model innovations.

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# DETERMINATION OF CUSTOMER PREFERENCES FOR BENEFITS PROVIDED BY SALES PROMOTION AT SHOPPING CENTRES IN LITHUANIA

**Lina PILELIENĖ***
**Arvydas Petras BAKANAUSKAS****

**Abstract**

*The intensifying competition forces organizations to search for various measures which could help in persuading consumer to buy a product. Consequently, the attention to customer attraction is growing enormously. One of marketing measures used for this purpose is sales promotion. However, many measures of this marketing tool used by the companies do not attract consumers and end in failure. The article is aimed to determine customer preferences for benefits provided by sales promotion at shopping centres in Lithuania. Based on the results of questionnaire research the main conclusion is that customers of shopping centres in Lithuania are mainly driven by the utilitarian benefits of sales promotion, and are not affected by hedonic ones.*

**Keywords:** consumer benefits, Lithuania, shopping centres, sales promotion

**JEL classification:** M30, M31, M39

## 1. INTRODUCTION

Many scholars agree that the primary motive of every business is to increase the sales of goods or services that it deals in (Ikenna Ofoegbu and Mfonobong Udom, 2013). Wide variety of methods used for the achievement of this goal are presented and analysed in scientific literature; e.g. advertising, direct selling, affiliate marketing, etc. Sales promotion is often analysed as one of such methods. By temporarily providing promotions, retailers can attract more potential consumers that normally buy different brands, and thus increase their market share (Liu *et al.*, 2011). However, the analysis of scientific literature indicates that incorrect usage of sales promotion does not bring profit to an organization – it even can be harmful (Ikenna Ofoegbu and Mfonobong Udom, 2013; Pauwels *et al.*, 2002, etc.). Pursuing the discussion, Chandon, Wansink and Laurent (2000) argue that studying the consumer benefits of sales promotion has practical implication to their effectiveness. Therefore, the assumption can be made that the proper focus on the benefits provided by

* Faculty of Economics and Management, Vytautas Magnus University, Lithuania; e-mail: *l.pileliene@evf.vdu.lt.*
** Faculty of Economics and Management, Vytautas Magnus University, Lithuania; e-mail: *a.bakanauskas@evf.vdu.lt.*

sales promotion can lead organization to success and can help to excel among competitors. Accordingly, the scientific problem analysed in this article is formulated by the question: what benefits of sales promotion should be accentuated by shopping centres in Lithuania to better stimulate purchases?

Achieving to provide an answer to the problem discussed, the aim of the article is to determine customer preferences for benefits of sales promotion used by shopping centres in Lithuania. Knowing of their customer preferences will enable shopping centres to plan and implement marketing communication campaigns best corresponding to consumer needs and desires.

The article is organized as follows: theoretical analysis and synthesis are provided achieving to substantiate the importance of sales promotion as marketing tool; moreover, it makes a background for the empirical research. Questionnaire composed in relation to theoretical findings was provided for consumer evaluation, achieving to determine their preferences for the benefits of sales promotion used by the shopping centres in Lithuania. The obtained results were grouped into factors reflecting benefits of sales promotion using factor analysis; customer preferences for the benefits were determined by calculating evaluations' means.

## 2. SCIENTIFIC SUBSTANTIATION

Sales promotion is widely recognized as a component of promotional mix, having impact on immediate consumer response. Moreover, Dubey (2014) argues that customers respond more positively to sales promotion than advertising due to direct and tangible benefits that promotions offer to them. However, Chandon, Wansink and Laurent (2000) suggested that not all the benefits provided by sales promotion are the same effective in terms of consumer preferences. Thus, it can be stated that organizations using sales promotion on purpose to attract consumers should adapt it to their customer preferences.

In scientific literature, sales promotion is categorized using a variety of classifications, based on its aim, duration, form, etc. The mostly used categorization is the regimentation of sales promotion measures into price-based (or monetary-based) and non-price-based (or non-monetary-based). According to Aydinli, Bertini and Lambrecht (2014) managers and academics often think of price promotions merely as incentives that entice consumers to accept offers that they might not have considered otherwise. As the opposite, non-price promotions are mainly used for customer loyalty creation: according to Raghubir, Inman and Grande (2004), promotions may no longer represent simply an economic incentive to purchase, but also have other effects on consumers' deal evaluations (positive or negative attitudes towards a consumer promotion) and purchase intentions.

Considering latter classification as a background, Chandon, Wansink and Laurent (2000) divided the benefits of sales promotion into utilitarian (Savings, Quality, and Convenience) and hedonic (Value expression, Exploration, Entertainment). Accordingly, utilitarian benefits have a functional essence and are relatively tangible. This kind of benefits enables the maximization of purchase utility, effectiveness, and economy. Conversely, hedonic benefits of sales promotion are based on experiences and are relatively intangible. This kind of benefits results in satisfaction, pleasure, inner pride.

Ramanathan and Dhar (2010) argue that consumers have a variety of motivations during the shopping process, which are related to what they value most in general and what might be relevant in a shopping situation in particular. Accordingly, the benefits provided by sales promotion used in a shopping centre can be a crucial factor affecting consumer choice.

I.e., if a consumer detects desired benefit this might end in a purchase decision. Moreover, often customers do not rationally calculate the utility of every single promotion. Their first impressions on the benefit they get lead them to a purchase.

## 3. RESEARCH METHODOLOGY

### 3.1. Research organization

Achieving to determine customer preferences for sales promotion measures used by shopping centres in Lithuania, questionnaire survey was provided. The questionnaire was composed of two main parts: sales promotion-related and socio-demographic.

The sales promotion-related part of the questionnaire contained 25 statements; respondents were asked to evaluate the degree of their agreement with every statement in 5-point Likert type scale with possible answers varying from 1 (meaning 'Totally disagree') to 5 (meaning 'Totally agree'); the evaluation '3' was assigned to an answer 'Neither agree nor disagree'. The statements in the questionnaire were adapted from Chandon, Wansink and Laurent (2000).

The research was held in Lithuania from March to May, 2014. The population of the research was Lithuanian citizens; the sample was composed to proportionally reflect all 10 counties of Lithuania. The simple random sampling method was applied; all the members of population had equal possibilities to participate in the research. 800 questionnaires were distributed and 518 were returned; 247 men and 271 women participated in the research.

### 3.2. Relevance of the research results

Achieving to measure data suitability for further analysis, reliability analysis was performed; Cronbach's Alpha was obtained 0.878 (higher than 0.7) and this displays the reliability of the constructs.

KMO and Bartlett's Test were provided to determine the suitability of the data for factor analysis. As it can be seen in Table 1, the KMO measure is higher than 0.5; and the Bartlett's criterion ($p < 0.01$) substantiates the rejection of null hypothesis ($H_0$: The correlation matrix is an identity matrix).

**Table no. 1 – KMO and Bartlett's Test**

| **Kaiser-Meyer-Olkin Measure of Sampling Adequacy** | **Bartlett's Test of Sphericity** | | |
|---|---|---|---|
| | Approx. Chi-Square | df | Sig. |
| .890 | 3856.524 | 300 | .000 |

After substantiating data reliability and suitability, the factor analysis can be provided.

## 4. RESEARCH RESULTS

Achieving to determine the benefits of sales promotion that should be accentuated by shopping centres in Lithuania to better stimulate purchases, the analysis was provided in two stages. The primary objective of the research was to determine the core benefits of sales promotion; further, the preferences of customers for latter benefits were assessed.

### 4.1. Determination of benefits

As the main statements reflecting the essence of sales promotion used by the shopping centres in Lithuania were adapted to reflect the preferences for sales promotion used, the assumption was made that they have to be regrouped using factor analysis. The Initial Eigenvalues were calculated and rotated to determine the amount of variation in the total sample accounted for by each factor. According to Kaiser's criterion, only those factors which eigenvalues were obtained higher than 1 were left for further analysis. As it can be observed in Table 2, five factors explain 51.999 percent of total variance.

The eigenvalues of the factors after rotation have changed and optimized the factor structure: factor 1 accounted for 14.878 percent of variance, factor 2 accounted for 10.866 percent of variance, factor 3 accounted for 10.091 percent of variance, factor 4 accounted for 8.649 percent of variance, and factor 5 accounted for 7.515 percent of variance.

**Table no. 2 – Total variance explained**

| Component | Initial Eigenvalues | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 6.653 | 26.611 | 26.611 | 3.719 | 14.878 | 14.878 |
| 2 | 2.166 | 8.663 | 35.273 | 2.716 | 10.866 | 25.743 |
| 3 | 1.663 | 6.654 | 41.927 | 2.523 | 10.091 | 35.835 |
| 4 | 1.359 | 5.437 | 47.364 | 2.162 | 8.649 | 44.483 |
| 5 | 1.159 | 4.634 | 51.999 | 1.879 | 7.515 | 51.999 |
| 6 | .959 | 3.837 | 55.836 | | | |
| 7 | .942 | 3.770 | 59.605 | | | |
| 8 | .842 | 3.367 | 62.972 | | | |
| 9 | .787 | 3.146 | 66.119 | | | |
| 10 | .768 | 3.071 | 69.190 | | | |
| 11 | .720 | 2.880 | 72.070 | | | |
| 12 | .700 | 2.799 | 74.869 | | | |
| 13 | .685 | 2.742 | 77.611 | | | |
| 14 | .607 | 2.430 | 80.040 | | | |
| 15 | .573 | 2.294 | 82.334 | | | |
| 16 | .551 | 2.204 | 84.538 | | | |
| 17 | .525 | 2.102 | 86.640 | | | |
| 18 | .512 | 2.050 | 88.690 | | | |
| 19 | .479 | 1.918 | 90.607 | | | |
| 20 | .459 | 1.835 | 92.443 | | | |
| 21 | .449 | 1.794 | 94.237 | | | |
| 22 | .405 | 1.621 | 95.858 | | | |
| 23 | .368 | 1.472 | 97.331 | | | |
| 24 | .363 | 1.453 | 98.784 | | | |
| 25 | .304 | 1.216 | 100.000 | | | |

Achieving to determine the amount of variance of every component explained by the five factors, communalities are provided in Table 3.

The communality of a variable is the proportion of that variable's variance that is produced by the common factors underlying the set of variables. Accordingly, when communality is higher than 0.2, the components are considered to be informative enough. As it can be observed in Table 3, all the communalities of the components were obtained higher than 0.2; thus, all the components were considered as being informative enough.

**Table no. 3 – Communalities**

| Component | Extraction |
|---|---|
| Monetary savings | .627 |
| Higher-quality product for the same price | .670 |
| Reminder of the product | .494 |
| Good feeling for saving money | .534 |
| Excitement for trying new brands | .272 |
| Fun for using promotions | .576 |
| Feeling of getting a good deal | .466 |
| Opportunity to afford a better-than-usual product | .574 |
| Easier life with promotions | .494 |
| Pride for purchases | .590 |
| Possibility of avoidance of always buying the same brands | .484 |
| Entertainment | .428 |
| Smaller spendings due to promotions | .582 |
| Opportunity to upgrade to a better brand | .511 |
| Reminder for the needed things | .487 |
| Feeling of a smart shopper | .491 |
| New ideas for things to buy | .529 |
| Reason for enjoying shopping | .588 |
| Getting more for the same price | .366 |
| Simplified search | .493 |
| Feeling of being awarded | .578 |
| Lower prices | .561 |
| Desire to embrace the opportunity | .481 |
| Opportunity of trying something novel | .472 |
| Possibility for getting something extra | .650 |

Research results enabled to attach all the 25 components (benefits provided by sales promotion) to some factor, determining almost 52 percent of total variance. The partition of components into factors based on Rotated Component Matrix (rotation method: Varimax with Kaiser Normalization) is provided in Table 4.

**Table no. 4 – Rotated component matrix**

| Component | Factor | Dimension |
|---|---|---|
| Good feeling for saving money | 1 | Entertainment |
| Fun for using promotions | | |
| Feeling of getting a good deal | | |
| Easier life with promotions | | |
| Pride for purchases | | |
| Entertainment | | |
| Feeling of a smart shopper | | |
| Reason for enjoying shopping | | |
| Desire to embrace the opportunity | | |
| Monetary savings | 2 | Savings-Quality ratio |
| Higher-quality product for the same price | | |
| Opportunity to afford a better-than-usual product | | |
| Smaller spending due to promotions | | |
| Opportunity to upgrade to a better brand | | |
| Reminder of the product | 3 | Exploration |

| Component | Factor | Dimension |
|---|---|---|
| Excitement for trying new brands | | |
| Possibility of avoidance of always buying the same brands | | |
| Reminder for the needed things | | |
| New ideas for things to buy | | |
| Getting more for the same price | 4 | Convenience |
| Simplified search | | |
| Feeling of being awarded | | |
| Highlighted lower prices | | |
| Opportunity of trying something novel | 5 | Value attainment |
| Possibility for getting something extra | | |

As it can be observed in Table 4, every factor reflects a benefit provided by sales promotion. In latter case, the benefits of sales promotion almost correspond to the ones provided by Chandon, Wansink and Laurent (2000). However, few corrections were made. Factor analysis revealed that components reflecting purchase savings and opportunity to get better quality due to sales promotion are interrelated and can be grouped as reflecting one single factor – 'Savings-Quality ratio'. Moreover, the benefit of 'Value expression' provided by Chandon, Wansink and Laurent (2000) was eliminated (its components were redistributed to reflect other factors). Instead, the new benefit of 'Value attainment' emerged.

Thus, as it can be seen in a Table 4, sales promotion was considered to be reflected by 5 core benefits: Entertainment, Savings-Quality ratio, Exploration, Convenience, and Value attainment.

### 4.2. Customer preferences

As it was mentioned previously, questionnaire research was provided achieving to determine customer preferences for the benefits of sales promotion used by the shopping centres in Lithuania. 25 statements related to sales promotion were formulated to reflect the attractiveness of the benefit. During the survey, respondents were asked to evaluate the degree of their agreement with every statement provided in the questionnaire. The evaluation means of every benefit of sales promotion, as well as of every factor are provided in a Table 5.

**Table no. 5 – Evaluations of the benefits of sales promotion**

| Component | Mean | Dimension | Mean |
|---|---|---|---|
| Good feeling for saving money | 2.70 | Entertainment | 2.83 |
| Fun for using promotions | 3.18 | | |
| Feeling of getting a good deal | 2.74 | | |
| Easier life with promotions | 2.74 | | |
| Pride for purchases | 2.76 | | |
| Entertainment | 3.16 | | |
| Feeling of a smart shopper | 2.65 | | |
| Reason for enjoying shopping | 3.14 | | |
| Desire to embrace the opportunity | 2.44 | | |
| Monetary savings | 3.56 | Savings-Quality ratio | 3.41 |
| Higher-quality product for the same price | 3.53 | | |
| Opportunity to afford a better-than-usual product | 3.32 | | |
| Smaller spendings due to promotions | 3.28 | | |
| Opportunity to upgrade to a better brand | 3.36 | | |
| Reminder of the product | 3.23 | Exploration | 2.94 |

| Component | Mean | Dimension | Mean |
|---|---|---|---|
| Excitement for trying new brands | 2.77 | | |
| Possibility of avoidance of always buying the same brands | 2.77 | | |
| Reminder for the needed things | 2.81 | | |
| New ideas for things to buy | 3.11 | | |
| Getting more for the same price | 3.65 | Convenience | 3.81 |
| Simplified search | 3.45 | | |
| Feeling of being awarded | 3.90 | | |
| Highlighted lower prices | 4.22 | | |
| Opportunity of trying something novel | 3.35 | Value attainment | 3.25 |
| Possibility for getting something extra | 3.14 | | |

The analysis of research results revealed that only three sorts of benefits provided by sales promotion were evaluated positively. Moreover, all the positively evaluated benefits can be considered as being utilitarian. Both hedonic benefits of sales promotion ('Entertainment' and 'Exploration') were evaluated negatively, indicating that customers of shopping centres in Lithuania are practical, attracted by savings of money and time, striving for getting better quality at the lowest possible costs.

## 5. DISCUSSION AND MANAGERIAL IMPLICATIONS

The research results revealed that for Lithuanian consumer utilitarian benefits provided by sales promotion are highly more attractive in comparison to hedonic. Latter findings can be explained by poor economic situation in the country. According to Statistics Lithuania (2014), the average gross monthly earnings of employees in the whole economy in 2014Q2 was 2355.7 LTL (local currency; 1 EUR = 3.4528 LTL).

Consequently, statistical Lithuanian consumer is basically driven by financial benefits in term of monetary savings/smaller spendings; larger quantities of the same product for lower prices; better quality product for the same price. Despite the insight of Ikenna Ofoegbu and Mfonobong Udom (2013) that monetary sales promotions could lead to negative impact on brand preference and trust, research findings highlighted that for a customer of shopping centres in Lithuania mainly price-related sales promotion measures have to be offered. Such measures can take a form of price reductions, rebates, discounts, or free products offers.

As the opposite, utilitarian benefits provided by sales promotion were evaluated negatively. Customers of shopping centres in Lithuania appeared to be conservative, uncertainty-avoidant. Latter finding is very important for the old stable brands having their loyal customers. Moreover, shopping was not considered as having relation to entertainment. Thus, attempts to attract consumers by offering them hedonic or emotional benefits can end in a waste-of-money for a company. Lithuanian consumers better evaluate time-saving during their shopping than time-wasting for having fun. Such sales promotion measures as sweepstakes, contests or non-product related free gifts should not be offered for Lithuanian consumers.

## 6. CONCLUSIONS

Sales promotion can be considered by business organizations as an immediate measure for stimulation of consumer attraction and sales elevation. It is found to be more effective and persuasive than advertising or other types of marketing communication.

However, to be effective and attract the highest possible amount of consumers, the essence of sales promotion has to correspond to their needs. The most basic classification of sales

promotion measures used by business companies is based on the relation of sales promotion measures to price of the product; accordingly, sales promotion measures can be divided into price-based (or monetary-based) and non-price-based (or non-monetary-based) promotions.

The acute discussion on the effectiveness of price-based and non-price-based promotions can be found in scientific literature. However, the main accent is that the essence of promotion has to be positively evaluated by consumers. Thus, for the organizations is very important to determine which kind of sales promotion is more preferable by their customers. The determination of benefits provided by sales promotion and the assessing of customer preferences for those benefits can help business companies in creation of optimal promotional campaign.

Research results revealed the existence of five core benefits of sales promotion; three of them ('Savings-Quality ratio', 'Convenience', 'Value attainment') had utilitarian or price-based essence and two ('Entertainment' and 'Exploration') had hedonic or non-price-based essence.

Analyzing customer preferences to the benefits of sales promotion provided by shopping centres in Lithuania, it was determined that only utilitarian (or price-based) benefits stimulate purchases. Both hedonic benefits ('Entertainment' and 'Exploration') were evaluated negatively and were considered as having no effect on consumer purchase decision making.

Thus, shopping centres in Lithuania mainly have to highlight monetary savings / smaller spending; larger quantities of the same product for lower prices; better quality product for the same price while implementing promotional campaigns. Providing customers with hedonic benefits in terms of fun, pleasure or product variety, for shopping centres in Lithuania would end in a waste-of-money.

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# DETERMINANTS OF BANK'S PROFITABILITY IN EU15

**Bogdan CĂPRARU**[*]
**Iulian IHNATOV**[**]

**Abstract**

*In this paper we analyse determinants of bank profitability of EU15 banking systems for the period 2001-2011. We use as proxy for banks profitability the return on average assets (ROAA), the return on average equity (ROAE) and net interest margin (NIM). We also measure the impact of the first and the largest wave of enlargement (10 new members in 2004) on EU15 bank profitability, introducing a dummy variable. The contribution of this paper for the empirical literature is that there are no other studies that deal bank profitability for all EU 15 countries for the period considered (2001-2011). The literature splits the factors that influence banks' profitability in two large groups: bank-specific (internal) factors and industry specific and macroeconomic (external) factors. Our results are in line with the economic theory. Cost to Income Ratio, credit risk and market concentration had a negative influence in case of all measures of banks' profitability, while bank liquidity only for ROAE and NIM. The size of banks had a negative impact on NIM, suggesting that bigger the bank is, smaller the net interest margin ratio is, but, on the contrary, in case of ROAA, had a direct effect. The market concentration had a negative influence, meaning that the increasing competition, as a structural point of view, increases banks' profitability. The results show us that the process of European Union enlargement from 2004 does not have significant impact on EU15 banking systems' profitability. It has a week and negative effect only in case of net interest margin. As policy recommendations, we suggest for authorities a better supervision for credit risk and liquidity and maintaining a competitive banking environment. For banks' management we also recommend to monitor the credit risk indicators, optimizing costs and diversifying the sources of income.*

**Keywords:** determinants of banks' profitability, EU enlargement, EU15

**JEL classification:** G21, C14

## 1. INTRODUCTION

During the integration process, the European banking systems have encountered major changes, especially in terms of bank performance. At the beginning, the European Union was formed by 15 countries. After three successive wave of enlargement (2004, 2007, 2013) it has

[*] Faculty of Economics and Business Administration, Alexandru Ioan Cuza University of Iaşi, Romania; e-mail: *csb@uaic.ro.*

[**] Faculty of Economics and Business Administration, Alexandru Ioan Cuza University of Iaşi, Romania; e-mail: *iulian.ihnatov@uaic.ro.*

currently 28 members. The new member accession had influenced the bank performances of EU15 though many ways. For example, some EU15 banks took advantage of single market passport and opened branches and/or subsidiaries on the new members' markets.

The aim of this paper is to extent earlier work on the determinants of profitability of banks in the EU and examine to what extent the performance of commercial banks operating in EU15 markets was influenced by the first wave of enlargement. Thus, we can see if the enlargement process was opportune or not for the banks of old EU members.

In this paper we assess determinants of bank profitability measured by three proxies, namely return on equity, return on assets and net interest margin for EU15 banking systems for the period 2001-2011. We also try to measure the impact of the first and the largest wave of enlargement (10 new members in 2004) on EU15 bank profitability.

The rest of the paper is organized as follows: section 2 shortly reviews the literature regarding the determinants of banks profitability in EU, section 3 presents the methodological approach adopted, while section 4 the results and the discussion. In section 5, the conclusions are drawn.

## 2. LITERATURE REVIEW

The literature on the determinants of bank profitability is large. Studies that investigate bank performance determinants are country specific, while others have focused on a panel of countries. Some of these papers assessed bank profitability determinants for European banks. Molyneux and Thorton (1992), being the first that examined the determinants of banks profitability, demonstrate that there is a significant positive association between the return on equity and the level of interest rates, bank concentration and government ownership. They examine the profitability of banks in 18 European countries during the period from 1986 to 1989. Saunders and Schumacher (2000) analyze the bank interest rate margins in six European countries, finding that bank market structure, interest rate volatility and bank capitalization matter for the spreads. Goddard *et al.* (2004) assess the profitability of European banks from 6 countries during the period from 1992 to 1998. Their results demonstrate a positive relationship between bank profitability and risk and, in the same time, an insignificant impact of the bank size on profitability. Staikouras and Wood (2003) investigate the performance of a sample of banks operating in thirteen EU banking markets over the period 1994–1998. Their results indicate that return on assets is inversely related to loans to assets ratio and the proportion of loan loss provisions, as well as that banks with greater levels of equity and funds gap ratio are relatively more profitable. Abreu and Mendes (2011) examine Portugal, Spain, France and Germany and find that loan to assets and equity to assets ratios positively determine interest margins and profitability. Pasiouras Pasiouras and Kosmidou (2007) split the investigation of determinants of banks' profitability in commercial domestic and foreign banks operating in the 15 EU countries over the period 1995–2001. They found that profitability of both domestic and foreign banks is affected not only by bank's specific characteristics but also by financial market structure and macroeconomic conditions. Mamatzakis and Remoundos (2003) examine the determinants of the performance of Greek commercial banks over the period 1989-2000. They found that profits are mainly explained by the financial ratios. They also observed that economies of scale and money supply significantly influence profitability. Kosmidou (2008) also examines the determinants of performance of Greek banks, but during the period from 1990 to 2002. He assesses an unbalanced pooled time series dataset of 23 banks. Their

results show that money supply growth has no significant impact on profits. On the other hand, bank assets to GDP ratio, stock market capitalization to bank assets ratio and concentration are all statistically significant and have negative impact on ROAA.

There are some papers that investigate determinants' of bank profitability in Europe during the present financial crisis. Beltratti and Stulz (2012) investigate the determinants of the relative stock return performance of large banks across the world during the period from the beginning of July 2007 to the end of December 2008. In their sample there are 16 European banks. They found the better-performing banks had less leverage and lower returns immediately before the crisis and no correlation between differences in banking regulations across countries are generally and the performance of banks during the crisis, with the exception of those large banks from countries with more restrictions on bank activities performed better and decreased loans less. Bolt *et al.* (2012) study the relation between bank profitability and economic activity in 17 OECD countries (14 of them European countries). They found larger impact of output growth on bank profitability than commonly found in the literature during the crises. Also, the loan losses are the main factor of influencing the banks' profits. Dietrich and Wanzenried (2011) analyze the profitability of 372 commercial banks in Switzerland over the period from 1999 to 2009 in order to evaluate the impact of the recent financial crisis. Their estimation results confirm findings from former studies on bank profitability in case of Swiss banking system. Also, the paper shows some evidence that the financial crisis did indeed have a significant impact on the Swiss banking industry and on bank profitability in particular. Berger and Bouwman (2013) show that capital enhances the performance of medium and large banks primarily during banking crises.

The present study attempts to provide additional and more recent evidence on the determinants of banks profitability in the EU15, including more recent years in the analysis by examining the period 2001–2011 and estimating the implication of the first wave of enlargement (2004) on banks' profitability of EU old members.

## 3. METHODOLOGY AND DATA

In this study we estimate the impact of determinants of bank performance on bank profitability of EU15 banking systems. In this order, we measure the impact of the first wave of enlargement on bank profitability. We use as proxy for bank profitability three ratios: the return on average equity (ROAE), computed as a ratio of the net profit to equity and the return on average assets (ROAA), computed as a ratio of the net profit to the bank's average assets and the net interest margin (NIM), computed as a ratio of the difference between interest income and interest expense to the total assets of the bank.

We consider three categories of independent variables: bank-specific (internal) variables (bank size, financial structure, credit risk taken, liquidity risk, business mix, income-expenditure structure and capital adequacy); industry specific (market concentration, financial intermediation etc.) and macroeconomic (external) variables (e.g. economic growth and inflation). After we estimate the influences of variables described, we introduce a "first wave of enlargement" dummy variable for the period from 2004 to 2011.

The bank specific variables are from the Bankscope database, the data for HHI were supplied by ECB Statistical Data Warehouse and growth and inflation series were downloaded from the World Bank database.

Table 1 describes the variables used in this paper.

**Table no. 1 – Variables description**

| Symbol | Variables | Proxy |
|---|---|---|
| ***Dependent Variables*** | | |
| ROAA | Return on Average Assets | Net profit/ Average Asset |
| ROAE | Return on Average Equity | Net profit/ Average Common Stock Equity |
| NIM | Net interest margin | Difference between interest income and interest expense/Total assets of the bank |
| ***Independent Variables*** | | |
| *Bank specific factors (internal):* | | |
| size | Bank Size | Logarithm of Total Assets (log) |
| adequacy | Capital Adequacy | Equity / Total Assets |
| crisk | Credit Risk | Impaired Loans(NPLs)/ Gross Loans |
| efficiency | Management Efficiency | Cost to Income Ratio |
| lrisk | Liquidity Risk | Loans/ Customer Deposits |
| busmix | Business Mix indicator | Oth Op Inc / Avg Assets |
| *Banking system specific factors (external):* | | |
| hhi | Market Concentration | Herfindhal-Hirschman Index |
| *Macroeconomic factors (external):* | | |
| inflation | Inflation | Inflation, GDP deflator (annual %) |
| growth | Economic Growth | GDP per capita growth (annual %) |

In order to avoid the selection bias, we included all the available data in our dataset for the UE15 countries in the selected period. The panel consists of 386 banks. We presented the descriptive statistics of all the data series in Table 2. The sample means are greater than zero for all variables. In terms of standard deviations the volatility is very high in the case of ROAE and much smaller in the case of ROAA and NIM. Regarding the regressors, the volatility is high in the case of efficiency, credit risk, liquidity risk, adequacy and business mix proxies. The volatility description is enhanced by the minimum and maximum values. In the case of very volatile variables, there is a very large difference between the extreme values (e.g., for the ROAE varies between -992.29% and 924.56%).

**Table no. 2 – Descriptive statistics of data series**

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| ROAE | 6259 | 6.124216 | 29.70486 | -992.29 | 924.56 |
| ROAA | 6281 | 0.6266317 | 4.653217 | -116.578 | 185.572 |
| NIM | 6248 | 2.369951 | 2.744409 | -36.272 | 80 |
| size | 6304 | 14.23854 | 2.297257 | 3.396988 | 21.51282 |
| efficiency | 6162 | 68.04987 | 44.01312 | 0 | 831.111 |
| crisk | 2163 | 4.99902 | 6.571192 | 0 | 100 |
| lrisk | 5490 | 126.4765 | 137.3773 | -641.96 | 994.6 |
| hhi | 9482 | 0.0643184 | 0.0508247 | 0.0158 | 0.37 |
| inflation | 9119 | 2.098526 | 1.301417 | -4.064806 | 7.629707 |
| growth | 9119 | 0.7881813 | 2.333636 | -8.974979 | 5.652283 |
| adequacy | 6281 | 12.89105 | 16.54977 | -44.444 | 100 |
| busmix | 6242 | 2.738473 | 13.69453 | -6.911 | 912.343 |

We estimate the following equation:

$$Y = X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + \alpha + \varepsilon \quad (1)$$

where:

- Y stands for the dependent variables ROAA, ROAE or NIM;
- $X_1$ is a vector of bank internal factors;
- $X_2$ is a vector of banking sector factors;
- $X_3$ is a vector of macroeconomic variables;
- α is the bank-specific intercept;
- ε is the error term;
- $\beta_i$ is the matrix of variable coefficients.

Considering that this study focuses on 15 countries for 11 years, there is highly probable that bank specificity plays an important role in the estimations. Thus, we compute the estimations with bank - fixed effects and robust estimators to heteroskedasticity and autocorrelation.

After the introduction of the dummy variable for first wave of enlargement in 2004, the equation becomes:

$$Y = X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + \beta_4 enlyear + \alpha + \varepsilon \quad (2)$$

where:

- "enlyear" is the dummy variable for first wave of enlargement in 2004

## 4. RESULTS AND DISCUSSIONS

The results of estimations (excluding the influences of first wave of EU enlargement) are exhibited in Table 3 and synthesized in Table 4.

Cost to income ratio, credit risk and market concentration had a negative influence in case of all measures of banks' profitability, while bank liquidity only for ROAE and NIM (in case of ROAA the results are statistically insignificant). The effect seems to be stronger in case of ROAE. The coefficient of cost to income ratio has the expected sign, as the efficiency of the bank enhances the profitability (Dietrich and Wanzenried, 2011). The bank size matters only in case of ROAA (positive impact) and NIM (negative impact). The literature is ambiguous regarding the impact of this variable. On one hand, economies of scale and reduced risk due to investment diversification may increase performance, but on the other hand very large banks are bureaucratic organizations with increased costs that affect performance (Pasiouras and Kosmidou, 2007). The business mix had direct relationship with ROAA and ROAE, but an inverse one with NIM. Also, the profitability is larger as the bank activity is more diversified. The liquidity proxy, Loans/ Customer Deposits, negatively impacts on bank profitability, except ROAA, where the results are statistically irrelevant. The liquidity-profitability relation is inverse: a high liquidity means the resources have been invested with low risk, that is low profitability. The effect of the macroeconomic variables is positive and statistically significant, but only for ROAE and ROAA. The impact is stronger in case of ROAE.

**Table no. 3 – Regression statistics**

| | (1) | (2) | (3) |
|---|---|---|---|
| | **ROE** | **ROA** | **NIM** |
| Total Assets (log) | 0.921<br>(5.617) | **0.522**$^{***}$<br>**(0.194)** | **-0.677**$^{***}$<br>**(0.152)** |
| Cost to Income Ratio | **-0.210**$^{***}$<br>**(0.0400)** | **-0.0100**$^{**}$<br>**(0.00509)** | **-0.00345**$^{**}$<br>**(0.00165)** |
| Impaired Loans(NPLs)/ Gross Loans | **-1.312**$^{*}$<br>**(0.681)** | **-0.109**$^{***}$<br>**(0.0314)** | **-0.0129**$^{**}$<br>**(0.00548)** |
| Loans/ Customer Deposits | **-0.0366**$^{**}$<br>**(0.0178)** | -0.000891<br>(0.000756) | **-0.000834**$^{*}$<br>**(0.000479)** |
| Equity / Total Assets | 0.0644<br>(1.423) | 0.0569<br>(0.0362) | -0.0213<br>(0.0273) |
| Oth Op Inc / Avg Assets | **3.303**$^{**}$<br>**(1.422)** | **0.227**$^{***}$<br>**(0.0666)** | **-0.0667**$^{**}$<br>**(0.0287)** |
| HHI | **-311.1**$^{**}$<br>**(141.7)** | **-12.71**$^{***}$<br>**(4.111)** | **-3.991**$^{*}$<br>**(2.330)** |
| Inflation, GDP deflator (annual %) | **2.561**$^{***}$<br>**(0.673)** | **0.121**$^{***}$<br>**(0.0335)** | 0.0185<br>(0.0191) |
| GDP per capita growth (annual %) | **1.236**$^{**}$<br>**(0.521)** | **0.0616**$^{***}$<br>**(0.0131)** | -0.00684<br>(0.00787) |
| *Observations* | *1971* | *1971* | *1971* |
| *Adjusted $R^2$* | *0.096* | *0.324* | *0.060* |

*Robust standard errors in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01*

**Table no. 4 – Determinants of banks' profitability influences (excluding the influences of first wave of EU enlargement)**

| | (1) | (2) | (3) |
|---|---|---|---|
| | **ROAE** | **ROAA** | **NIM** |
| Total Assets (log) | Statistically insignificant | **Positive influence** | **Negative influence** |
| Cost to Income Ratio | **Negative influence** | **Negative influence** | **Negative influence** |
| Impaired Loans(NPLs)/ Gross Loans | **Negative influence** | **Negative influence** | **Negative influence** |
| Loans/ Customer Deposits | **Negative influence** | Statistically insignificant | **Negative influence** |
| Equity / Total Assets | Statistically insignificant | Statistically insignificant | Statistically insignificant |
| Oth Op Inc / Avg Assets | **Positive influence** | **Positive influence** | **Negative influence** |
| HHI | **Negative influence** | **Negative influence** | **Negative influence** |
| Inflation, GDP deflator (annual %) | **Positive influence** | **Positive influence** | Statistically insignificant |
| GDP per capita growth (annual %) | **Positive influence** | **Positive influence** | Statistically insignificant |

**Table no. 5 – Regression statistics with the enlargement dummy variable**

| | (1)<br>ROAE | (2)<br>ROAA | (3)<br>NIM |
|---|---|---|---|
| Total Assets (log) | 1.288<br>(6.274) | **0.592**$^{***}$<br>**(0.200)** | **-0.538**$^{***}$<br>**(0.131)** |
| Cost to Income Ratio | **-0.210**$^{***}$<br>**(0.0400)** | **-0.0100**$^{**}$<br>**(0.00509)** | **-0.00347**$^{**}$<br>**(0.00164)** |
| Impaired Loans(NPLs)/ Gross Loans | **-1.314**$^{*}$<br>**(0.684)** | **-0.109**$^{***}$<br>**(0.0315)** | **-0.0138**$^{**}$<br>**(0.00579)** |
| Loans/ Customer Deposits | **-0.0367**$^{**}$<br>**(0.0179)** | -0.000912<br>(0.000757) | **-0.000875**$^{*}$<br>**(0.000472)** |
| Equity / Total Assets | 0.0807<br>(1.450) | 0.0600<br>(0.0378) | -0.0152<br>(0.0252) |
| Oth Op Inc / Avg Assets | **3.298**$^{**}$<br>**(1.424)** | **0.226**$^{***}$<br>**(0.0662)** | **-0.0687**$^{**}$<br>**(0.0283)** |
| HHI | **-309.5**$^{**}$<br>**(141.2)** | **-12.41**$^{***}$<br>**(4.051)** | -3.405<br>(2.126) |
| Inflation, GDP deflator (annual %) | **2.572**$^{***}$<br>**(0.684)** | **0.123**$^{***}$<br>**(0.0334)** | 0.0229<br>(0.0178) |
| GDP per capita growth (annual %) | **1.235**$^{**}$<br>**(0.521)** | **0.0616**$^{***}$<br>**(0.0131)** | -0.00697<br>(0.00780) |
| enlyear | -1.405<br>(3.231) | -0.272<br>(0.189) | **-0.531**$^{***}$<br>**(0.148)** |
| *Observations* | *1971* | *1971* | *1971* |
| *Adjusted $R^2$* | *0.095* | *0.325* | *0.077* |

*Robust standard errors in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01*

**Table no. 6 – Regression statistics with the enlargement dummy variable**

| | (1)<br>ROAE | (2)<br>ROAA | (3)<br>NIM |
|---|---|---|---|
| Total Assets (log) | Statistically insignificant | **Positive influence** | **Negative influence** |
| Cost to Income Ratio | **Negative influence** | **Negative influence** | **Negative influence** |
| Impaired Loans(NPLs)/ Gross Loans | **Negative influence** | **Negative influence** | **Negative influence** |
| Loans/ Customer Deposits | **Negative influence** | Statistically insignificant | **Negative influence** |
| Equity / Total Assets | Statistically insignificant | Statistically insignificant | Statistically insignificant |
| Oth Op Inc / Avg Assets | **Positive influence** | **Positive influence** | **Negative influence** |
| HHI | **Negative influence** | **Negative influence** | Statistically insignificant |
| Inflation, GDP deflator (annual %) | **Positive influence** | **Positive influence** | Statistically insignificant |
| GDP per capita growth (annual %) | **Positive influence** | **Positive influence** | Statistically insignificant |
| enlyear | Statistically insignificant | Statistically insignificant | **Negative influence** |

The results after including the "enlargement" dummy are exhibited in Table 5 and Table 6. We notice that the results are very close to the previous ones. The main difference regards the market concentration, where there is no statistical significance for NIM. The "enlargement" dummy coefficient is statistically significant only in the case of NIM and it shows a negative effect of first wave of enlargement on net interest rate. This could be due to increased competition that determined a reduction of interest margins.

## 5. CONCLUSIONS

Our results are in line with the economic theory. The size of banks had a negative impact on NIM, suggesting that the bigger the bank is, the smaller the net interest margin ratio is, but, on the contrary, in case of ROAA, had a direct effect. The market concentration had a negative influence, meaning that the increasing competition, as a structural point of view, increases banks' profitability. This result validates one of European integration objective: the stimulation of competition. The inflation and economic growth, as macroeconomic factors, improve banks' profitability.

The process of European Union enlargement from 2004 does not have significant impact on EU15 banking systems' profitability. It has a week and negative effect only in case of net interest margin.

Considering the results obtained, we suggest for authorities a better supervision for credit risk and liquidity and marinating a competitive banking environment. For banks' management we also recommend to monitor the credit risk indicators, optimizing costs and diversifying the sources of income.

**Acknowledgements**

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# CASE STUDY IN THE FIELD OF INNOVATION IN SELECTED COMPANIES IN SLOVAK REPUBLIC

**Zuzana HAJDUOVÁ[*], Roman LACKO[**]**
**Stanislava MILDEOVÁ[***], Michal STRIČÍK[§]**

**Abstract**

*Innovations are the source of competitive advantage and direction of the strategic choices are the most important factor determining the success of a business in the 21st century. In this context, the objective is to examine the contribution of the innovation process in small and medium-sized enterprises in the Slovak Republic, with the help of analysis we evaluate the benefits of the introduction of innovations, and search for the structure of the system and behaviour of systems archetypes. There is some evidence that might be used as advice to help with effectivity of innovation process in wider international spectrum.*

**Keywords:** small and medium enterprises (SMEs), large companies, innovation, questionnaire survey, systems approach, Slovakia, ICT

**JEL classification:** O3

## 1. INTRODUCTION

Innovation activities are the driving force of the economy, they develop possibilities, future competitiveness in the form of new knowledge, improvement in efficiency and economy, and its response capability. The need to deploy innovation in some sectors is essential for survival on the market.

In the countries of the European Union, the innovation policy and innovation in the recent period have become very frequent terms and often are declared as a priority. Innovative policy is implemented primarily at the level of individual Member States, which most of them at the national level have developed a fairly comprehensive support programs for innovation.

[*] Faculty of Business Economics with seat in Košice, University of Economics, Slovak Republic; e-mail: *zuzana.hajduova@euke.sk.*

[**] Faculty of Business Economics with seat in Košice, University of Economics, Slovak Republic; e-mail: *roman.lacko@euke.sk.*

[***] Faculty of Informatics and Statistics, University of Economics, Czech Republic; e-mail: *mildeova@vse.cz.*

[§] Faculty of Business Economics with seat in Košice, University of Economics, Slovak Republic; e-mail: *michal.stricik@euke.sk.*

Innovation has become a priority even by prolonged Slovak government. Here it plays an important role in the innovation strategy for the SR for the years 2007 – 2013 (MH SR, 2007). Its task is to ensure that the innovations have become one of the main instruments of development of the knowledge economy and securing high economic growth of SR in order to reach the level of most advanced economies in the European Community. Priority of innovation strategy is established to respond to the main deficiencies resulting from the lack of support for innovative activities, particularly for SMEs (Stricik, 2009). SMEs have very important role in EU, since they provide jobs for approximately 66% employees (Ciriaci *et al.*, 2012). There is influence of firm size and R&D intensity enhances product and process innovation and have positive influence on productivity of firm and among SMEs especially for larger and older companies, they are less productive. (Hall *et al.*, 2009) In UK, there is evidence that SMEs receiving state support were more likely to innovate. It was shown that even in if there were spending cuts in country, persisting with SMEs innovation policy would be prudent (Foreman-Peck, 2013). Another research showed that there is no influence of state support on R&D for all firm sizes (Griffith *et al.*, 2006). Systems approach, developed in accordance with the principles of general systems theory as a concept for thinking, can be applied in various fields, from economics to science (Potuzakova and Mildeova, 2011). Some demonstrate that systems approach and its modern methods can help strengthen innovation and holistic thinking capacity much more than traditional ones (Cancer and Mulej, 2006).

The aim of our paper is to examine the contribution of the innovation process in small and medium-sized enterprises in the Slovak Republic, with the help of analysis we evaluate benefits of the introduction of innovations, and search for the structure of the system and behaviour of systems archetypes.

## 2. MATERIALS AND METHODS

The basic method of our research is an analytical evaluation of the innovation process and systems approach to the search of broader regularities of innovation in small and medium-sized enterprises in the Slovak Republic, which have been mapped by questionnaire survey. The purpose of the questionnaire survey was to find out what's the amount of innovation activities within the small and medium sized enterprises, what sources of financing do they use, and if they are satisfied with support of innovation activities from the state, self-government and EU and what should they focus on in order to help this particular area.

The actual questionnaire survey was evaluated by traditional statistics methods with closed answer questionnaire, and statistical methods that used analytical method for searching the key words in open answered questionnaires.

We have formulated hypothesis:

*$H_a$: Is there correlation between business field and innovation activity?*
*$H_b$: Is there correlation between past and future innovations?*
*$H_c$: Is there correlation between size of firm and financial requirements?*
*$H_d$: Is there correlation between size of firm and funding from state and EU funds?*

### 2.1. Research

The survey, that was aimed to examine the level of deployment of innovation by small and medium-sized enterprises and finding their satisfaction with supporting programs, was attended by 127 small and medium enterprises.

For the comparison of the relationship between small and medium and huge enterprises, huge enterprises entered the survey as well. 5 huge enterprises were present with more than 250 employees at each enterprise.

The questionnaire consisted of 15 questions, of which the first 5 were identifiers and others have been aimed at examining the issues. The questions had mostly enclosed character. The questions were mainly multiple choice. In the case when the respondent did not find a suitable answer from the offered options, our respondents could pick the last one and there give an open answer to the question.

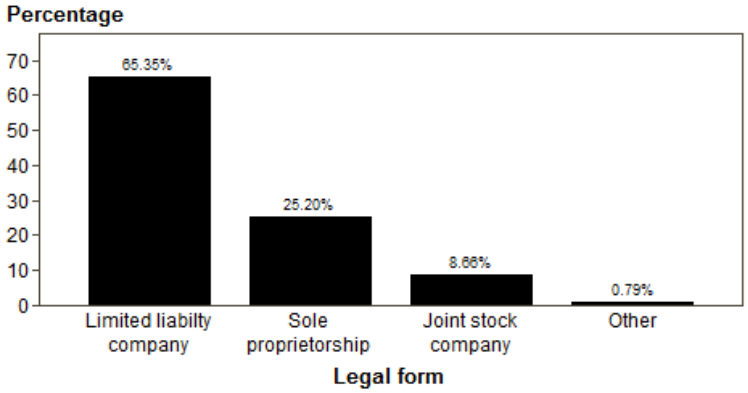
One question was open. Upon answering respondents could express their views and observations in the examination of problems in connection with the introduction of innovation.

Potential respondents were surveyed using a short request for participating in the questionnaire survey. Potential respondents were chosen according to their area of business, the aim was to cover each area of business equally. Contact details were drawn from the catalogue of web page http://www.zoznam.sk/, section of industry, services, agriculture, restaurant, catering, and so on. We placed the questionnaire on a website.

***Respondent structure***

Structure of the respondents is assessed in terms of its legal form, industry, number of employees, length of business activity and the action of businesses that are involved in the questionnaire survey.

In terms of the legal form of the enterprise especially commercial enterprises, with a total of 95 participated in the questionnaire survey, which represents 74.80 % of all respondents, while liability companies dominate with a share of 65.35 % of all respondents participating in the questionnaires survey. Respondents with the legal form of a sole proprietorship have been involved at 25.2 % of all respondents. The option "other" was marked only by one respondent, who stated that he is a state enterprise. In the questionnaires survey the companies with legal form of a partnership and limited liability company were not involved (see Figure 1).




*Source: own processing*

**Figure no. 1 – Legal form of the enterprise**

According to the business of the questionnaires survey, most of the enterprises were involved in focusing on manufacturing and trade. For other fields, the respondents were recruited from areas: ecology, Energy, IT, management of company, programming, advertising and health care.

Number of employees in the company determined the size of the business. In terms of number of employees in the company that were involved in the questionnaire survey, especially micro-enterprises (with a staff of 0-9), with a total of 74 respondents. The second largest group was small businesses (with a staff of 10 to 49), with the number of respondents 32 medium-sized enterprises (with a staff of 50 to 249) 21 respondents (see Figure 2).

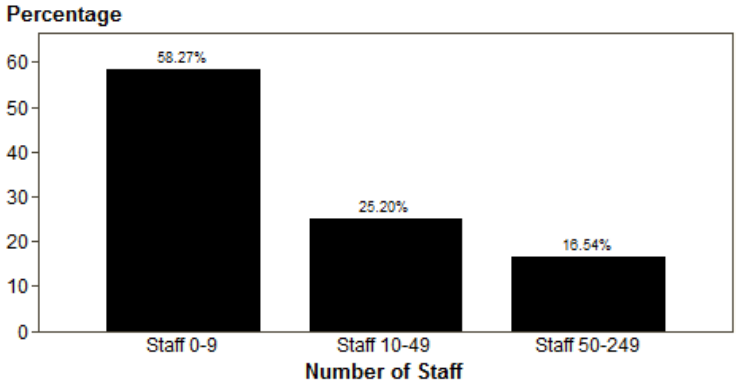



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**Figure no. 2 – Number of staff**

**In terms of the duration of the enterprise** most respondents participated in the survey to the length of the scope of business in 10 years.

In pursuit of the **respondents in terms of the scope of their business**, it was found that in the survey most businesses nationwide participated (44 companies) and transnational competence (43 companies), where there was only a slight difference between them. At the local level we had 23 enterprises involved. The least amount of respondents to the questionnaire survey were involved with regional scope, total of 17 (see Figure 3).

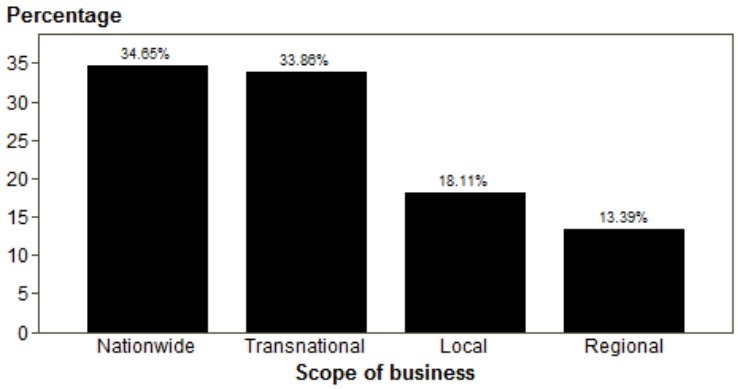


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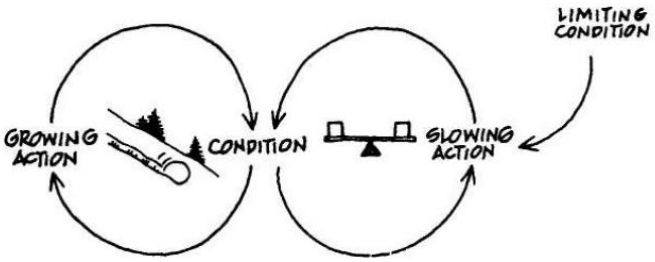
**Figure no. 3 – Scope of business**

### 2.2. System approach

Due to the various aspects of the systems approach it is possible to carry out own author's configuration (Houskova Berankova and Houska, 2011). That means that we could use those aspects that are relevant to the examination in the paper. In this way the paper with the system approach selects/uses systems archetypes (Senge, 1990) for next survey evaluation. With such types of systems archetypes we can show the positive/negative impact of selected factors on innovation activity and benefits of innovation. Then we can identify the areas which need to be improved. An example (Senge, 1990) is shown on the next figure (Figure 4).




*Source: Senge (1990, p. 84)*
**Figure no. 4 – Structure of an archetype**

### 2.3. Statistical methods

First we use graphical methods to analyse the answers from the survey. The most common used method, that we used were column graphs. Then we use Pearson correlation coefficient to examine the dependence between selected variables. According to Tkac (2001) Pearson coefficient of correlation can be expressed as

$$r_{xy} = \frac{s_{xy}}{s_x s_y} = \frac{\overline{xy} - \bar{x}.\bar{y}}{\sqrt{(\overline{x^2} - \bar{x}^2).(\overline{y^2} - \bar{y}^2)}} \tag{1}$$

If $|r_{xy}|$> 0.5, we can say there can be strong dependence between selected variables. If coefficient of correlation is positive there is positive dependence, otherwise there is negative dependence. Then we used Pearson contingency coefficient which is expressed according to Tkac (2001) as:

$$C_p = \sqrt{\frac{G}{G+n}} \tag{2}$$

where:

$$G = \sum_{i=1}^{r}\sum_{j=1}^{s}\frac{(n_{ij} - \Psi_{ij})^2}{\Psi_{ij}} \tag{3}$$

and $\Psi_{ij}$ is pooled relative boundary frequency.

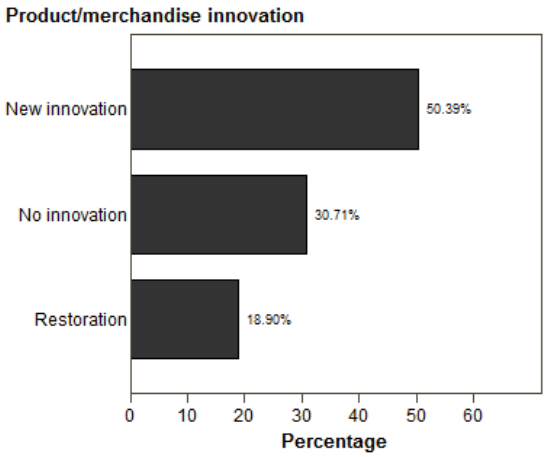
Pearson coefficient of contingency cannot by negative, if its value is higher, then 0.5 there can be strong dependence, otherwise there is moderate or trivial (none) dependence.

## 3. RESULTS

### 3.1. Analysis of innovation process in SMEs

In this section we will try to find out to what extent we are introducing small and medium enterprises innovations, what represents the financial benefit for them as their innovation in where they see flaws within the promotion of innovation by institutions at a national and European level, and whether they plan to innovate in the future.

First, we investigated whether respondents made product innovation in their company within the last 5 years. The answers of 50.39% of respondents indicated that in terms of product innovation / merchandise introduced. 30.71% of respondents indicated that they did not make any innovation in product/merchandise. 18.90% of respondents said that the product innovation led to its restoration (see Figure 5).

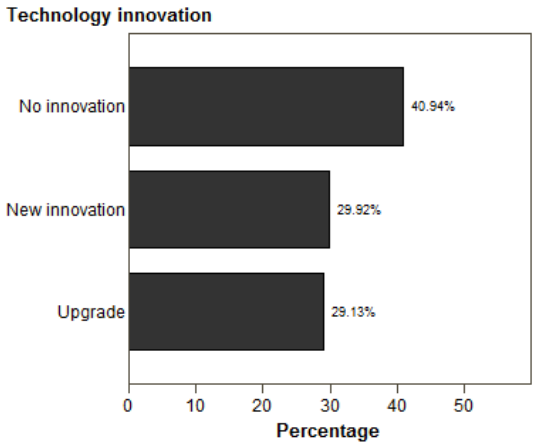



*Source: own processing*

**Figure no. 5 – Product / merchandise innovation**

In determining whether respondents made in their company for the last 5 years of technology innovation, we found the final answers were fairly balanced. In this question 40.94% of respondents indicated that no change has taken place in the field of technology. 29.92% of respondents said they have introduced new technology, and 29.13% of respondents reported an upgrade in already existing technology in the enterprise (see Figure 6).

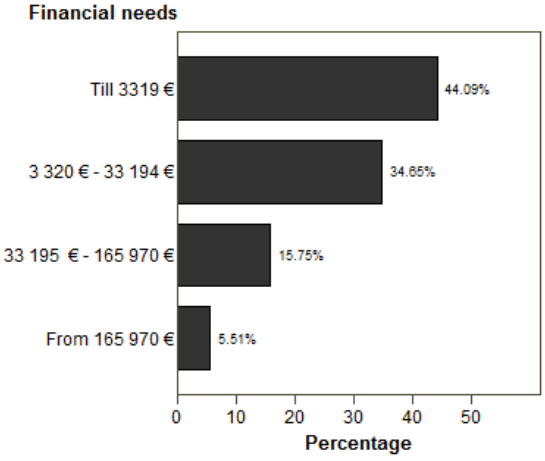
In the next question we have investigated the financial needs imposed on business innovation. In this question, respondents most often marked the answer with the lowest possible amount. Overall, this option was marked by 44% respondents as is shown in Figure 7. This is understandable, since the survey involved small and medium-sized businesses that have limited resources, difficulties to credit access, and it does not allow them to invest in financially challenging innovation activities.




*Source: own processing*

**Figure no. 6 – Technology innovation**

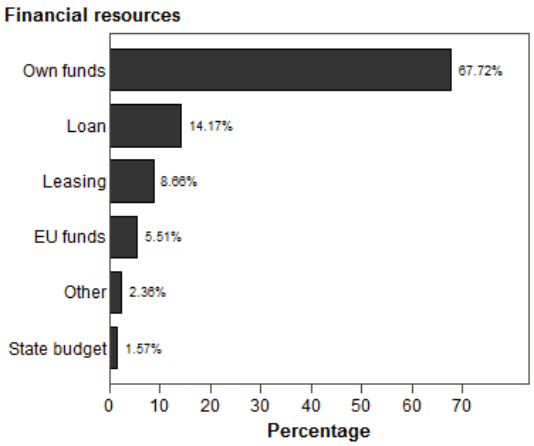
Within the analysis of the sources for financing innovative activities, we found that the 67.72% of respondents stated that for financing their innovation they tend to use their own funds. 14.17% of respondents said that innovation activities in the company funded through a loan and 8.66% of respondents through leasing. These financial resources therefore are considered more affordable.




*Source: own processing*

**Figure no. 7 – Financial needs**

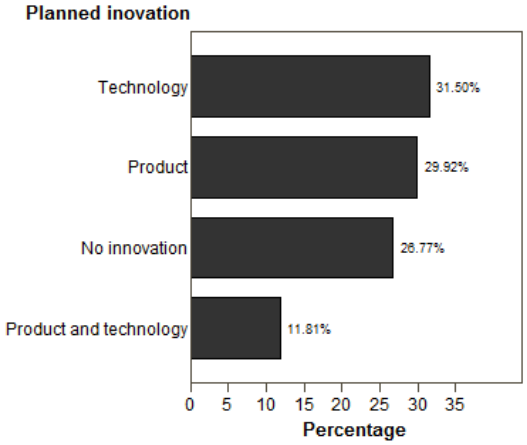
Financial resources from the state budget are reasonable only for 1.57% of respondents. Venture capital as a source of funding was not mentioned even once. Only 5.51% of respondents indicated as a source of innovation financing EU structural funds. 2.36% of respondents marked the other option where they indicated the financial source of innovation financing-loan from a friend, loan from the customer. Situation is illustrated in Figure 8.




*Source: own processing*

**Figure no. 8 – Financial resources**

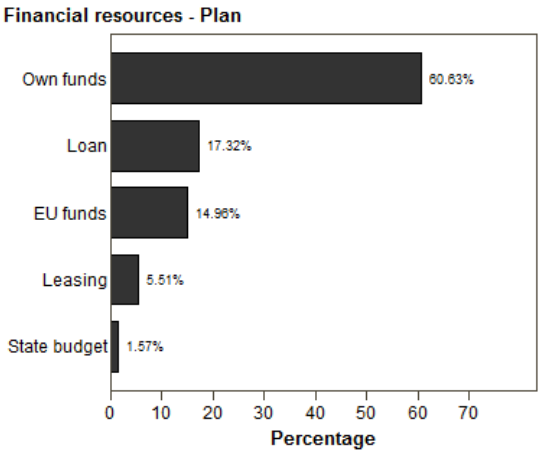
When asked whether respondents planned in 5 years to carry out innovations 73% of respondents answered this question positively. Almost 27% of respondents said they do not intend to innovate. Another question was aimed at finding areas in which respondents plan to carry out their innovation activities. 31.5% of respondents said they plan technology innovation and only 29.92% of respondents indicated only to upgrade product / merchandise. Both options, thus innovation in product / merchandise and technology, were marked by 11.81% of respondents.




*Source: own processing*

**Figure no. 9 – Planned innovation**

In determining what financial sources for innovations will respondents plan to use, we found that the most common source was own resources, which was marked by 60.63% of respondents. 14.96% respondents are interested in the funding from EU structural funds and 17.32% of respondents consider a loan (see Figure 9).



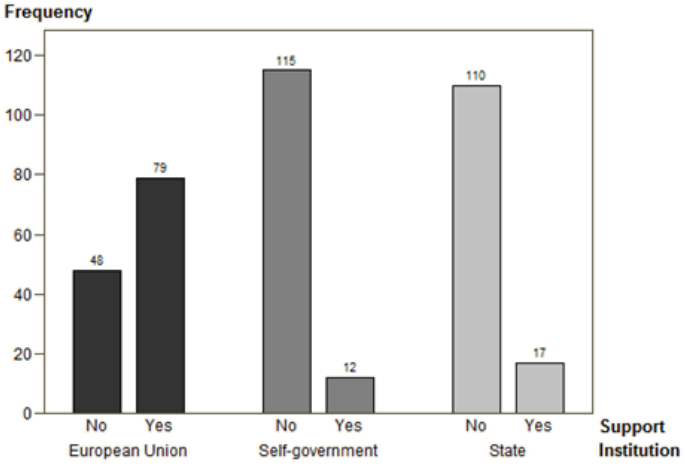

*Source: own processing*

**Figure no. 10 – Planned financial resources**

Results comparison from acquired innovation compared to the planned innovation show:

- more planned innovation activity compared to acquired (see Figure 4, Figure 5 and Figure 8)
- diversion from own funds to EU funds and loans to finance innovation (see Figure 7 and Figure 9).

In next part of the questionnaire survey we have focused on customer satisfaction with the support from self-government, the state and EU. Based on collected results we can state, that most of the respondents think that innovation support from the state and self-government is insufficient (110 respondents stated insufficient innovation support from the state, and with self-government it was even more 115 respondents). Innovation support from the EU consider most of the respondents sufficient, it was answered by 79 respondents. Remaining 48 respondents don't consider the innovation support from EU sufficient (see Figure 10).



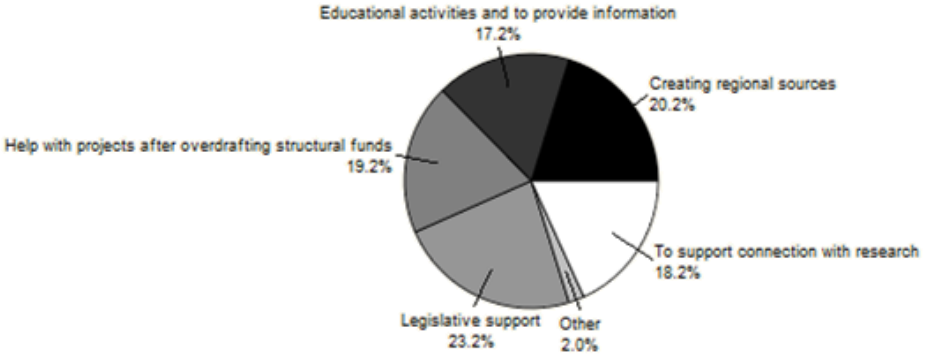

*Source: own processing*

**Figure no. 11 – Satisfaction with the support**

Further we looked at what should these institutions focus on when it comes to supporting innovations. Figure 11 represents respondent opinion, what should the support of innovation activities from the state, self-government and EU consist of. Most of the respondents (22.8%) expressed, that the government and other institutions should create conditions for development and application of research, development and innovations in business sphere with legislative creation and support. 18.3% of respondents stated, that it is necessary to create effective connection between business and research subjects. Others recommend to support:

- educational activities and to provide information,
- creating of regional sources to financing innovation,
- to help with projects after overdrafting structural funds.

Other options that are mentioned in graph are only slightly different. 2% of questioned, mentioned these proposals: support when earning credit from the banks, elimination of corruption in approval of projects and funds from EU, focus on support of mostly young native starting businessmen, lower the tax and tax levy, increase awareness and access to new technologies.




*Source: own processing*

**Figure no. 12 – Respondent opinion about the support**

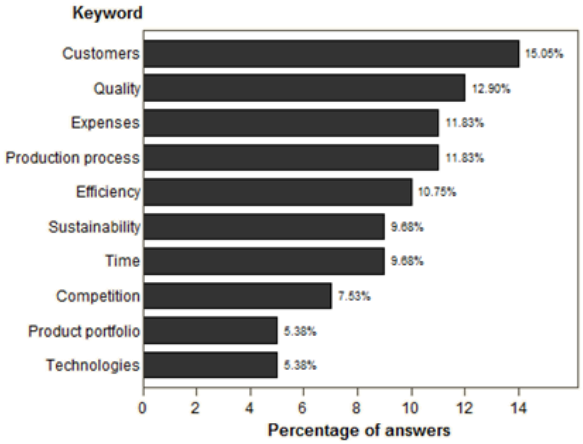
### 3.2. Results and categorization of answers to the open question

As was mentioned in 3.1, only one question in the questionnaire was an open one. Upon answering this open question respondents could provide feedback and review impacts (benefits / cons) of recent innovations. These answers were evaluated by the analytical method with the use of keywords, we tried to find the most significant and most important words and word collocations, expressing content from the open question. On this basis, the following categorization of key words occurs, which featured various benefits / cons:

- Benefit categorization
- Brand mark increased credit for customers
- Competition maintain competitiveness, increase of competitiveness, getting a head start against competitors
- Customers retain customers, increase customers, increase range of customers, clients, increase customer satisfaction, acquisition of new and old customers, boosting the currency in the market

- Efficiency improvement in production efficiency, more efficient work, effective work - more work in less time, reducing the necessary maintenance and support, increasing labour productivity
- Employees increase employee satisfaction through facilitating work
- Environment the impact on the ecological environment, usage of ecological energy resources
- Error rate reduction in the risk of errors, reducing the number of rejects
- Expenses business costs cost reduction, saving financial costs, saving material and labour (saving jobs), reducing energy costs
- ICT awareness of customers online connection to economic units, more effective work and communication through innovation of computer technology, new computer systems and OS (windows 7), saves time processing confession by electronic signature, the opportunity to develop an inventory of goods during full operation of branches and shorten the inventory stocks by computing innovation
- Market extension of the market, better market position, new markets, new contract
- Price reduction in product prices
- Product portfolio expansion of the product portfolio, introducing new products, the possibility of processing new types of products
- Production process change the production system, simplification of production, work simplification, testing new materials with improved properties, the transition from manual to mechanical work, the transition from manual to laser measurement
- Quality improve product quality, increase product quality, improve service, increase standards
- Safety improvements in enterprise security, theft reduction
- Subscribers fulfilment of subscriber's conditions
- Supplier fulfilment of supplier's conditions
- Sustainability of survival in times of crisis, the existence and prosperity of the company, making profits, increased sales of own products and services Technologies technological change process, shift technically higher, increasing the technical and technological level
- Time saving time, time reduction, assembly time reduction of operating cycles
- Turnover increase in sales turnover, increase production
- Cons categorization
- Company culture no effect of technology innovation is associated with the old way of thinking, it means that nothing happens breath-taking.
- ICT benefits of the new software (a program for drawing and cad-very small, cost-benefit disproportionately high)
- Frequency

This graph was based on the frequency of the keywords in respondent answers that present the most common spheres and changes within the spheres after the recent innovations (Figure 12).




*Source: own processing*

**Figure no. 13 – Frequency of the keywords**

### 3.3. Correlation measurement results

Testing the dependence between responses to individual questions focused only on the facts relevant to our investigation. Using the Pearson correlation coefficient we examined the relationships between fields of respondent activity and its innovation activities, and the relationships between past innovation activities and planned innovation activities.

**Table no. 1 – Results of correlation measurement**

| **Variables** | | **Pearson coeff. of correlation** | **Pearson coeff. of contingency** | **Result** |
|---|---|---|---|---|
| Business field | Innovation activity | 0.24 | - | Weak |
| Past innovation activity | Willingness to innovate | 0.37 | - | Moderate |
| Size of company | Financial needs | - | 0.36 | Moderate |
| Size of company | Satisfaction with EU and Gov. funding | - | 0.60 | Strong |

*Source: own processing*

When testing the relationship between the respondent and his innovation activity our research has focused on dependency between the business field and innovation activity. The calculated correlation coefficients did not show any significant values. With aggregation of fields into the cluster "industry and agriculture" and "services" (services, restaurant, catering, and so on) it shows weak correlation (correlation coefficient 0.24) in sense of bigger tendency to innovate within the "industry and agriculture" cluster compared to the "service" cluster, at the same time we can see the tendency in more financially demanding innovations within the "industry and agriculture" cluster compared to the "service" cluster.

Determining the dependence between past innovation activity and planned innovation activity was identified as moderate dependence with correlation coefficient 0.37.

Subsequently, we examined and compared the relationship between small and medium-sized enterprises and large enterprises. This relationship is once again measured by the contingency coefficients, Pearson's contingency coefficient.

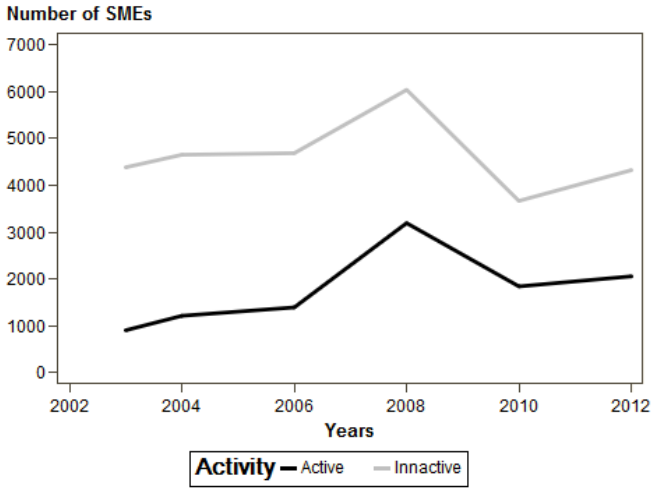
Based on the results we can state that regarding the introduction and innovation, both in product and in terms of technology between small and medium-sized enterprises and large enterprises is not dependent.

Relationship between large enterprises and SMEs through Contingency coefficients was measured also in terms of financial requirements and introduced innovations. Despite the fact that large enterprises have more financial resources and better access to them, Pearson contingency coefficient of 0.36 shows only partial dependence between them.

When examining the dependence between large enterprises and SMEs through Contingency coefficients in terms of satisfaction of respondents with the support of innovation activities from the State self-government and the EU, we found strong dependence, as it is shown in the result of correlation 0.60.

### 3.4. Systems structure and archetypes

As it is shown on Figure 14, displaying development during the years 2001-2010, innovation activity of SMES has strong rising tendency. Our research verified – interest of companies about future innovation is higher than innovation activities in the past.

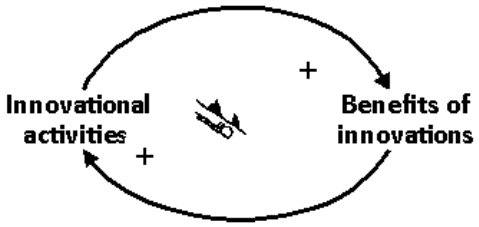



*Source: processed from the data http://portal.statistics.sk/showdoc.do?docid=5686*

**Figure no. 14 – Trend of innovation activities of SMES**

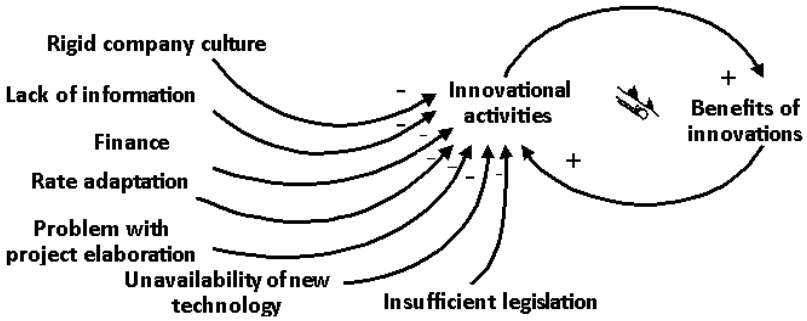
Note: fluctuation recorded in 2008 was influenced by the fact, that, from the year 2008 there were enterprises with non-technological innovations included into active innovating enterprises category.

At the same time the above categorization shows that in most cases innovations worked well. Relationship between innovation activity and acquisition from innovation can present through the systems archetype Reinforcing feedback. This archetype shows how the reinforcing (positive) feedback will accelerate the innovation activities.



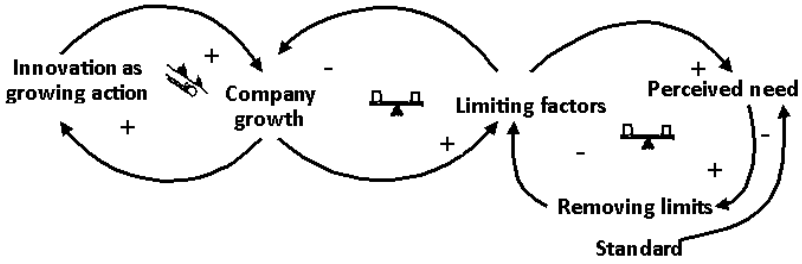

*Source: own processing*
**Figure no. 15 – Reinforcing feedback**

As growth limits of Reinforcing feedback z, Figure 15 can present from answers of respondents: rigid company culture, lack of information, finance, problem with project elaboration after overdrafting structural funds, unavailability of new technology and insufficient legislation. As shows Figure 18, the archetype Reinforcing feedback is changing on the systems archetype Limits of growth. It shows how the limits cause that growth cannot continue.




*Source: own processing*
**Figure no. 16 – Limits of growth**

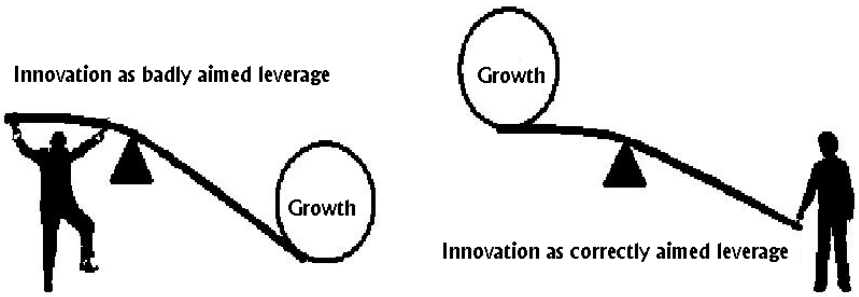
Although the trend of innovation is increasing, as shown Figure13, not every enterprise is innovating. The current trend of economic development is innovation in the broadest sense and its implications are the core of dynamics of economic system and the company soon stops or is at least crippled in matters of quality improvement and innovation, which has negative consequences for the future development, even though it can be only in growth phase, as is shown by the systems archetype Growth and underinvestment (see Figure16).




*Source: own processing*
**Figure no. 17 – Growth and under investment**

This archetype shows that company growth is inhibited by limiting factors that interact with a defined standard, this develops a perceived need for action to develop. The support from state, autonomy and EU, which companies evaluate as poor, plays a significant role in removing these limits (see Figure 15 and Figure 16).

We show that in most cases innovations worked well. But innovation is not panacea in itself. As it is shown in Figure 17 from the system point of view, it is necessary to assess whether the innovation had the nature of correctly aimed leverage and starts positive effects on growth feedback.




*Source: own processing*

**Figure no. 18 – Leverage**

The case where the contribution of the new software (a program for drawing-cad) was evaluated as very small, and the cost-benefit disproportionately high, corresponds to the problems of innovation through ICT, as reported (Mildeova and Brixi, 2011). Of course this does not mean that the companies should not carry out innovation through ICT. These innovations are the engine of growth of not only SMEs, but the entire economy and society (Doucek, 2004). The necessity of this type of innovation was specifically highlighted by the current discussion of the government, corporate and academic sector about support of innovative areas of business in Slovakia, conceptual solutions and integrated strategy in innovation (American Chamber of Commerce in the Slovak Republic, 2013).

On another issue, namely the need for system solutions pointed response that technology innovation is associated with the old way of thinking and innovation therefore does not have the desired effect. Leverage therefore should be (together with innovations) aimed at changing the way of thinking, culture of the organization. In this context systems archetype Shifting the burden can be mentioned. Using innovation, the company apparently tried to solve their problems without attempting a fundamental systemic change. This approach draws on the resources inefficiently.

Dependence on EU sources and its dividing is typically based on tragedy of mutual sources with its negative aspects, this is another problem which we can mention.

The stand of companies towards finished innovation is related to the necessity of system solutions. Companies evaluate partial benefits and in our opinion, there was not adequately considered desirable sustainability of holistic approach towards equilibrium of the organization. Also the impact on the environment should be taken into account which is ignored by many companies (Sauer *et al.*, 2012).

## 4. CONCLUSION

The success of a business is not dependent only on optimization of existing processes, but also in innovation. The importance of innovation is also proven by interest in the introduction of innovative activities in businesses. This was confirmed by ¾ of respondents among SMEs. Nevertheless, it is necessary to mention and is alarming that interest in innovation in technology compared to the product is balanced. However the most of businesses are interested to innovate, they realize the deployment necessity of innovation, if they want to not only maintain market position, survive in today's tough conditions of strong competition, but also to increase its value. Regarding the focus of future innovation in the next five years ¼ of respondents did not answer at all.

In financing their innovation activities, firms rely mainly on their own sources of funding and funds from the Structural Funds, which have a growth of almost 15%. Opportunity to fund innovative activities by risk capital was not entered by any respondent, which may mean that businesses are not sufficiently aware of this form of financing innovation.

Majority of respondents don't consider the innovation support activities from the state and self-government as sufficient. Respondents claimed that the only sufficient innovation support within the enterprises is from the side of EU. Most of the respondents claimed, that government and other institutions should support introduction of innovation activities in enterprises through creation and legislative support for regional development, research and scientific development, support when earning credit from the banks, elimination of corruption in approval process of projects and funds from EU, focus on support of mostly young native starting businessmen, lower the tax and tax levy, increase awareness and access to new technologies.

When testing the relationship between the respondent type and his innovation activity the calculated correlation coefficients showed no important values. Moderately strong dependence was observed in determining the relationship between past innovation activities and planned innovation activity. From this we can state that the companies which implemented innovations in the last 5 years tend to innovate again compared to the companies that did not innovate in the past 5 years. The motivation for future innovations corresponds to positive benefits, which were categorized by search keywords.

The categorization summarizes the benefits / cons of finished innovation. Here is shown the basic areas in which they had a positive effect - innovation impacts had overwhelmingly positive effect on companies benefit.

When examining the correlation between SMEs and large enterprises, we found that between innovation introduction and in terms of financial resources of innovation activities there is no dependency. In terms of financial demands of carried out modifications, we found slight dependence. Strong dependence was found when respondents expressed satisfaction with the support of innovation activities from the State, Self-government and EU.

As was shown by our survey, in its above mentioned analysis, not every enterprise is innovating and not every innovation goes without a problem and brings substantial benefits. Mention applications of the systems archetypes that reveal patterns of innovation behaviour tried to point out the threats that could be specified in this context. At the same time systems approach showed that innovation can become only symptomatic solution if it is not addressed systematically and that issues with innovation efficiency and overall corporate culture must be considered.

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# IT APPLICATIONS IN LOGISTICS AND THEIR INFLUENCE ON THE COMPETITIVENESS OF COMPANIES/SUPPLY CHAINS

**Tatiana MIRALDES[*], Susana GARRIDO AZEVEDO[**]**
**Fernando Bigares CHARRUA-SANTOS[***], Luís António F. MENDES[§]**
**João Carlos OLIVEIRA MATIAS[§§]**

**Abstract**

*This paper aims to study the influence of Information Technologies on the competitiveness of companies/supply chains. That is, it intends to analyse if the adoption of Information Technologies contributes to improve costs, time and customer service. To attain this objective a case study and content analysis methodology is used. Results indicate that there is a positive relation between the adoption of technologies, namely RFID, A.R. and the competitiveness of companies/supply chains. By the use of these technologies it is possible to improve several processes across the supply chain, as well as the reduction of costs related to labor, improvement in inventories and management of transport channels as well as an improvement on customer service. The improvement of these indicators has as consequence a gain in competitiveness allowing the companies to respond to the market needs in a differentiated way increasing by this way the customers' satisfaction. As the information technologies have been considered very important for businesses it is crucial to improve our understanding on the main advantages associates with them and their contribution for competitiveness improvement of companies and supply chains, so this paper represents an important contribution for academics and professionals in this field.*

**Keywords:** logistics; information-technology; competitiveness; company, supply chain

**JEL classification:** E29, F23, M15

## 1. INTRODUCTION

One of the major vectors responsible for changing the competitive paradigm is the globalization phenomena, generally considered as a process which raises social, political, cultural and economic interdependence (Thoumrungroje, 2004), generating significant

[*] Department of Management and Economics, University of Beira Interior, Portugal; e-mail: *tatiana.miraldes@hotmail.com.*
[**] Department of Management and Economics, University of Beira Interior, Portugal; e-mail: *sazevedo@ubi.pt*.
[***] Department of Electromechanical Engineering, University of Beira Interior, Portugal; e-mail: *bigares@ubi.pt*.
[§] Department of Management and Economics, University of Beira Interior, Portugal; e-mail:; e-mail: *lmendes@ubi.pt*.
[§§] Department of Electromechanical Engineering, University of Beira Interior, Portugal; e-mail: *matias@ubi.pt.*

changes in the business environment. Among those changes, it is most visible the emergence of new opportunities and threats. The opportunities raised from this businesses' globalisation context are the constant raising of potential markets, potential clients, investment capacity and, resources availability. With that, threats focus on the raising of more intensive competition and on the difficulty to foresee the business environment, which derives from the increased complexity and dynamism (Naghi and I., 2013).

In the adaptation process of companies to these environmental changes, logistics has been playing a strategic role being considered as a new competitive weapon on the businesses' service (Waller, 1998). In fact, the definition of logistics throughout time, has been focused on customers' satisfaction during the 1950's. Though, on the 1960's, its focus was on handling and storage from the raw material/product to the consumer, which actually encompasses the full amount of information and material flows. This way, logistics has stopped being seen as a simple operational activity to be seen as a strategic activity (Carvalho, 2004). It is a believe that the pertinent ascertainment that the superb growth rates of markets with similar future tendencies, energy costs increasing day by day and markets' globalization, raised new challenges. Logistics can be a nuclear competence adding value to the company's product/service, differentiating it form the others (Morash *et al.*, 1996), thus being a fundamental element on companies' strategy definition (Visser, 2008) by helping them to reach critical competitive advantages (Bowersox and Closs, 1996; Bowersox and Daugherty, 1995).

A concept which is closely related to logistics is the supply chain, which consists in the entire range of activities involved in the delivery of a product – from the raw product until it gets to the customer –, including the acquisition of raw materials and the components, production and assembly, storage and inventory location, orders' reception and management, channel distribution, delivery to the customer and information systems (IS) required to control all this range of activities (Lummus and Vokurka, 1999).

One of the most common factors associated to supply chain practices is the information technologies (IT), which allow connecting companies to clients, suppliers, regulating agents and strategic partners (Weill and Broadbent, 1998). This way, IT represents a key support to companies in order to create competitive advantages by allowing the centralization of the strategic planning and the decentralization of the daily operations execution (Bowersox and Daugherty, 1995). As it is defined by Porter and Millar (1985), IT's change the industries' structures and competitions' rules, contributing to create competitive advantages and new market opportunities. Thanks to the IT's, it became possible the synchronization of activities and the establishment of continuous flows, without any interruptions or fails, which makes possible the coordination and integration of processes between agents, the tasks rationalization, the inventories' decrease and the client services upgrade (Bowersox and Closs, 1996).

This raising of IT adoption by companies, has motivate the introduction of new technologies like the radio frequency identification (RFID) and the augmented reality (A.R.), which contributed to increase companies and supply chains competitiveness.

Considering the globalization process and the raising competition the companies need to invest on tools which allow them to reach increased competition.

Bearing in mind this, this study intends to analyse the IT's influence on the companies and supply chain competitiveness. In order to understand such influence, several propositions arise from the literature review and they are tested using some case studies and secondary sources are analysed The main goals of this study are to analyse if IT's adoption

allows both cost and time reduction and also client service upgrades. In order to reach the proposed goals the impact of IT's adoption on nine multinationals companies are analysed.

In what concerns the study structure, in the first chapter – introduction – it is intended to contextualize the study and to formulate its main goal. In the second chapter, it is intended to understand the importance of logistics to companies inside this competitive environment, approaching concepts such as competitive advantage and supply chain. In the third chapter, IT's are presented on logistics' services and, as well, the advantages reached by companies and their own supply chains. The fourth chapter presents the methodological framework and in chapter five the cases studies are presented and the main results. At last, the final chapter (sixth) displays the general conclusions of this study and the limitations, as well as future research lines.

## 2. LOGISTICS IMPORTANCE ON COMPANIES AND SUPPLY CHAINS COMPETITIVENESS

Among the diversity of changes occurred inside companies, it should be given a special highlight to the strategy as a research field because of the importance of customer value concept.

According to Poon and Lau (2000), "value" means: functional benefit of a received product or service, being quantified by:

- Association between total cost and the performance of each produced unity;
- Economized quantity, bearing in mind the use of alternatives;
- Accessibility of a person in charge besides the regular customer support;
- Free support;
- The synergy attained by one product, process or other materials;
- A cultural value presence inside the organization.

Knowing the aspects which create value or not is essential in a competitive environment: in order to be the source of a competitive advantage, the company has to execute a certain activity in a better way than their competition (Popescu and Dascalu, 2011). In order to achieve competitive advantage over its competition, companies should proportionate value to their clients/consumers, performing those activities in the most efficient way and in a way that the result is seen as an effective value addition by the served markets, in order to achieve the highest effectiveness and loyalties.

One of the companies' main goals is to create sustainable competitive advantage which proportionate value for both clients and stockholders, being this the aim of all business activity.

Competitiveness integrates one of fundamental importance of logistics organization, since it is from the logistic service the value that achieves the clients and it is also through that same value that the company acquires the necessary information that the value needs in order to be recognized by consumers (Menezes, 2000).

According to Leitão *et al*. (2008, p. 323):

"The logistic competences which may support/create generic advantages can, in a general way, be nested in the following sources of competitive advantage:

- Advantage in terms of service quality;
- Advantage in terms of time;
- Advantage in terms of cost/efficiency".

Bowersox and Closs (1996) claim that logistics' goal is to provide products or services on the expected local and moment by clients and underline the idea that the implementation of the best logistic practices is one of the biggest challenges faced by organizations on global competition.

Morash *et al.* (1996) stand by the idea that logistics may be a nuclear competence, capable of adding value to the companies' product/service, differentiating it from others towards the client.

The adjoining environment which surrounds companies' actions is unique, turbulent and unstable, characterized by several mutations. Facing that, one of the companies' basic demands is a result of the continuous mutations capacity of their intern reality, facing so to the characteristics of the surroundings (Carvalho, 1999). Markets are, most of the time, of national or international character, by which its logistics are the bridge between production locations and markets separated by time and distances (Ballou, 2004).

So, according to Carvalho (2004), companies need to internationalize, tending to operate on environments both external and internal. Entrepreneurial answers should establish an explicit focus on what concerns to the "GLOCAL" experience, a complex binomial due to differentiations amongst several components and basic markets. According to Carvalho (1999): "Companies constantly seek to adjust to the external mutating context, when daring to remain competitive in the market".

Logistics are vital towards consumers, companies and to the economy in general for a several set of reasons, especially about the huge geographic dispersion between suppliers and customers, with the consequent need to match the offer (this is, to whom? Which amount of product/service will be produced or sold?) with the demanded supply (this is, with product/service will be required? When? How much?), allowing customers the needed goods and services and assuring companies their production outflow, along with raw material supplies and other used inputs on production operations (Moura, 2006).

According to Leitão *et al.* (2008), the rising importance of logistics is mostly a result of a combination between some factors that have been transforming the entrepreneurial competitive environment much more demanding and more complex. These same authors underline eight factors of change that have an impact on logistics importance:

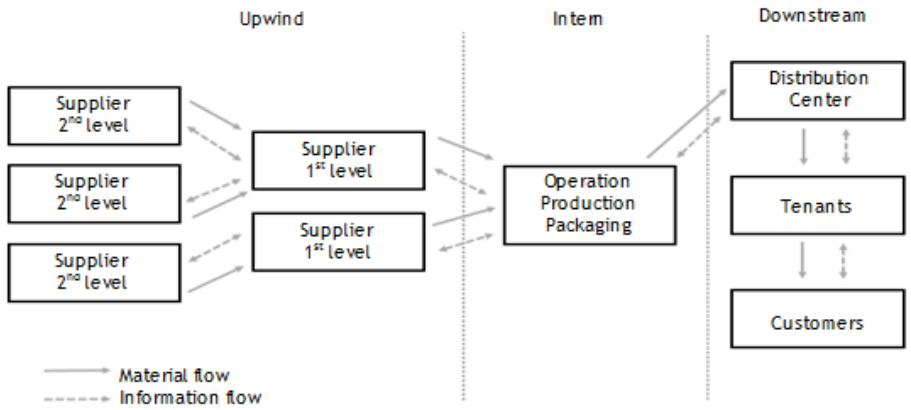
- Economic globalization, depicted, on one hand, by the rising exportations and importations, either on European or Portuguese companies, thus rising competiveness and pressure over costs, and, on the other hand, eases buying policies on a global scale;
- Companies' internationalizing movements and logistics and production units relocations, as well as an existing tendency towards production specialization;
- The quick changes of markets' and market segments' behaviours;
- The rising number of cases in which products'/services' differentiation is achieved by the customer services component;
- The higher demands of customers (higher power on bonds located downstream of the supply chain) conduct companies to offer a wider range of products and services and of a higher added value;
- Pressures to simultaneously improve customer service levels and reduce costs, due to stakeholders pressure, while using only one European coin and while selling online;
- Fashion characteristics are even more present and massified, leading to a demand's higher volatility, to a product's lifecycle reduction and to a time-to-market reduction;

- The environmental risks have been leading to the introduction of legislations on recycling and product packaging, producer's responsibility on their own end of life products and fuel and penalty taxes prices, which challenge the concepts of the actual supply chain.

The supply chain forms a structured manufacturing process in which raw materials are transformed in finished products and, after that, delivered to the final clients (Beamon, 1998). On what concerns to the supply chains' configuration, it does not exist any principle that makes it equal to all products/services, as it is defined by Fisher (1997): each supply chain must be drawn, configured, developed and managed accordingly to the products' competitive requirements or of the service in question.

However, with the result of globalization, of the international commerce, of the outsourcing of productive factors and the consumption of a wide-world range of products, it is notorious the existing interdependence between the supply chain's producers and suppliers on an international level (Janvier-James, 2012). As a matter of fact, today's conception of supply chain is more perceived as a network rather than a chain. According to Christopher (2005), the term "chain" should be replaced for "network", since there exists multiple suppliers and customers from several lines to be included in the entire system and the term "supply chain" should be called "demand chain", since it better reflects the fact that the chain is guided by the market rather than by suppliers.

The following figure represents a generic supply chain with the company connected to the suppliers (upwind) and to their distributers (downstream):




*Source: adapted from Laudon and Laudon (2004)*

**Figure no. 1 – Supply chain**

Through Figure 1, it is possible to verify that there are three segments (upwind, intern and downstream), which Laudon and Laudon (2004) define in the following way:

- **Upwind:** includes the company's suppliers (1st level) and the suppliers' suppliers (2nd level), allowing to zoom in until the basic raw material supplier. The main activities in this segment are purchases and deliveries;
- **Intern:** includes the entire range of processes the company goes through to process and transform the received materials into products, since the material's entrance inside the company, to the product's shipping. The main activities in this segment are material drives, inventory controls, manufacturing and quality control;

- **Downstream:** includes the distribution and delivery of the products towards final customers. This segment activity includes packaging, inventories and deliveries.

At last, it is important to clarify that companies who have a better coordinate and structure the relationship with their partners – in a network committed to deliver superior value in the final market – will be better prepared to reach competitive advantages in the market they compete (Christopher, 2005).

## 3. INFORMATION TECHNOLOGIES IN LOGISTICS

Today's world economy is known by the pressure caused by strong competition, constant shifts and a high level of uncertainty and market unpredictability. Besides, the market's offered product variety keeps rising, by which it adds difficulties when administrating the information flow throughout the supply chain, forcing the introduction of new technologies to ease logistic operations towards manufacturers (Ngai *et al.*, 2007). This way, it can be claimed that all companies are exposed to technologies' developments, being its application obvious on every level of the supply chain, including on communications with suppliers, producers, in the relationship with the clients (Beig *et al.*, 2012), as well as on global logistics management, especially on world distribution coordination, product design, production, shopping and inventories (Huang *et al.*, 2001).

IT's can be defined as the technological side of an IS, which includes the hardware, data bases, software, networks and other devices (Turban *et al.*, 1999).

According to several researchers, IT's have been being the essential infrastructure in competitiveness and cooperation amongst companies, having positive effects on the supply chain's performance (Zhao and Xie, 2002; Yee, 2005), on the achievement of competitive advantage (Spalding, 1998), amongst other benefits:

- More efficient results (Mukhopadhyay *et al.*, 1995);
- Global error reduction (Mukhopadhyay *et al.*, 1997);
- Increasing quality of the business's execution process (Devaraj and Kohli, 2003);
- Satisfaction increasing and relationship engagement (Devaraj and Kohli, 2000);
- Learning and organizational memory increase (Alavi and Leidner, 2001);
- Strategic benefits that lead to the companies' competitive advantage (Ray *et al.*, 2004);
- Innovation in several products and services, enabling the appearance of some important capacities (information delivery online; electronic access to services; ability to request and obtain specific services; payments and electronic billing presentation) (Albertin, 2000);
- Easy access to some markets (Albertin, 2000);
- Entry barriers establishment (Albertin, 2000);
- Data storage from an external environment (database) (Newell, 2000).

After being recognized the IT's rising importance towards companies/supply chains, it is now important to analyse in detail the technologies that allow to support the companies' and their respective supply chain's competitive advantage. Part of the analysed technologies that will be analysed here are: i) Radio Frequency Identification (RFID); ii) Augmented Reality (A.R.).

### *i) Radio Frequency Identification (RFID)*

RFID is a wireless identification technology that allows electronic information communication when associated to physical items (Modrak *et al.*, 2010). RFID's main

component is the smart tag fixated in the product. The electronic information is identified on the tag and after is collected through electromagnetic devices, which goes to a radio transmitter where a radiofrequency holder transmits to a possibly distant receptor, designated as reader, capable of interpreting and registering information (Floerkemeier and Sarma, 2009). Hassan and Chatterjee (2006) consider that the RFID system is basically made out of three elements: tags, electromagnetic data readers and a series of computational programmes.

When the tag passes through the external electronic reader, the data on the tag's memory are recovered and then transmitted. This memory consists in an integrated circuit or microchip and has the capacity to store a considerable amount of information, like in this case (Atkinson, 2004):

- Electronic code of a specific product;
- A product's reference code;
- Production data;
- Delivery dates;
- Expiration dates;
- Suppliers' information.

There exist numerous studies on possible companies' winnings in case they adopt RFID; in the same way, it is equally common to find out other studies that prove the fact that RFID has not yet presented results that reveal its implementation as a benefit. The reality is that the possible generated benefit will always be different between companies, even that they are in the same market segment. Like any other technology, its capacity to generate value is not exclusively relying on technical factors, but also on economical and organizational factors (Amitava *et al.*, 2007).

On the supply chain level, several activities have been being applied, from production, distribution, transportation and retail (Rutner *et al.*, 2004), being its improvements presented in the following table (Table 1).

**Table no. 1 – Advantages associated to RFID usage**

| User | Advantage |
|---|---|
| **Suppliers** | **Inventory**<br>• More information about the inventory (Smaros and Holmstrom, 2000);<br>• More effective decisions on replenishment (Singh, 2003);<br>• Decreasing inventory levels (Attaran, 2007).<br>**Operational**<br>• Increasing productivity (Attaran, 2007);<br>• Upgrade on the material/product movement tracing, which leads to a efficiency raising on order accomplishment (Jilovec, 2004);<br>• Higher quality and trust of the product (Attaran, 2007);<br>• Higher profit margins as a result of cost reduction (Prado *et al.*, 2006);<br>• Cost reduction on technical help (Prado *et al.*, 2006). |
| **Distributers** | **Inventory**<br>• More information on the inventory (quantity and tracing) (Amitava *et al.*, 2007);<br>• Loss reduction (Amitava *et al.*, 2007).<br>**Information**<br>• Less possibilities of inventory recount (A.T. Kearney, 2004);<br>• Data gathering efficiency (possibility to read multiple tags simultaneously and without requiring to manoeuvre articles to reach the line of sight) (Soon and Gutiérrez, 2008). |

| User | Advantage |
|---|---|
| | **Delivery**<br>• Better management of the storage and transportation channels (Attaran, 2007);<br>• Higher delivery precision levels (Attaran, 2007). |
| **Tenants** | **Service Level**<br>• Customer service improvement (Soon and Gutiérrez, 2008);<br>• Better identification of the target audience (Jones *et al.*, 2004);<br>• Easier identification of the clients' needs (Attaran, 2007);<br>• Better product display on the shelves (Attaran, 2007).<br>**Inventory**<br>• Improvements on obtaining consume data (Singh, 2003).<br>**Information**<br>• Faster data recollecting (Singh, 2003).<br>**Security**<br>• Theft decrease (Kinsella, 2003);<br>• Product veracity verification, which allows forgery discovery (Kinsella, 2003). |

Even though RFID is starting to be seen as promising and versatile technology, there also exist some disadvantages/limitations on adopting it:

- High hardware and software costs (Kwang *et al.*, 2010);
- Costs by applying tags on products (Smith and Konsynski, 2003);
- System installing costs (Smith and Konsynski, 2003);
- Costs on training and reorganizing the team (Smith and Konsynski, 2003);
- Resistance towards cooperation amongst the supply chain's different levels (Kwang *et al.*, 2010);
- Interference that may difficult the transmission between the tag and the reader (Kwang *et al.*, 2010);
- Lack of RFID professionals (Viehland and Wong, 2007);
- Consumers' privacy violation (Schindler, 2003);
- Lack of tag patterns on a world level (Vijayaraman and Osyh, 2006);
- The collected data are not standardized, which demands the implementation of a specific software that takes care of formatting (Smith, 2005);
- Possibility of having twisted tags due to the products' characteristics where they are applied on (Sellitto *et al.*, 2007);
- The range of products that reach extreme temperatures may damage the tag (Sellitto *et al.*, 2007).

***ii) Augmented Reality (AR)***

Through technological breakthroughs, society ownership numbers on smartphones and tablets keeps rising, which allows a generalised usage of AR systems. This system creates an environment where computer generated information are overlying to the user's vision of the real world (Chin *et al.*, 2013), in order to raise the information of a certain space, leading to a wider perception of the world (Vallino, 2002). AR technology supplies a mist of realities through overlying virtual objects on real environments (Azuma, 1997), thus allowing real time interaction between real environments and virtual models/objects in 2D and 3D.

In order to be able to visualize those objects it is necessary to recur to symbols that are generally associated to entities or to real world information (Kalkofen *et al.*, 2009).

In the following table (Table 2), there are several advantages presented, which are associated with each supply chain's level.

**Table no. 2 – Advantages associated with AR usage**

| User | Advantage |
|---|---|
| **Suppliers** | **Inventory**<br>• Mistake decrease, through the supply of more information on the inventory (Cirulis and Ginters, 2013).<br>**Operational**<br>• Higher interactive work and with less mistakes (Cirulis and Ginters, 2013);<br>• Better productive process (this is, assembly/disassembly instructions through animations, images or videos) (Novak-Marcincin *et al.*, 2013);<br>• Higher performance (user gets more focused) (Tang *et al.*, 2003);<br>• Possibility of visualizing modifications in an already existing product (Lu *et al.*, 1999);<br>• Cost reduction related with labour costs (Cirulis and Ginters, 2013). |
| **Distributers** | **Inventory**<br>• Upgrade on inventory information (locations) (Cirulis and Ginters, 2013);<br>• Quick identification on the packaged product (Ginters *et al.*, 2013).<br>**Information**<br>• Encourages human attention (through arrows, symbols, displaying objects and animations) (Tang *et al.*, 2003);<br>• A more efficient decision making process (Ginters *et al.*, 2013);<br>**Delivery**<br>• Better distribution planning (Lu *et al.*, 1999). |
| **Tenants** | **Service level**<br>• Better client-brand relationship (Owyang, 2010);<br>• Better product promotion (Woods, 2009);<br>• Higher client satisfaction, through provided experiences (Benjamin, 2009);<br>• Arouses the consumer's interest (Benjamin, 2009);<br>• Higher client loyalty rates (Fornell *et al.*, 1996);<br>• Quicker purchasing decision (Williams, 2006);<br>• Ability to test the product before its acquisition (Owyang, 2010);<br>• Client's ability to see through the product's package (Bulearca and Tamarjan, 2010). |

However, just like what happens with RFID, AR technology also presents some disadvantages/ limitations:

- Difficult social acceptance of technology – from ethical questions (glasses and gloves) to privacy issues (Krevelen and Poelman, 2010);
- The webcam has to see the marker clearly, wherefore a limited angle, excessive illumination and the camera's quality may cause several problems in the appearance of a 3D model (Ginters *et al.*, 2013).

## 4. METHODOLOGY

With the goal of relating the themes presented before with the entrepreneurial reality, it was recurred to a content analysis, which consists in a diversified set of methodological instruments, which are applicable to discourses, whose common factor is interference and deductive reason (Bardin, 1991). This methodology requires a research on the unsaid,

through an effort of interpretation between objectivity and subjectivity. With that being said, this sort of analysis was chosen due to the fact that it offers the possibility of researching the implicit assumptions (latent content) side by side with explicit declarations (manifested content) (Krippendorff, 2003). Besides, it is possible to analyse how investigators have approached and researched about certain areas (Peetz and Reams, 2011), as well as determine what in in vanguard, considered valuable or cherished by academics (Pedersen and Pitts, 2001).

However, there is a gap between theory and practice (Shapiro *et al.*, 2007), by which the adoption of study cases fills in such gaps. A study case is a qualitative method which is widely known by investigators (Yin, 1994) and it is particularly adequate to new research areas/fields or to certain areas where the existing theory appears to be insufficient (Benbasat *et al.*, 1987; Yin, 1994). The study case consists in a research strategy which results from the analysis of experimental cases that behold a certain profile in terms interest towards the investigation (Eisenhardt, 1989; Halinen and Törnroos, 2005), where questions focus on "how" or on "why" and the research strategy is quite comprehensive (Yin, 2005). The use of multiple study cases, rather than using a single case, allows a sample's maximum variation, being appropriated for analysis on market researches (Stokes and Perry 2005). Multiple study cases are always recommended when the study purpose is the description, the theory's construction, or to test the theory (Moon, 2008). As a matter of fact, multiple study cases allow general research results (Benbasat *et al.*, 1987), wherefore the present investigation focused in nine large corporations, highly representatives as far as this study is concerned, in order to provide information towards a deep analysis. With the purpose to build a theory about the competitiveness advantage upgrade through IT usage, it was recurred to a secondary data analysis obtained through media.

Bearing in mind that, actually, we live in a competitive environment and that companies need to gain competitiveness against their opponents, it was first attempted to analyse in which ways did the IT's constitute a tool capable of generating competitive advantage, whereas this section is organized as it follows: first, some cases were selected and study cases were analysed based in a wide variety of secondary sources; after that, it was tried to answer to the propositions formulated on Table 6 in order to obtain a deeper and wider knowledge on questions related with competitiveness and new technologies adoption.

Having said so, it was established the main investigation question:

*Do IT's contribute towards a competitiveness upgrade on organizations/supply chains?*

Through that investigation question, objectives and propositions were formulated and are find in the table below (Table 3).

**Table no. 3 – Objectives and investigation propositions**

| **Objectives** | **Propositions** |
|---|---|
| Analyse if IT's adoption allows to obtain advantages in terms of cost | P1. With the RFID there is a cost reduction in labour; |
| | P2. With AR there is a cost reduction in the productive processes; |
| Analyse if IT's adoption allows to obtain advantages in terms of time | P4. With RFID there is an inventory management improvement; |
| | P5. With AR there is a productive processes' upgrade; |
| Analyse if IT's adoption allows to obtain advantages in terms of service quality | P7. With RFID there is an easy identification of the clients' necessities; |
| | P8. With AR there is a customer satisfaction upgrade. |

### 4.1. Data Gathering towards Investigation

Since this investigation has as final purpose to understand in which way the adoption of new technologies does supports the achievement of competitive advantage against opponents, the companies' selection criteria were: i) position in the market; ii) used technological systems through the supply chain; iii) recognition for being success cases on what concerns the adoption of the abridged technologies. By bearing in mind such criteria, it is possible to understand in which way did technologies allowed improvements in several processes (e.g.: production, distribution and commercialization), that may be associated to success that the companies in question have in the world market. Besides, once there are not any restrictions on the dimension, country or activity field, it is possible to do a wider analysis and present conclusions on how technologies adapt in different realities. This way, the goal is not to offer a deeper vision of single companies' experiences, but to bring them together in order to obtain a wider vision and learn with study cases fusions (Seuring, 2009).

In order to reach the proposed goals, the data gathering for the study cases was made through secondary data analysis and based on a wide variety of sources, like journals, news, industrial reports, conference articles, white papers, press releases and specialized magazines (e.g.: *RFID Journal*, *Electronic Engineering Journal*).

## 5. CASE STUDIES

In order to answer the investigation question, motifs, advantages and the adopted technology's characteristics were analysed in nine companies located in different countries and continents, which allows a better understanding of technologies implementation all over the world. The difference among activity fields allows the achievement of a wider vision on the usage of each one of the various technologies, making this study more appealing and rich. Besides, every studied company has over 10.000 employees and have adopted an internationalization strategy with stores, factories and storages in several countries. In the following table (Table 4) it is presented the succinct profile of the nine multinational companies in study:

**Table no. 4 – Companies' profiling**

| Company Name | Characterization | Employees Total | Source |
|---|---|---|---|
| **Tesco** | Hiper and supermarket and convenience stores network | +500.000 | Tesco (2014) |
| **Inditex** | Clothing sector stores network | +125.000 | Inditex (2013) |
| **Air Liquide** | Cylinder gas producer and distributer | 50.000 | Air Liquide (2013) |
| **Lego** | Game pieces manufacturer | +10.000 | The Lego Group (2013) |
| **Mitsubishi Electric** | Air systems manufacturer | +124.000 | Mitsubishi Electric Corporation (2014) |
| **DHL Solutions** | Stock transporter / Logistic services | +475.000 | Deutsche Post DHL (2012) |

### 5.1. Radio Frequency Identification (RFID) Application

During the last decades, the business environment has suffered major changes, forcing the companies to increasingly recur to the use of new technologies as a way to obtain competitive advantage. Challenges are getting higher and higher for companies, as it is on stores and the necessity to efficiently replace their stock on shelves, customer service or even the management of the entire levels of the supply chain. In this context, RFID technology reveals to be a strong ally on making these processes more effective (Wamba and Boeck, 2008), allowing improvements on labour costs, inventory management and supply chain efficiency (Jones *et al.*, 2004). Bearing that in mind, it will be displayed the RFID supported contexts and operations (cost reductions, inventory and transportation management and customer service) in three companies: Tesco, Inditex and Air Liquide.

#### *5.1.1. Tesco's case*

Hiper and supermarket stores network, founded in 1919 on the United Kingdom, counting over 6.000 stores in the world (like China, USA and France) (Tesco, 2014). Tesco already counts with a team over 500.000 employees. Their areas of action go through food service, books, clothing, electronic devices, furniture, fuel, financial services, telecommunications, internet services, DVD rental and music downloads (Tesco, 2014).

Despite the good presented results, Tesco was forced to implement the RFID system in their stores in order to raise their sales and offer customer satisfaction service (IDTECHEX, 2013). After RFID's adoption, the obtained results were quite positive, thus allowing cost reductions, process simplifications, inventory loss decrease, among several other advantages specified in the following table (Table 5), which helped to maintain their leadership position in the UK (Thomas, 2004).

**Table no. 5 – RFID application in Tesco**

| | |
|---|---|
| **Adoption drivers** | • Customer satisfaction service (IDTECHEX, 2013);<br>• Sales growth (IDTECHEX, 2013). |
| **Advantages** | • Inventory reports submission to the employees, their location and movement, either in store or in the warehouse (Roberti, 2005);<br>• Sales maximization (IDTECHEX, 2013);<br>• Processes simplicity, resulting in labour cost reduction (IDTECHEX, 2013);<br>• Customer service upgrade –products' availability growth on 50% (Roberti, 2005);<br>• Less inventory losses (losses and thefts) (IDTECHEX, 2013). |
| **System characterization** | • Network technology that allows to control hundreds of antennas, contrasting with the conventional majority that may control from 4 to 8 antennas (IDTECHEX, 2013). |

#### *5.1.2. Inditex's case*

Inditex is one of the companies acting on the dressing business and it is world-wide known company. Inditex is composed by almost one hundred companies responsible by designing, production and distribution. This company was founded in Spain, in 1985, and actually has over 6.000 stores all over the world (Inditex, 2013). Its sale volume rounds 16.725 billion euros through brads like Zara, Zara Home, Pull&Bear, Massimo Dutti,

Bershka, Stradivarius, Oysho and Uterqüe (Inditex, 2013). Inditex is another example of a multinational who decided to adopt the RFID technology in order to improve their precision throughout the supply chain and to improve customer service. In fact, as it can be seen through Table 6, this group reached a series of advantages on several levels, mainly on customer service improvements and cost reductions.

**Table no. 6 – RFID application in Inditex**

| | |
|---|---|
| **Adoption drivers** | • Necessity of precision on every chain supply's levels (Inditex, 2014);<br>• Customer service improvement (Inditex, 2014). |
| **Advantages** | • Better work flow on distribution platforms, revealing a future cost reduction on labour (Inditex, 2014);<br>• Warnings issues towards employees on necessary clothing pieces for store replenishment, thus raising their availability (Inditex, 2014);<br>• During the merchandise unloading, the system immediately identifies the designs and sizes that need to be unloaded (Inditex, 2014<br>• Effective control of the entire inventory, both on stores and warehouses (inventory loss decrease) (Inditex, 2014);<br>• Simultaneous reading of several tags, which means a cost reduction on labour (Inditex, 2014);<br>• Customer service improvement – by soliciting a certain piece, the system verifies its availability either on the store or warehouse; in case the piece is not available in the warehouse, it's automatically located on the store's website or in any other store, being then sent to the store or to the customer's address (Inditex, 2014);<br>• Knowledge on the target audience and on their necessities through the definition of prevention plans (Inditex, 2014). |
| **System characteristics** | • RFID tags are put individually in each piece (Inditex, 2014);<br>The piece's ID is stored in each piece inside the safety alarm (Inditex, 2014);<br>• When the stock reaches the stores, the employee passes the reader that automatically updates the inventory (Inditex, 2014);<br>• RFID tags are 100% reusable and recyclable (Inditex, 2014). |

*5.1.3. Air Liquide's case*

Founded in France, in 1902, Air Liquide is actually the world leader in health gases and technologies (Air Liquide, 2013). Their services go through gas production and distribution to the final consumer. Air Liquide is now in eighty countries and employs over 50.000 people, having a sale volume rounding 29.000.000 euros (Air Liquide, 2013). After 9/11, this company felt the need to increase control of what is done on stock transportation, since the substances they work with are dangerous and may cause negative impacts in case of a security breach (Wasserman, 2005). With such a set, they chose to bet on the RFID implementation, which allowed them to make an effective trace of transportations and their inventories, as well as other advantages presented on the following table (Table 7).

**Table no. 7 – RFID application in Air Liquide**

| | |
|---|---|
| **Adoption reasons** | • Need to increase the safety issues on stock transportation: guarantee that dangerous substances are not accidentally or intentionally used, lost nor stolen (Wasserman, 2005);<br>• Cost reductions (IDTECHEX, 2013). |
| **Advantages** | • Transportation tracing: possibility to check the routes, times and stock delivery locations (Air Liquide, 2014);<br>• Inventories' control processes automation (location and quantity) (Air Liquide, 2014);<br>• Stock transportation control and safety, which translates in an inventory loss reduction (IDTECHEX, 2013);<br>• Easy information achievement (IDTECHEX, 2013);<br>• Labour cost reductions (IDTECHEX, 2013);<br>• Customer services – gas consume controls and automatic request of cylinder refills (IDTECHEX, 2013). |
| **System characteristics** | • The tag is put in each gas cylinder, by which they are read is made through readers (IDTECHEX, 2013). |

*5.1.4. Cross-companies analysis of RFID application*

The analysis of the three presented study cases allowed the RFID's impact evaluation on the companies' and their supply chains' competitiveness improvements, having as research propositions:

**P1. With RFID there is a labour cost reduction**

This technology allowed a cost reduction on what concerns labour related costs, once that it allows tag reading without the need to analyse the product itself, like in traditional code bars (Lee and Özalp, 2007). By allowing the reading of several tags simultaneously, RFID generates a works reduction, either by distributers and tenants (Lee and Özalp, 2007). According to Pisello (2004), on what concerns about distribution, labour cost reductions can be as significant as 30%, since for the tenants is inferior, placing itself around 17%. Consequently, A.T. Kearney (2004) corroborates these results demonstration that labour savings towards manufacturers place around 9% and around 7,5% for distributers and tenants.

According to the obtained information through a detailed analysis on Table 8, it is possible to verify that all the studied companies suffered labour cost reductions. This cost reductions occurred on the automation and simplification of several processes throughout the supply chain. With these results, it was obviously identified labour cost reductions, by which it can be claimed that the first proposition (P1) is not rejected.

**P4. With RFID there is an inventory management improvement**

Nowadays, companies have a large scale of inventory on shelves, which means that its management always needs to be done efficiently on order not to cause result contradictions. The non-accurate inventory phenomenon is defined by Kok and Shang (2005) as the mistakes that originated shifts on the physical inventory done in the end of each period. Atali and Lee (2006) consider that the problem on incorrect inventory registration occurs due to two fluxes: losses and transaction errors. RFID emerges as a powerful technology that solves inventory discrepancies mistakes (Heese, 2007), since it provides an inventory

transparency through localization and inventory quantities data sharing (McFarlane and Sheffi, 2003). By implementing this technology in distribution centres, received stock is compared to its purchase order, avoiding discrepancies and time losses since the inventory is automatically updated (Angeles, 2006).

Inventory management is strengthened with tags and readers, allowing to be programmed in a way that, in case of an inventory rupture, the information is automatically sent and places a replenishment order (Owunwanne and Goel, 2010). With RFID's adoption, it is possible to obtain a more precise prevision of stock necessity, thus forcing the administrative board to act more effectively and opportunely (Owunwanne and Goel, 2010

This inventory control reduces loss and fraud possibilities, which leads to an inventory direct reduction (Lee and Özalp, 2007).

Booth-Thomas (2003) claims that inventory reduction through RFID usage is placed between 10 to 13% throughout the supply chain. Also, A.T. Kearney (2004) estimates that tenants feel between an 8 to 12% reduction.

By analysing Table 8, it can be verified that all the abridged companies suffered an inventory management improvement, especially on issues related to inventory loss decrease and easy access to localization and quantity information on the inventory. With that being said, it can be claimed that the fourth proposition (P4) is not rejected.

**P7. With RFID there is an easy identification of the clients' necessities**

Through RFID, tenants are able to adapt to the needs of demand and improve the precision of future sales predictions (Curtin *et al.*, 2007; Kumar *et al.*, 2009). Market orientation suggests that companies should focus on customers and on competitive environment through the provided information and this way answering to market's necessities (Kohli and Jaworski, 1990). RFID is used by companies in order to understand the customer's behaviours and buying decisions (Owunwanne and Goel, 2010). With this technology, it is possible to narrow down the customers' focus and improve globally service quality: functional quality (how the product/service is delivered), technical quality (the delivered product's/service's quality) and the quality of the service's environment (the environment where the product/service is delivered) (Brady and Cronin, 2001).

Among the abridges companies, Inditex and Air Liquide where the ones that, after adopting the RFID technology, obtained positive results on identifying clients' needs and consumption information attainment (Table 8). Through these results, it may be claimed that the seventh proposition (P7) isn't rejected.

**Table no. 8 – Summary on the obtained advantages about RFID usage**

| | Tesco | Inditex | Air Liquide |
|---|---|---|---|
| More information on the inventory (location and quantity) | • | • | • |
| More effective replenishment decisions | | • | |
| Inventory loss decrease (losses and robberies) | • | • | • |
| Better product tracing (warehouse and stores) | • | | |
| Sales rising | • | | |
| Labour costs reduction | • | • | • |
| More information on transported stock | | • | • |
| More efficient data gathering | • | • | • |
| Stock/vehicles tracking | | | • |
| Higher levels on delivery's precision | | • | • |

| | Tesco | Inditex | Air Liquide |
|---|---|---|---|
| Customer support improvement | | • | • |
| Improvement on target-audience identification | | • | |
| Higher product availability | • | • | • |
| Easy identification of the customer's needs | | • | • |
| Consume information data improvement | | • | • |

### 5.2. Augmented Reality application

The way companies and society use technologies is on constant changing, being supported by the generalized adoption of new technologies, like the case of AR, that allows innovative and unique experiences to its users. With that being said, it is opened a path towards the development of solutions that allow to offer advantages to the entrepreneurial world, like it is with cost reductions, users' new experiences and productive processes improvements (Novak-Marcincin *et al.*, 2013). So, it will be analysed three different companies: Lego, Mitsubishi Electric and DHL Solutions, which already have this technology along their supply chain.

#### *5.2.1. Lego's case*

Being the third largest game manufacturer in the world, founded in 1932, in Denmark, it counts with 117 stores on 130 countries and over 10.000 employees (The Lego Group, 2013). Lego felt the necessity to provide the customers new experiences, so it adopted AR in order to demonstrate its product fully assembled (Metaio, 2013). Lego's bet went by two AR systems: the first was a mobile application, and the second was an interactive terminal. Through those systems, it was possible to increase its sales volume, positively increase buying decisions and among other advantages presented in Table 9.

**Table no. 9 – Lego's AR application**

| | |
|---|---|
| **Adoption drivers** | • Necessity to show the fully assembled product to the clients (Metaio, 2013). |
| **Advantages** | • Sales increase around 17% (on 2011) (Metaio, 2013);<br>• Positive influences on buying decisions (Metaio, 2013);<br>• Vision of the fully assembled product and with animations of the product inside the package, which increases the consumer's knowledge about the products and diminishing buying uncertainty (Venturebeat, 2010);<br>• Marking and unique experiences which involves consumers (Metaio, 2013). |
| **System characteristics** | Two systems usage:<br>• *Lego Connect* – Mobile application that every consumer, by looking through the catalogue, point their mobile devices to the printed page and obtain game related content, including information on the product, example model in 3D direct access to its online sale page (Vuforia, 2012);<br>• *Lego Digital Box* – Interactive terminal composed by a camera and a screen, where the consumer points his package to the camera and that reveals its content fully assembled in 3D (Venturebeat, 2010). |

*5.2.2. Mitsubishi Electric's case*

One of the main acclimatising and refrigerating systems manufacturer is Mitsubishi Electric, founded in 1921, in Japan. This company is composed by 110 branches in 39 countries and counting on over 124.000 employees (Mitsubishi Electric Corporation 2014). Mitsubishi Electric is another fine example of a multinational company who decided to adopt AR in order to reduce costs through catalogue printing or even by easily distributing them (Metaio, 2013; Lord, 2013). Through the analysis of Table 10, it can be seen that needs were rectified and still achieved other advantages, like productivity increase and error reduction on equipment repairs.

**Table no. 10 – Mitsubishi Electric's AR application**

| | |
|---|---|
| **Adoption drivers** | • Necessary cost reduction on marketing practices (Metaio, 2013);<br>• Difficulties on catalogues distribution to all salesman in order to guarantee recent and updated information (Lord, 2013);<br>• Sales volume maximization (Metaio, 2013);<br>• Need to show how the fully assembled product to the client (Lord, 2013). |
| **Advantages** | • Reduction on catalogues' printing costs (Metaio, 2013);<br>• Visual appeal and clients' experience increase (Lord, 2013);<br>• Cost reductions due to larger user performance (Metaio, 2013);<br>• Sales increase around dos 50 million euros (Metaio, 2013);<br>• Equipment maintenance/reparation support, which translates in an error reduction (Lord, 2013);<br>• Product visibility in 3D (Lord, 2013);<br>• Product promotion (Lord, 2013). |
| **System characteristics** | • Mobile application through which the technician points his own mobile device, doing an automatic recognition of the unit type he's using; the application then provides a potential maintenance scenarios list, detailing instructions with 3D animations which assist the technician repairing the device. Through this same application, the salesman is able to show how the equipment will be assembled on the desired place through 3D images (Lord, 2013). |

*5.2.3. DHL Solutions' case*

Leader on European land transportation, founded in 1969, in Germany, counting over 6.500 offices in over 220 countries, it counts with over 475.000 employees (Deutsche Post DHL, 2012). DHL Solutions offers numerous solutions for their customers, like in cargo transportation, storage and distribution and other solutions over its supply chain (Deutsche Post DHL, 2012). AR adoption was due mainly to the company's necessity to homogenate and improve their data system used all over the world, since there were several fails and divergences reported on what concerned data recollection (DHL, 2014). By adopting this system, DHL Solutions reached a vast quantity of information, which allowed advantages on cost reductions and operational efficiency increase, among others that are specified in Table 11.

**Table no. 11 – DHL Solutions' AR application**

| | |
|---|---|
| **Adoption drivers** | • Need to reduce time wastes (DHL, 2014);<br>• Need to detect errors (DHL, 2014);<br>• Necessity to ease and homogenate commercial documentation (DHL, 2014);<br>• Necessity to improve orders' transportation, thus creating adequate management (DHL, 2014);<br>• Necessity to raise quality control and reduce learning associated costs (DHL, 2014). |
| **Advantages** | • Orders' separation errors decrease (DHL, 2014);<br>• Reduction of time wasted on searching for orders (DHL, 2014);<br>• Virtual visualization of storage processes (DHL, 2014);<br>• Visualization of virtually overlapped modifications for measurement adjustments (DHL, 2014);<br>• Storage costs reduction (DHL, 2014);<br>• Cost reductions on planning processes (DHL, 2014);<br>• Automatic registration and confirmation when the delivery service is completed (DHL, 2014);<br>• Foreign packages' tags immediate translation or of commercial terms (DHL, 2014);<br>• Extra information (content, destination and weight) and handling instructions attainment on every single palette (DHL, 2014);<br>• Assembling or repairing instructions visualization in 3D, meaning an error reduction (DHL, 2014);<br>• Customer support on determining the packaging type, which meant a better relationship with the customers (DHL, 2014). |
| **System characteristics** | Assembly and repair:<br>• Hands-free devices (glasses) use, which show 3D virtual pictures that support specific tasks (DHL, 2014);<br>Orders' separation:<br>• AR readers that, by pointing to a certain object/code, present detailed information on the order (DHL, 2014).<br>Customer service:<br>• AR application for mobile devices, that helps consumers determining the package type that best fits to the goods for ship (DHL, 2014). |

*5.2.4. Cross-companies analysis on Augmented Reality application*

Through information gathering and consequent analysis on companies who recur to AR, it was intended to check the veracity of the following four propositions:

**P2. With AR there is a cost reduction in the productive processes**

The results visualization possibility has been being a widely discussed topic over all activity sectors, since it allows errors reduction, translating into costs reduction (Cirulis and Ginters, 2013). By generating results, there is any kind of psychological distress, which could cause additional errors (Ginters and Martin-Gutierrez, 2013).

Through the analysis of information on Table 12, it is verified that Mitsubishi Electric and DHL Solutions obtained costs reduction through productive processes improvements. This costs reduction was mainly due to essential information sharing that assures perfect

development of every processes. With that being said, it can be claimed that the second proposition (P2) is not rejected.

**P5. With AR there is a productive processes' upgrade**

Each time is more important to develop manual skills in order to allow tools manipulation and getting to know component positioning (Gilchrist and Gruber, 1984). Sharing these manual skills is particularly important to support businesses related in production, development and/or product maintenance (Fox *et al.*, 2011).

Nowadays, manual skills are inherited through interaction between people: one that disposes those skills (this is, the instructor) and the other that needs to learn those skills (this is, the learner/tutor) (Fox *et al.*, 2011).. However, sometimes it is hard to find available people that possess such skills (Katz, 2008) and that are available to share their knowledge in the pretended place (Fox *et al.*, 2011). In order to minimize knowledge sharing difficulties, which means a productive processes improvement, AR appears as an innovative way to communicate visual information, like charts, texts or work demonstrations (Fox *et al.*, 2011)., being the best solution to share manual skills , which allows time saving (Boud *et al.*, 1999). For example, AR allows learners to see their own movements at the same time they see a 3D movement model that should be executed (Fox *et al.*, 2011)., without requiring the presence of an instructor (Sielhorst *et al.*, 2005).

After analysing Table 12, it can be seen that both Mitsubishi Electric and DHL Solutions experienced improvements on productive processes (this is, error reduction, extra information sharing and better users' performance), by which it can be claimed that the fifth proposition (P5) is not rejected.

**P8. With AR there is a customer satisfaction upgrade**

Benefits associated to AR usage have been generating some controversy due to the fact that initially this technology was seen as products/services promotion tool (Woods, 2009) and, now, it is being considered as a way to contribute towards a positive relation between brand and clients (Owyang, 2010) and customer satisfaction through the creation of experiences of value (Chou, 2009; Yuan and Wu, 2008). Like it is defined by Yuan and Wu (2008) and Schmitt (1999), AR usage can be seen as a way to create experiences that are not exclusively focused on the product's/service's commercialization, but also on experiences created for customers.

Experiences' marketing importance goes through the capacity to create value towards the final consumer (Pine and Gilmore, 1998), forcing companies to become externally competitive (Prahalad and Ramaswamy, 2000), as it can also motivate clients having quicker and positive buying decisions (Williams, 2006). Towards a better understanding of this thematic, numerous quantitative studies were studied, namely by Chou (2009), Yuan and Wu (2008), who ended up demonstrating that experimental value can be translated into customers' satisfaction. Customers' satisfaction can be seen from two different perspectives: specific transaction aspects and cumulative aspects (Johnson *et al.*, 2002). Specific transaction aspects refer to the value that customers give after a determined transaction, while cumulative aspects include the customers' full experience with products/services of a determined company and on the entire phases of the purchase process (Patterson and Spreng, 1997; Fornell, 1992). By occurring on all phases of the purchase process and due to the fact that AR mainly works on a pre-buying phase – since in this phase the customer evaluates the choices before he makes a buying decision (Fill, 2009) –, this technology

allows to put the product on the users' hands (Woods, 2009), offering them the opportunity to test the product as if they already have it, attracting them to buy the product in question (Owyang, 2010).

On what concerns the clients' satisfaction improvements, the obtained results were positive to all three companies, since the all offered the possibility to the clients to visualize/test the product, thus improving their relationship with the customer (Table 12). With that being said, it can be claimed that the eighth proposition (P8) is not rejected.

**Table no. 12 – Advantages reached through AR application**

| | Lego | Mitsubishi Electric | DHL |
|---|---|---|---|
| Error decrease | | • | • |
| Extra information share (instructions) | | • | • |
| Visualization of virtual modifications on a real object | | | • |
| Users' highest performance | | • | |
| Cost reductions on productive processes | | • | • |
| Cost reductions on advertisement | | • | |
| Possibility to get more information | | | • |
| Error decrease | | | • |
| Possibility to visualize/test the packaged product | • | • | • |
| Quicker buying decisions | • | | |
| Allows customers' experiences | • | • | |
| Sales rising | • | • | |

## 6. CONCLUSIONS

With globalisation's emergence, companies are increasingly under great challenges, forcing them to operate effective and efficiently in order to guarantee survival on competitive environment. Companies nowadays are branded by consumption general increase and the appearance of new products with shorter lifecycles, as well as they're affected by consumers' profile changes, finding them more and more demanding.

Facing such reality, all companies desire to differentiate from their competition in order to emphasize the position in the market. Logistics comes up as a nuclear tool to help companies to acquire that so much ambitioned and desired position of power in comparison to their opponents. The concept of logistics evolved through time and assumes every time more a nuclear role on companies due to their great capacity to answer to the markets' constant fluctuation. Supply chain is a concept that is initially related with logistics. Due to the globalisation phenomena, the complexity level of supply chains has been rising, what means a greater difficulty for companies to efficiently manage a complex entities network that may be geographically distant, which makes trades and flow management being something difficult financially, informatively and physically. It is through the supply chain that companies are able to manage and structure easily the relationships with their partners, reaching competitive advantage.

So, competitive advantage is obtained through strengthening every activities' being inside the company's value chain, from production to commercialization, making possible to position the company and create a base of values that distinguishes it from its opponents.

Within this need of competitive advantage winnings/maintenance, IT's revealed as a tool to attain a competitive differential between companies, being considered as a vehicle

that allows improvements on inventory management, customers' relationship and satisfaction and even costs reduction. This way, IT's should be present supply chain's levels, since they are considered resources capable of providing a superior value to the company, facing a dynamic market.

With that being said, this study has searched to identify conceptually the influence that several IT's, like RFID and AR, had on companies'/supply chains' competitiveness improvement. For that, several investigation propositions were raised through study cases' and secondary sources analysis, in order to analyse the felted impacts.

The main results show that through IT's adoption it is possible to reach improvements on costs reduction, time and service quality improvements. In that sense, the analysed companies on RFID usage achieved: i) cost reductions through processes improvement, as in automation; ii) time reductions on inventory management improvements, inventory loss decrease and stock location easiness; iii) service quality improvements through customers' satisfaction raise, thanks to a better identification on the clients' needs.

As far as AR technology is concerned, the companies reached: i) costs and time reductions on productive processes as a result of error decrease with extra information sharing throughout employees; ii) customers' satisfaction improvement, originated by a better relationship brand-customer, product promotion improvement and consumers' new experiences potentiation.

Since the adopted methodology in this study focuses on secondary sources' data use (e.g.: specialized journals, magazines and scientific articles) makes the results being influenced by the available information, it can mean a limitation. So, the results presented in this study are limited in the way that specific variables of organizational contingency are not controlled.

For future lines of investigation/research, it would be interesting to complete this study with an analysis to other fashionable technologies, either for companies, either for society in general, as it is on *Near Field Communication* (NFC) and *Natural User Interfaces* (NUI). This way, it would be possible to provide more information to companies about technologies that may supply some of their flaws and help them compete in an increasingly competitive environment. From another point of view, towards a better understanding of IT's impacts on different entrepreneurial realities would be beneficial to develop studies on companies that reveal a minor dimension when opposed to these studied ones, as well as on national companies.

Since this study only focused on a perspective of how IT's grant competitive advantage winnings against opponents, it would make sense to be developed a research on performances which includes productive cycle's time and costs reductions and quality improvement as indicators.

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